# The Kentucky Building Code

Second Edition
1983

**James R. Smith**
*Editor, Kentucky Edition*

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**KENTUCKY DEPARTMENT OF HOUSING**

**The 127 Building—U.S. 127 South**
**Frankfort, Kentucky 40601**
**Telephone (502) 564-8090**

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1983

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# EFFECTIVE DATES

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On February 15, 1980 the *Kentucky Building Code* became mandatorily effective for all buildings in Kentucky in excess of three stories; or in excess of 20,000 square feet; or intended for assembly, educational, institutional, or high hazard occupancy; or business or industrial occupancy in excess of 100 persons; or for use as a frozen food locker plant.

The *Kentucky Building Code* became mandatorily effective for other buildings on a county wide basis on the following schedule:

## February 15, 1980

Boyd, Campbell, Daviess, Fayette, Franklin, Jefferson, Kenton, McCracken and Warren.

## August 15, 1981

Allen, Anderson, Barren, Bath, Bell, Boone, Bourbon, Boyle, Bracken, Breathitt, Bullitt, Caldwell, Calloway, Carroll, Carter, Christian, Clark, Clay, Crittenden, Estill, Fleming, Floyd, Fulton, Gallatin, Graves, Grayson, Greenup, Hardin, Harlan, Harrison, Henderson, Henry, Hopkins, Jessamine, Johnson, Knox, Larue, Laurel, Letcher, Lewis, Logan, Madison, Magoffin, Marshall, Marion, Mason, Mercer, Montgomery, Muhlenberg, Nelson, Nicholas, Oldham, Pendleton, Perry, Pike, Powell, Pulaski, Robertson, Rowan, Scott, Shelby, Simpson, Taylor, Todd, Union, Washington, Wayne, Webster, Whitley, Woodford.

## August 15, 1982

Adair, Ballard, Breckinridge, Butler, Carlisle, Casey, Clinton, Cumberland, Edmonson, Elliott, Garrard, Grant, Green, Hancock, Hart, Hickman, Jackson, Knott, Lawrence, Lee, Leslie, Lincoln, Livingston, Lyon, McCreary, McLean, Martin, Menifee, Meade, Metcalfe, Monroe, Morgan, Ohio, Owen, Owsley, Rockcastle, Russell, Spencer, Trigg, Trimble and Wolfe.

Any local government may extend the *Kentucky Building Code* coverage to include single family dwellings within its jurisdiction.

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# PREFACE

The *Kentucky Building Code* is essentially the *BOCA Basic Building Code* published by the Building Officials and Code Administrators, International, Inc., with a new administrative section written to conform with Kentucky law and other selective additions, deletions or changes.

The *Kentucky Building Code* includes the State Plumbing Code which is reprinted herein as Article 22. It includes the *National Electrical Code,* 1981 Edition, NFiPA #70, published by the National Fire Protection Association, 470 Atlantic Avenue, Boston, Massachusetts 02210. It also includes the *BOCA Energy Code/1981.* These latter publications are not included herein because of their bulk and specialized use. However, they are readily available from their publishers.

The *Kentucky Building Code* states regulations in terms of measured performance rather than in rigid specification of materials and, in this way, makes possible the acceptance of new materials and methods of construction which can be evaluated by accepted standards, without the necessity of adopting cumbersome amendments for each variable condition.

By presenting the purposes to be accomplished rather than the method to be followed, the code allows the designer the widest possible freedom and does not hamper development. It accepts nationally recognized standards as the criteria for evaluation of minimum safe practice, or for determining the performance of materials or systems of construction. The application of these standards is stated in the text of the code requirements, and the standards are listed and identified in the appendices of the code, making it practical and convenient to update any standard as it is revised or reissued by the sponsoring agency.

This edition presents the code as amended through November 30, 1982.

This code may be amended by proposals to the Kentucky Board of Housing, Buildings and Construction by code enforcement officials, industry and design professionals, and other interested persons and organizations. Changes are discussed in an open meeting of the board. Changes approved are printed in the Kentucky Administrative Register and forwarded to the BOCA organization for inclusion in their mailings to BOCA's Kentucky members.

This edition of the *Kentucky Building Code* includes a comprehensive change in the format and structure of the various articles of requirements. Article 2 has been separated into three articles, Article 7 into two and Article 8 into three, for a total of 25 articles. These changes were made to parallel the changes made in the 1981 *BOCA Basic Building Code* and enable the *Kentucky Building Code* users to most easily avail themselves of the various BOCA organization services.

The table following this preface will assist those using the code in quickly locating articles and sections where numbering has been changed.

# Article Numbering Changes in 1981 Edition

| 1978 Article or Section | 1981 Article |
|---|---|
| **Article 1**<br>Administration and Enforcement | **Article 1**<br>No Change |
| **Article 2**<br>Definitions and Classifications | **Article 2**<br>Definitions |
| (Sections 202-213) | **Article 3**<br>Use Group Classification |
| (Sections 214-218) | **Article 4**<br>Type of Construction Classification |
| **Article 3**<br>General Building Limitations | **Article 5**<br>No Change |
| **Article 4**<br>Special Use and Occupancy Requirements | **Article 6**<br>No Change |
| **Article 5**<br>Light, Ventilation and Sound Transmission control | **Article 7**<br>No Change |
| **Article 6**<br>Means of Egress | **Article 8**<br>No Change |
| **Article 7**<br>Structural and Foundation Loads and Stresses | **Article 9**<br>Structural Loads and Stresses |
| (Sections 720-742) | **Article 10**<br>Foundation Systems |
| **Article 8A**<br>Materials and Tests | **Article 11**<br>No Change |
| **Article 8B**<br>Steel, Masonry, Concrete, Gypsum and Lumber Construction | **Article 12**<br>No Change |
| **Article 8C**<br>Building Enclosures, Walls and Wall Thickness | **Article 13**<br>No Change |
| **Articles 9-20** | **Articles 14-25** (respectively)<br>No Change |

# Note to Kentucky Building Code Users

Double vertical lines have been added in the margins adjacent to all passages of the code text which are changed from the original text of the *BOCA Basic Building Code/1981.*

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# ARTICLE 1

## ADMINISTRATION AND ENFORCEMENT OF THE KENTUCKY BUILDING CODE

Department of Housing, Buildings and Construction

### SECTION 101.0 DEFINITIONS

(1) **Board of Housing** or "Board" means the Kentucky Board of Housing, Buildings and Construction.

(2) **BOCA** means Building Officials and Code Administrators International, Inc.

(3) **Building** means any combination of materials, whether portable or fixed, which comprises a structure or non-mine underground area affording facilities or shelter for any human occupancy, whether infrequent or regular. The word "building" shall be construed wherever used herein as if followed by the words "or part or parts thereof and all equipment therein" unless the context clearly requires a different meaning. "Building" shall also mean swimming pools constructed below grade on site, but not swimming pools assembled above grade on site. "Building" shall not mean a mobile home, or a farm dwelling or other farm buildings and structures incident to the operation and maintenance of the farm if such farm structures are located outside the boundary of a municipality and are not used in the business of retail trade or used as a place of regular employment for ten or more people or structures used in the storage or processing of timber products.

(4) **Commissioner** means the Commissioner of the Department of Housing, Buildings and Construction.

(5) **Department** means the Department of Housing, Buildings and Construction.

(6) **Fire official** means the Chief of the Fire Department or of the Fire Prevention Bureau, or if there is not a jurisdictional fire department or fire prevention bureau, such officer as shall be designated by the appointing authority of the jurisdiction or his duly appointed representative, to enforce the provisions of KRS 227.300 and 815 KAR 10:020.

(7) **Industrialized building system** or "building system" means a structure or component thereof which is wholly or in substantial part fabricated in an off site manufacturing facility for installation or assembly on a permanent foundation at a building site in Kentucky. "Industrialized building system" includes a building of any size or for any use, all or any component part of which is of closed construction made from precast concrete panels, or precut wood sections fabricated to individual specifications in an off site manufacturing facility, and assembled in accordance with the manufacturer's instructions.

(8) **KAR** means Kentucky Administrative Regulations.

(9) **KBC** means Kentucky Building Code.

(10) **KRS** means Kentucky Revised Statutes.

(11) **Major structural change** means alterations or repairs made within any period of 12 months, costing in excess of 50 percent of the physical value of the structure, as determined by a comparison of the BOCA chart of constructions costs and the value of the structure as established by the tax records of the county in which the property is located.

(12) **Person** means a person, partnership, corporation or other legal entity.

(13) **Single family dwelling** means one unit providing complete independent living facilities for one or more persons including permanent provisions for living, sleeping, eating, cooking and sanitation, and which is not connected to any other unit or buildings.

(14) **Trade or brand name house** means any single structure made of precut or prefabricated panels, sections or individual pieces that are sold or prefabricated under a name that identifies both the manufacturer and a particular type of structure he makes, and that are assembled on a permanent foundation by conventional homebuilding and electrical and plumbing installation techniques.

## SECTION 102.0 SCOPE

This regulation shall supersede any and all other conflicting administration and enforcement provisions which may be incorporated by reference within the KBC.

(1) The KBC shall control all matters concerning the construction, alteration, addition, remodeling, use and occupancy classifications of all buildings in the state.

(2) Trade or brand name houses shall be constructed in accordance with the applicable provisions of the KBC.

(3) The provisions of the KBC relating to single family dwellings, that are

not trade or brand name houses or industrialized building systems, shall be mandatory only after a local government, by ordinance, extends the application of the KBC to those units. However, the State Plumbing Code and the National Electrical Code shall be applicable to these units, whether or not the local government passes an ordinance. A local government may not enforce any building code other than the KBC on such units.

(4) Unless otherwise specifically provided within the KBC, all references to article or section numbers, or to provisions not specifically identified by number, shall be construed to refer to such article, section or provision of the KBC.

(5) Nothing in the KBC shall require historic buildings listed on the state or federal register to conform to new buildings requirements because of their restoration.

(6) The KBC shall be construed to secure its expressed intent which is to secure public safety, health and welfare insofar as they are affected by building construction quality, electrical systems, plumbing, energy, boiler, safety, handicapped accessibility, life safety from hazards of fire and explosion and other disasters. It is the further expressed intent of this code to avoid duplicative plan review and inspection of new construction and to gather together in one set of regulations all the requirements relating to the construction of buildings in the state to enable builders, owners and building officials to be adequately informed.

## SECTION 103.0 APPLICABILITY

(1) The provisions of the KBC shall cover all matters affecting or relating to buildings, and structures, as set forth in Section 102.0 above.

(2) No person shall construct a building or structure, extend, repair, remove or alter in violation of these provisions, except for ordinary repairs as identified in Section 104.0 and except further that the raising, lowering, or moving of a building or structure as a unit necessitated by a change in legal grade or widening of a street shall be permitted provided the building or structure is not otherwise altered or its use or occupancy changed.

(3) Any requirement for structural, fire or sanitary safety of a building essential for the safety of the occupants thereof, and which is not specifically covered by this code, shall be determined by other regulations of the department or other applicable law.

(4) Any person who violates any provision of the article or any other provision of the Kentucky Building Code shall be subject to the penalties provided in Section 119.0.

## SECTION 104.0 ORDINARY REPAIRS

Ordinary repairs to structures may be made without application to the building official. Ordinary repair means any nonstructural reconstruction or renewal of any part of an existing building for the purpose of its maintenance, or decoration, and shall include, but not be limited to, the replacement or

installation of non-structural components of the building such as roofing, siding, windows, storm windows, insulation, drywall or lath and plaster, or any other replacement, in kind, that does not alter the structural integrity, alter the occupancy or use of the building, or affect, by re-arrangement, exitways and means of egress; but shall not include additions to, or alteration of, or relocation of any standpipe, water supply, sewer, drainage, gas, soil, waste, vent or similar piping, electric wiring or mechanical equipment including furnaces and hot water heaters or other work affecting public health or safety.

## SECTION 105.0 INSTALLATION OF SERVICE EQUIPMENT

When the installation, extension, alteration or repair of an elevator, moving stairway, mechanical equipment, refrigeration, air conditioning or ventilating apparatus, plumbing, gas piping, electrical wiring, heating system or other equipment is specifically controlled by the provisions of this code, it shall be unlawful to use such equipment until a certificate of approval has been issued therefor by the building official or other agency having jurisdiction.

## SECTION 106.0 EXISTING STRUCTURES

(1) The legal use and occupancy of any structure existing on the effective day of this code or for which it had been heretofore approved, may be continued without change, except as may be specified in this regulation.

(2) Existing structures, when altered or repaired, as specified in this section, shall be made to conform with the requirements of the KBC for new structures, only to the extent provided herein.

(3) Alterations: All alterations, repairs, and additions, except those "ordinary repairs" as defined in Section 104.0, shall be made in accordance with the terms of the KBC for new structures.

(4) Remodeling: Any major structural change, or a change to a more restrictive use group shall cause the entire building to be brought into conformity with the KBC requirements for new structures. However, the building official exercising his sole discretion may issue an occupancy certificate with such restrictions as he deems necessary when the building official agrees with the certification of a licensed Kentucky architect or engineer that in his professional judgment the structure adequately meets the intent of the requirements of this code for the new use, and that the change does not result in any greater hazard to public or occupant safety.

(5) Increase in size: If the building is increased in floor area or number of stories, the entire structure shall be made to conform with the requirements of the KBC in respect to life safety.

(6) Part change in use: If a portion of the structure is changed to a new more restrictive use group, and that portion is separated from the remainder of the structure with the required vertical and horizontal fire separation assemblies, it shall be made to conform to the requirements for the new use and occupancy and the existing portion shall not be subjected to the requirements of the KBC relating to new structures.

## SECTION 107.0 DEPARTMENTS OF BUILDING INSPECTION

(1) Each local government singularly or by association with other local governments shall employ a building official or inspector and other code enforcement personnel as necessary to enforce this code within its jurisdiction. The department shall be responsible for the enforcement of this code as it pertains to the buildings assigned by law to it.

(2) All building officials shall be appointed by the chief appointing authority for the respective jurisdiction, and shall meet the qualifications for the position.

(3) Official records shall be kept of all business and activities of the various local building departments or state building departments specified in provisions of the KBC, and all such records shall be open to the public inspection at all appropriate times under the terms and conditions of KRS Chapter 61.

## SECTION 108.0 DUTIES AND POWERS OF THE BUILDING OFFICIAL

The local government shall designate the persons to be charged with the responsbilitity of enforcing the KBC within its community and it shall neither adopt nor enforce any ordinance regulating buildings which conflicts with the KBC. The local building official shall be responsible for the examination and approval of plans and specifications for the following buildings:

(1) All buildings classified as storage, residential, miscellaneous and/or temporary occupancies so long as they do not exceed three stories in height or 20,000 square feet of floor area.

(2) All buildings classified as assembly, business or mercantile occupancies having a capacity which does not exceed 100 persons.

(3) All churches having a capacity of 400 or less persons and 6,000 or less square feet of total floor area.

(4) All buildings classified as factory or industrial occupancies having a capacity which does not exceed 100 persons.

## SECTION 109.0 DUTIES AND POWERS OF THE DEPARTMENT

(1) It shall be the responsbiliity of the department to review plans and specifications, issue permits and to determine compliance with the KBC for the following buildings:

(a) All buildings classified as assembly occupancies having a capacity in excess of 100 persons, except churches having a capacity of 400 or less persons and 6,000 or less square feet of total floor area;

(b) All buildings classified as educational occupancies;

(c) All buildings classified as institutional occupancies;

(d) All buildings classified as business and mercantile occupancies having a capacity in excess of 100 persons;

(e) All buildings classified as industrial and factory occupancies having a capacity in excess of 100 persons;

(f) All frozen food locker plants;

(g) All buildings classified as high hazard occupancies;

(h) All other buildings containing in excess of three stories or 20,000 square feet of floor area;

(i) All industrialized building systems regardless of occupancy classification.

(2) Any local government may petition to the department for additional plan review responsbility. Such petition shall include the evidence of the local government's capability to perform those functions, as required by regulations of the board. Denials of such petitions are appealable to the board.

(3) The appropriate official shall make all the required inspections, or he may accept reports of inspection by authoritative and recognized services or individuals; and all reports of such inspection shall be in writing and certified by a responsible officer of such authoritative service or by the responsible individual.

(4) The building official or his authorized representative should carry proper credentials of his respective office for the purpose of inspecting buildings and premises and the performance of his duty under this code.

(5) The board shall have the powers as may be necessary in the interest of public safety, health and general welfare, to adopt and promulgate amendments to the code and other rules and regulations which are necessary to implement this code and by means of the appeals board procedures, to issue interpretations which shall be binding upon the appellant and the building official. The building official shall implement the provisions of this code to secure the intent thereof.

(6) In the absence of provisions not specifically contained in this code or approved rules and orders, the regulations, specifications and standards listed in Appendix A, Referenced Standards and Appendix B, Related Standards, shall be deemed to represent accepted engineering practice with respect to the materials, equipment, systems or methods of construction therein specified, and shall therefore be acceptable.

## SECTION 110.0 NEW MATERIALS AND MODIFICATIONS

(1) It is the purpose of the KBC to set forth performance objectives so as to facilitate new technologies, techniques and materials; therefore, alternate materials and equipment may be used, provided such an alternative has been tested and listed by nationally recognized testing and research laboratories approved by the board.

(2) The building official may accept as supporting data to assist him in his determinations duly authenticated research reports from BOCA or from other approved authenticated sources, for all materials or assemblies proposed for use which are not specifically provided for in the KBC.

(3) Used materials, equipment and devices may be used provided they have been retested and placed in good and proper working condition and approved by the building official.

(4) When there are practical difficulties involved in carrying out structural or mechanical provisions of this code or of an approved rule, the building official having plan review responsbility may vary or modify such provision upon application of the owner or his representative only if the spirit and intent of the law shall be observed and equivalent safeguards provided. The application for modification and the final decision of the building official shall be in writing. When a modification is granted by a local building official, a copy of the application and the decision shall be forwarded to the department and the local fire official.

(5) The board may withdraw authority for plan review from a local building department where it finds, upon petition of the department, that the local

inspection agency is not adequately performing any portion of its program and thereafter, allow the department to preempt that portion of a local program.

## SECTION 111.0 INSPECTIONS

(1) Before issuing a permit, the appropriate building officials may examine or cause to be examined all buildings, structures and sites for which an application has been filed for a permit required by this code. No construction shall begin on buildings covered by this regulation until a local building official has issued a permit for such construction or if there is no local official, an official representing the department has issued a plans approval letter if the department has plan review responsibility.

(2) After issuing a building permit or letter for a building over which he has plan review responsibility, the building official shall conduct inspections from time to time during and upon completion of work and he shall maintain a record of all such examinations and inspections and of all violations of the KBC. The building official shall cooperate with the fire official by allowing him to inspect all buildings during construction. Any recommendations made by the fire official relating to fire safety in construction of a building shall be considered by the building official and if a certificate of occupancy is issued contrary to said written recommendations, the building official shall give written notification of his decision to the fire official and the department at once.

(3) The building official may accept reports of approved inspection services which satisfy the requirements of the appropriate governmental entity.

(4) Inspections for KBC compliance of trade or brand name homes shall be the responsibility of the local building official.

(5) In-plant inspections in production and manufacturing facilities for industrialized building systems as well as on-site inspection shall be conducted by the department or its authorized agent pursuant to 815 KAR 7:020. The local building official shall be responsible to inspect such systems only for location under applicable local ordinances.

(6) Upon completion of the building, the owner or agent of the facility shall request a final inspection. The building official shall set a time for said inspection and notify the owner or agent and the fire official. If compliance with the approved plans and permit has been achieved, a certificate of occupancy shall be issued, as described in Section 117.0. If compliance has not been achieved, any violations shall be noted and immediately communicated to the owner or agent.

## SECTION 112.0 RIGHT OF ENTRY

Applicants for building permits shall be deemed to consent to inspection during construction and upon completion of construction for the purpose of determining that such building is constructed in compliance with the Kentucky Building Code, and the inspector may enter upon the premises during any reasonable hour.

## SECTION 113.0 APPLICATION FOR PERMIT REQUIRED

(1) It shall be unlawful to construct, enlarge, or alter a structure; or change the type of occupancy of a building requiring greater strength, exiting or sanitary provisions; or to change to another use; or to install or alter any equipment for which provision is made or the installation of which is required by KBC, without first filing an application with the appropriate building official in writing and obtaining the required permit or letter therefore; except that ordinary repairs, as defined in Section 104.0 which do not involve any violation of KBC, shall be exempt from this provision.

(2) The application for a permit shall be submitted in writing and in such form as the department may prescribe and shall be accompanied by the required fee.

(3) The application shall contain a general description of the proposed work, its location, the use and occupancy of all parts of the building or structure and of all portions of the site or lot not covered by the building or structure, and such additional information as may be required by the building official.

(4) Application for permit shall be made by the owner or lessee of the building or structure, or agent of either, or by the licensed engineer or architect employed in connection with the proposed work. If the application is made by a person other than the owner in fee, it shall be accompanied by a duly verified affidavit of the owner, or the qualified person making the application, that the proposed work is authorized by the owner in fee and that the applicant is authorized to make such application. The full names and addresses of the owner, lessee, applicant and of the responsible officers, if the owner or lessee is a corporate body, shall be stated in the application.

(5) The application for the permit shall be accompanied by not less than two copies of specifications and of plans drawn to scale, with sufficient clarity and detail dimensions to show the nature and character of the work to be performed. The building official shall cooperate with the fire official by allowing the fire official to review all plans. Any recommendations made by the fire official relating to fire safety in construction of a building shall be considered by the building official and he shall report his decision to the fire official at once. When quality of materials is essential for conformity to the KBC, specific information shall be given to establish such quality; and the KBC shall not be cited, or the term "legal" or its equivalent be used, as a substitute for specific information. The building official may waive the requirement for filing plans when the work involved is of a minor nature.

(6) Site plan: there shall also be a site plan showing to scale the size and location of all new construction and all existing structures on the site, distances from lot grades; and it shall be drawn in accordance with an accurate boundary line survey.

(7) Engineering details: the building official may require adequate details of structural, mechanical and electrical work including computations, stress diagrams and other essential technical data to be filed. All engineering plans

and computations shall bear the signature of the responsible design professional. Plans for buildings more than two stories in height shall indicate how required structural and fireresistance rating integrity will be maintained, and where a penetration will be made for electrical, mechanical, plumbing and communication conduits, pipes and systems.

(8) An application for permit for any proposed work should be deemed to have been abandoned six months after date of filing, unless such application has been diligently prosecuted or a permit shall have been issued; except that for reasonable cause, the building official may grant one or more extensions of time for additional periods not exceeding 90 days each.

(9) Subject to the limitations of Section 113.0, amendments to a plan, application or other records accompanying the same, may be filed at any time before completion of the work for which the permit is sought or issued and such amendments shall be deemed a part of the original application and shall be filed therewith.

(10) The building official may revoke a permit or approval issued under the KBC in case of any false statements or misrepresentation in the application or on the plans.

## SECTION 114.0 PERMIT REQUIRED

(1) The building official shall examine or cause to be examined all applications for permits and amendments thereto within a reasonable time after filing. If the application or the plans do not conform to the requirements of all pertinent laws, he shall reject such application in writing, stating the reasons therefor. If he finds that the proposed work conforms to the requirements of this code and all laws and ordinances applicable thereto, he shall issue a permit therefor as soon as practicable.

(2) Any permit issued shall become invalid if the authorized work is not commenced within one year after issuance of the permit, or if the authorized work is suspended or abandoned for a period of six months after the time of commencing the work.

(3) The KBC shall not require changes in the plans, construction or designated use of a building for which a lawful permit has been heretofore issued or otherwise lawfully authorized by approved plans, so long as the substantial construction on the project has commenced within one year from the date the permit was issued.

(4) The building official shall attach his signature to every permit, or he may authorize a subordinate to affix such signature thereto.

(5) The building official shall record and communicate to the owner or agent the terms and conditions related to his approval to commence construction.

(6) The building official may issue a permit for the construction of foundations or any other part of a building or structure before the entire plans and specifications for the whole building or structure have been submitted, provided adequate information and detailed statements have been filed complying with all the pertinent requirements of this code. The holder of such permit

for the foundations or other part of a building or structure shall proceed at his own risk with the building operation and without assurance that a permit for the entire structure will be granted.

(7) Approved plans: The building official shall stamp or endorse in writing both sets of corrected plans approved, and one set of such approved plans shall be retained by him and the other set shall be available at the building site, open to inspection of the building official or his authorized representative at all reasonable times.

(8) A true copy of the building permit shall be available on the site of operation open to public inspection during the entire time of prosecution of the work and until the completion of the same.

## SECTION 115.0 CONDITIONS OF PERMIT

(1) A permit shall not be issued until the fees prescribed by the department or the local government have been paid. The permit shall be a license to proceed with the work and shall not be construed as authority to violate, cancel or set aside any of the provisions of the KBC, except as specifically stipulated by modification or legally granted variation as described in the permit.

(2) All work shall conform to the appropriate application and plans for which the permit has been issued and any approved amendments thereto and shall be located strictly in accordance with the approved plot plan and any local ordinances governing the location of the building.

(3) A lot shall not be changed, increased or diminished in area from that shown on the official plot site plan, unless a revised plan showing such changes accompanied by the necessary affadavit of owner or applicant shall have been filed and approved, except that such revised plan will not be required if the change is caused by reason of an official street opening, street widening or other public improvement.

## SECTION 116.0 FEES

(1) A permit to begin work for new construction, alteration or other building operations shall not be issued until the fees prescribed by law shall have been paid to the department or local building department, nor shall an amendment to a permit necessitating an additional fee because of an increase in the estimated cost of the work involved be approved until the additional fee shall have been paid.

(2) The payment of the fee for the construction, alteration and for all work done in connection with or concurrently with the work contemplated by a building permit, shall not relieve the applicant or holder of the permit from the payment of other fees that may be prescribed by law or ordinance for water taps, sewer connections, electrical permits, erection of signs and display structures, marquees or other appurtenant structures, or fees of inspections, certificates of use and occupancy or other privileges or requirements, both within and without the jurisdiction of building inspection.

(3) The fee for building permits and other functions performed pursuant to

KRS Chapter 198B may be designed to fully cover the cost of the service performed; and the department and each local government is authorized to establish by approved rules or ordinances a schedule of unit rates for buildings and structures of all use groups and types of construction as classified and defined in the KBC.

## SECTION 117.0 CERTIFICATE OF USE AND OCCUPANCY

(1) No building on which site preparation and assembly were begun, after the Kentucky Building Code becomes effective as to that building, shall be occupied until the appropriate building official has issued a certificate of occupancy certifying that the building was constructed in conformance with the standards of the Kentucky Building Code, or assembled or installed in conformance with application instructions; except that:

(a) a building for which a permit was legally granted prior to the effective date of the KBC may be constructed and occupied under the provisions of relevant regulations in force at the time the permit was issued, provided that substantial construction has commenced within one year from the date the permit was issued;

(b) a building for which plans were prepared at least three months prior to the effective date of the KBC in a locality not then requiring a building permit may be completed and occupied without a building permit.

(2) A building or structure hereafter enlarged, extended or altered to change from one use group to another or to a different use within the same use group, in whole or part, and a building or structure hereafter altered for which a certificate of use and occupancy has not been heretofore issued, shall not be occupied or used until the certificate shall have been issued by the building official, certifying that the work has been completed in accordance with the provisions of the approved permit; except that any use or occupancy, which was not discontinued during the work or alteration, shall be discontinued within 30 days after the completion of the alteration unless the required certificate is secured from the building official.

(3) After a change of use has been made in a building or structure, the reestablishment of a prior use that would not have been legal in a new building of the same type of construction is prohibited unless the building complies with all applicable provisions of this code. A change from one prohibited use, for which a permit has been granted, to another prohibited use shall be deemed a violation of this code.

(4) Upon the request of the holder of a permit, the building official may issue a temporary certificate of occupancy for a building or structure, or part thereof, before the entire work covered by the permit shall have been completed, provided such portion or portions may be occupied safely prior to full completion of the building or structure without endangering life or public welfare.

(5) When a building or structure is entitled thereto, the building official shall issue a certificate of use and occupancy within ten days after written application. The certificate shall certify compliance with the provisions of this

code and the purpose for which the building may be used in its several parts. The certificate of use and occupancy shall specify the following information from the KBC, the use group, in accordance with the provisions of Article 3; the fire grading as defined in Article 4 and Table 1402, the maximum live load on all floors as prescribed in Article 9; the occupancy load in the building and all parts thereof as defined in Article 2 and Article 8; and any special stipulations and conditions of the building permit.

## SECTION 118.0 POSTING STRUCTURES

(1) Every building and structure and part thereof designed for business, factory and industrial, high hazard, mercantile, or storage use (Use Groups, B, F, H, M and S) as defined by the KBC shall be posted on all floors by the owner with a suitably designed placard in a form designated by the department, which shall be securely fastened to the structure in a readily visible place, stating the use group, the fire grading, the live loads and the occupancy loads.

(2) Every room constituting a place of assembly shall have the occupancy load of the room posted in a conspicuous place, near the main exit from the room. Approved signs shall be maintained in a legible manner by the owner or his authorized agent. Signs shall be durable and shall indicate the number of occupants permitted for each room use.

(3) All posting signs shall be furnished by the owner and shall be of permanent design; they shall not be removed or defaced and, if lost, removed or defaced, shall be immediately replaced.

## SECTION 119.0 VIOLATIONS AND REMEDIES

(1) It shall be unlawful for any person, firm or corporation to erect, construct, alter, extend, repair, remove, use or occupy any building or structure or equipment regulated by the KBC, or cause same to be done, contrary to or in conflict with or in violation of any of the provisions of this code.

(2) The building official shall serve a notice of violation or order on the person responsible for erection, construction, alteration, extension, repair, removal, demolition, use or occupancy of a building or structure in violation of this code or in violation of a permit or certificate issued under the provisions of this code; and such order shall direct the discontinuance of the illegal action or condition and the abatement of the violation.

(3) If the notice of violation is not complied with promptly, the building official shall request the legal counsel of the jurisdiction to institute the appropriate proceeding at law or in equity to restrain, correct or abate such violation or to require the removal or termination of the unlawful use of the building or of the order or direction made pursuant thereto.

(4) Penalties: Any person who shall violate a provision of the KBC or shall fail to comply with any of the requirements thereof or who shall erect, construct, alter or repair a building or structure in violation of an approved plan or proper direction of the building official, or of a permit or certificate issued under the provisions of the KBC, shall be subject to such penalties as

may be provided by KRS 198B.990 and other applicable law.

(5) Injunctive relief: The department or any local agency enforcing the uniform state building code may obtain injunctive relief from any court of competent jurisdiction to enjoin the offering for sale, delivery, use, occupancy or construction of any building on which construction was begun after the effective date of said code, upon an affidavit of the department or the local government agency specifying the manner in which the construction, or if a building existing prior to the effective date of said code, the reconstruction, alteration, repair or conversion does not conform to the requirements of KBC.

(6) No person shall hinder an inspector enforcing any of the provisions of this code in the performance of his lawful duties under this chapter.

## SECTION 120.0 NOTICE TO OWNER

(1) Upon notice from the building official that work on any building or structure is being prosecuted contrary to the provisions of this code or in an unsafe and dangerous manner, such work shall be immediately stopped. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's agent, or to the person doing the work; and shall state the conditions under which work may be resumed.

(2) Unlawful continuance: Any person who shall continue any work in or about the structure after having been served with a stop work order, except such work as he is directed to perform to remove a violation or unsafe conditions, shall be liable to the restraints provided in Section 119.0.

## SECTION 121.0 AUTHORITY FOR EXISTING BUILDINGS

(1) Upon the issuance of a final approval of a facility and the issuance of a lawful certificate of occupancy with respect to a particular facility, the building official's authority and responsibility as to that facility is ended so far as the KBC is concerned, unless the facility later becomes subjected to the KBC by virtue of Section 106.0.

(2) Other local or state law must be consulted to determine the existence of other powers given to the building official, such as those related to demolition or authority over unsafe structures, which are not specifically awarded him or her in the KBC.

(3) The State Fire Marshal's Office and the local fire official designated by the local government shall continue to be the persons responsible for enforcement of the standards of safety for existing buildings and shall also inspect for fire safety maintenance after a building has been given a final certificate by the building official, under KRS Chapter 227, and 815 KAR 10:015.

## SECTION 122.0 LOCAL BOARD OF APPEALS

(1) The mayor, chairman of the board of trustees or county judge executive of a local government which is enforcing the Kentucky Building Code may,

upon approval of the local legislative body, appoint a local appeals board, consisting of at least five technically qualified persons with professional experience related to the building industry, three of which must not be employees of the local government, to hear appeals of the decisions of the local building official.

(2) Local governments which are enforcing the Kentucky Building Code may cooperate with each other and provide a local appeals board and shall adhere to the provisions of KRS Chapter 65 when entering into such cooperative agreements.

(3) No local building official or employee of a local inspection department may sit on a local appeals board if such board is hearing an appeal to a decision rendered by his department. No member of a local appeals board shall hear an appeal in a case in which he has financial interest.

(4) Any party to a decision by the local building official may appeal that decision to the local appeals board. Upon receipt of an appeal from a qualified party, the local appeals board shall convene a hearing to consider the appeal within 15 days of receipt.

(5) All parties to the appeal shall be notified of the time and place of the hearing by letter mailed by certified mail no later than ten days prior to the date of hearing.

(6) The local appeals board shall render a decision within five working days after the hearing. The board may uphold, amend or reverse the decision of a local building official, and there shall be no appeal from the decision of the local appeals board other than by appeal to the board.

## SECTION 123.0 APPEALS PROCEDURES

(1) Where a local appeals board exists, a party must first appeal to the local board when aggrieved by a decision of the local building official.

(2) A party, including the fire official, aggrieved by a decision of a local building official where no local appeals board exists may appeal directly to the board. The board shall further hear appeals directly from a party aggrieved by the decision of an agent of the department.

(3) Application for appeal may be made when it is claimed in writing that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply, or an equally good or better form of construction can be used, or that the building official has refused to grant a modification to the provisions of this code covering the manner of construction or material to be used in the erection, alteration or repair of a building or structure.

(4) The board may appoint five or more of its members, excluding the chairman of the board, to consider the recommendations of the commissioner or to conduct hearings, and those appointed shall act in all matters concerning the appeal for the entire board.

(5) The board may adopt such rules, regulations and by-laws as are necessary to conduct said appeals; and no member of the board or committee may vote on any matter which will result in his direct or indirect financial gain.

(6) Appeals to the board shall be in writing and shall be addressed to the Commissioner of Housing, Buildings and Construction, The 127 Building, U.S. 127 South, Frankfort, Kentucky 40601; Attention: Appeals Board. Such appeals shall include citations of those provisions of the Kentucky Building Code which are at issue, an explanation as stated in subsection (3) of why the decision of the state building official or local building official relative to those provisions is being contested and a copy of the decision rendered by the local appeals board, if any.

(7) The commissioner shall immediately notify the board when an appeal is received. The commissioner or a designated employee of the department shall then investigate the evidence pertaining to such an appeal, based upon the results of such investigation, and make recommendations to the board or committee on the disposition of the case in question.

(8) No employee of the department shall investigate or make recommendation on an appeal to his own decision, but shall defer in such cases to employees who are not party to the decision which lead to the appeal.

(9) In conducting such investigation, the commissioner or the designated representatives, acting for the department, shall have the authority to administer oaths and affirmations, issue subpoenas authorized by law, rule upon offers of proof and receive relevant evidence, take or cause depositions to be taken, regulate the course of any hearings they may schedule, and hold conferences for the settlement or simplification of the issue by consent of the parties.

(10) The commissioner shall cause such investigation to be completed, and forwarded with written recommendation to the board within 30 days after receiving such an appeal.

## SECTION 124.0 ACTION OF THE BOARD

(1) Upon receiving the written recommendations of the commissioner, the board may decide to accept such recommendations, or it may decide to convene a hearing to consider the question further. Upon receipt of the recommendations of the commissioner, the board shall render a decision on each appeal at its regularly scheduled meeting but no later than 30 days after receipt of such recommendations.

(2) If the board has authorized an appeals committee to hear an appeal, the committee shall act for the board in all matters related to the appeal.

(3) Should the board's decision be to schedule a hearing on the appeal, such hearing shall occur within 30 days of such decision, and all parties to such hearing shall be immediately notified in writing of the time and place of such hearing by the commissioner. The board may further exercise the same powers of investigation as granted to the commissioner in Section 123.0. The board shall render a decision within ten days of any appeals hearing it may conduct.

(4) The board may uphold, amend or reverse the decision of a local appeals board, a local building official or the state building official; and the decision of the board shall be final.

(5) The chairman of the board shall notify the appropriate building official and he or she shall take immediate action in accordance with the decision of the board.

(6) There shall be no appeal from the board's decision except to the circuit court within whose jurisdiction the property in question is located. Application for review shall be made to the proper court within 30 days following that decision.

## 125.0 CONSTRUCTION CONTROL AND RESPONSIBILITIES

(1) The provisions of this section shall define the responsibility of the building official in relation to design professionals and the circumstances under which the department or the local building official shall be authorized to accept design professional's affirmation in their plans and specifications as to compliance with various provisions of this code.

(2) All new, alteration, repair, expansion, addition or modification work involving the practice of professional architecture and engineering as defined by KRS Chapters 322 and 323 shall be prepared by registered professional architects or engineers as certified by the state; and all plans, computations and specifications required for a building permit application for such work must be prepared by or under the direct supervision of the registered architect or engineer and bear his seal and signature in accordance with those statutes.

## SECTION 126.0 VALIDITY

(1) In the event any part or provision of this code is held to be illegal or void, this shall not have the effect of making void or illegal any of the other parts of provisions thereof, which may or shall be determined to be legal; and it shall be presumed that this code would have been passed without such illegal or invalid parts or provisions.

(2) Any invalid part of this code shall be segregated from the remainder of this code by the court holding such part invalid, and the remainder shall remain effective.

(3) The invalidity of any provision in any section of the KBC as applied to existing buildings and structures shall not be held to affect the validity of such section in its application to buildings and structures hereafter erected.

## SECTION 127.0 EFFECTIVE DATES FOR KBC APPLICATION

(1) Any building required by Section 109.0 (1) to be submitted to the Department of Housing, Buildings and Construction and which has not been submitted and accepted for construction prior to February 15, 1980, must be constructed in compliance with the applicable provisions of the KBC.

(2) Any building required by Section 108.0 to be submitted to a local government for plan review and which has not been lawfully approved for construction prior to the following timetables shall be constructed in compliance with the applicable provisions of the KBC:

(a) In all local governments in a county containing a first or second class

city or urban county government, no later than February 15, 1980.

(b) In all local governments in a county where the largest city is of the third or fourth class, no later than August 15, 1981.

(c) In all local governments in a county containing no city larger than fifth or sixth class, no later than August 15, 1982.

## SECTION 128.0 ALTERNATIVE CODES

(1) Whenever the department has entered into a contractual obligation requiring enforcement of applicable federally approved codes, the department shall approve plans and make inspections using those federal codes as an alternative to other applicable provisions of the KBC.

## SECTION 129.0 DAY CARE CENTERS

Family child day care homes, group day care homes and child day care centers which comply with the provisions of the 1973 Life Safety Code, NFiPA Pamphlet #101, shall be deemed to have satisfied all the life safety requirements of the Kentucky Building Code.

# ARTICLE 2

## DEFINITIONS

### SECTION 200.0 GENERAL

**200.1 Scope:** The terms herein defined shall be used to interpret all the applicable provisions of this code.

**200.2 Meaning:** Unless otherwise expressly stated, the following terms shall, for the purpose of this code, have the meanings indicated in this article.

**200.3 Tense, gender and number:** Words used in the present tense include the future; words used in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural the singular.

**200.4 Terms defined in other codes:** Where terms are not defined in this article and are defined in the plumbing or mechanical codes listed in Appendix A, they shall have the meanings ascribed to them as in those codes.

**200.5 Terms not defined:** Where terms are not defined, they shall have their ordinarily accepted meanings or such as the context may imply.

### SECTION 201.0 GENERAL DEFINITIONS

**Accepted engineering practice:** That which conforms to accepted principles, tests or standards of nationally recognized technical or scientific authorities.

**Accessory structure:** A building the use of which is incidental to that of the main building and which is located on the same lot.

**Addition:** An extension or increase in floor area or height of a building or structure.

**Airplane hangar, private:** A hangar for the storage of four or less single motor planes in which volatile or flammable oil is not handled, stored or kept other than that contained in the fuel storage tank of the plane.

**Airplane hangar, public:** A building for the storage, care or repair of private or commercial airplanes not included in the term "private airplane hangar."

**Air supported structure:** A structural and mechanical system which is constructed of high strength fabric or film and achieves its shape, stability, and

support by pretensioning with internal air pressures. Air structures may be used for temporary applications (see Section 621.0).

**Alarm system, automatic fire:** A manual fire alarm system containing automatic detecting device(s) which actuate a fire alarm signal (see Section 1716.0).

**Alarm system, manual fire:** An interior alarm system composed of sending stations and signaling devices in a building, operated on an electrical circuit, so arranged that the operation of any one station will ring all signals throughout the building and at one or more approved locations (see Section 1717.0).

**Alarm system, sprinkler:** An alarm activated by waterflow from a sprinkler system (see Section 1704.0).

**Alley:** A secondary thoroughfare less than 30 feet (9144 mm) in width dedicated for the public use of vehicles and pedestrians affording access to abutting property.

**Alteration:** As applied to a building or structure, means a change or rearrangment in the structural parts or in the means of egress; or an enlargement, whether by extending on a side or by increasing in height; or the moving from one location or position to another.

**Amusement device:** A device or structure open to the public by which persons are conveyed or moved in an unusual manner for diversion (see Section 618.0).

**Anchor store:** An exterior perimeter department store or major merchandising or magnet center having direct access to a mall and having its required exits independent of the mall (see Section 630.0).

**Approved:** Approved by the building official or other authority having jurisdiction.

**Approved material, equipment and methods:** Material, equipment and methods evaluated and approved by the building official (see Section 107.0).

**Approved rules:** The legally adopted rules of the building official (see Section 110.0).

**Appurtenant structure:** A device or structure attached to the exterior or erected on the roof of a building designed to support service equipment or used in connection therewith, or for advertising or display purposes, or other similar uses.

**Architectural terra cotta:** Plain or ornamental hard burned plastic clay units, larger in size than brick, with glazed or unglazed ceramic finish (see Article 13).

**Area, building:** The area included within surrounding exterior walls (or exterior walls and fire walls) exclusive of vent shafts and courts. Areas of the building not provided with surrounding walls shall be included in the

building area if included within the horizontal projection of the roof or floor above (see Section 505.0).

**Areaway (form of construction):** An uncovered subsurface space adjacent to a building.

**Assembly, place of:** A room or space accommodating 50 or more individuals for religious, recreational, educational, political, social or amusement purposes, or for the consumption of food and drink, including all connected rooms or spaces with a common means of egress and entrance.

**Assembly, place of, outdoor:** Premises used or intended to be used for public gatherings of 200 or more individuals in other than buildings.

**Attic:** The space between the ceiling beams of the top story and the roof rafters.

**Attic, habitable:** A habitable attic is an attic which has a stairway as a means of access and egress and in which the ceiling area at a height of $7\frac{1}{3}$ feet (2235 mm) above the attic floor is not more than one third the area of the floor next below.

**Automatic:** As applied to fire protection devices, automatic refers to a device or system providing an emergency function without the necessity of human intervention and activated as a result of a predetermined temperature rise, rate of rise of temperature, or increase in the level of combustion products; such as incorporated in an automatic sprinkler system, automatic fire door, etc.

**Basement:** That portion of a building the average height of which is at least half below grade, which is ordinarily used for purposes such as storage, laundry facilities, household tool shops, and installation and operation of heating, cooling, ventilating facilities, but which is not ordinarily used for purposes of general household habitation (see "Grade", "Story" and "Cellar").

**Bay (part of a structure):** The space between two adjacent piers or mullions or between two adjacent lines of columns.

**Brick**

**Clay or shale:** A solid masonry unit of clay or shale, usually formed into a rectangular prism while in the plastic state and burned or fired in a kiln.

**Calcium silicate brick (sand lime brick):** A building unit made of sand and lime.

**Concrete brick:** A solid masonry unit having a shape approximately a rectangular prism and composed of inert aggregate particles embedded in a hardened cementitious matrix.

**Hollow brick:** A masonry unit of clay or shale whose net cross sectional area in any plane parallel to the bearing surface is not less than 60 percent or more than 75 percent of its gross cross sectional area measured in the same plane.

**Building:** Any structure used or intended for supporting or sheltering any use or occupancy.

**Building, existing:** Any structure erected prior to the adoption of the appropriate code, or one for which a legal building permit has been issued.

**Building line:** The line established by law, beyond which a building shall not extend, except as specifically provided by law.

**Building official:** The officer or other designated authority charged with the administration and enforcement of this code, or a duly authorized representative.

**Building service equipment:** The mechanical, electrical and elevator equipment including piping, wiring, fixtures and other accessories, which provide sanitation, lighting, heating, ventilation, fire fighting and transportation facilities essential for the habitable occupancy of the building or structure for its designated use and occupancy.

**Building site:** The area occupied by a building or structure, including the yards and courts required for light and ventilation, and such areas that are prescribed for access to the street.

**Buttress:** A projecting part of a masonry wall built integrally therewith to furnish lateral stability which is supported on proper foundations.

**Cellar:** That portion of a building which is partly or completely below grade and having at least one half its height below grade (see "Grade," "Story" and "Basement").

**Central station system:** A system, or group of systems, the operations of which are signaled to, recorded in, maintained and supervised from an approved central station, in which there are competent and experienced observers and operators in attendance at all times whose duty it shall be, upon receipt of a signal, to take such action as shall be required under the rules established for their guidance. Such systems shall be controlled and operated by a person, firm or corporation whose principal business is the furnishing and maintaining of supervised protective signaling service and who does not have interest in protected properties (see Section 1718.0).

**Certificate of use and occupancy:** The certificate issued by the building official which permits the use of a building in accordance with the approved plans and specifications and which certifies compliance with the provisions of law for the use and occupancy of the building in its several parts together with any special stipulations or conditions of the building permit (see Section 117.0).

**Change of use:** An alteration by change of use in a building heretofore existing to a new use group which imposes other special provisions of law governing building construction, equipment or means of egress (see Section 106.0).

**Child day care center:** A facility providing a program less than 24 hours per day per child for the care of more than five children, two and one half years

or older, and who are fully ambulatory and capable of following evacuation instructions (see Section 302.5).

**Chimney:** A primarily vertical enclosure containing one or more passageways.
**Factory built chimneys:** A chimney that is factory made and listed by an approved testing or inspection agency for the venting of gas appliances, gas incinerators and solid or liquid fuel burning appliances.
**Masonry chimney:** A field constructed chimney of solid masonry units, bricks, stones, listed hollow masonry units or reinforced concrete.
**Metal chimney (smokestack):** A field constructed chimney made of metal.

**Combustible, material:** A combustible (material) is a material which cannot be classified as noncombustible in accordance with that definition.

**Concrete:** A mixture of cement, aggregates and water, of such proportions and manipulation as to meet specific requirements.

**Concrete, reinforced:** Concrete in which reinforcement, other than that provided for shrinkage or temperature changes, is combined in such manner that the two materials act together in resisting forces.

**Conflagration hazard:** The fire risk involved in the spread of fire by exterior exposure to and from adjoining buildings and structures.

**Construction equipment:** The construction machinery, tools, derricks, hoists, scaffolds, platforms, runways, ladders and all material handling equipment, safeguards and protective devices used in construction operations.

**Construction operation:** The erection, alteration, repair, renovation, demolition or removal of any building or structure; and the excavation, filling, grading and regulation of lots in connection therewith.

**Construction, type of:** See Section 401.0.
**Type 1:** See Section 402.0.
**Type 2:** See Section 403.0.
**Type 3:** See Section 404.0.
**Type 4:** See Section 405.0.

**Controlled materials:** Materials which are certified by an approved agency as meeting accepted engineering standards for quality and as provided in Sections 919.0 and 1100.0.

**Corridor:** A hallway, passageway or other compartmented space providing the occupants with access to the required exit(s) of the building or floor area.

**Court:** An open, uncovered and unoccupied space on the same lot with a building.
**Inner:** Any court other than an outer court.
**Outer:** A court extending to and opening upon a street, public alley, or other approved open space, not less than 15 feet (4572 mm) wide, or upon a required yard.

**Curb level:** The elevation of the street curb as established in accordance with law.

**Building or wall height:** The elevation of the street grade opposite the center of the wall nearest to and facing the street lot line.

**Excavations:** The elevation of the street grade nearest to the point of excavation.

**Damper, fire:** A damper arranged to seal off air flow automatically through part of an air duct system, so as to restrict the passage of heat. The fire damper may also be used as a smoke damper if location lends itself to the dual purpose (see Section 1417.0).

**Degree day, heating:** A unit, based upon temperature difference and time, used in estimating fuel consumption and specifying nominal heating load of a building in winter. For any one day, when the mean temperature is less than 65 degrees F. (18 degrees C.) there exist as many degree days as there are Fahrenheit (Celsius) degrees difference in temperature between the mean temperature for the day and 65 degrees F. (18 degrees C.) (see Article 25).

**Deluge system:** An automatic sprinkler system consisting of open sprinklers with water supply valves activated by a separate automatic detection system.

**Detecting device, automatic:** A device which automatically detects heat, smoke or other products of combustion (see Section 1716.0).

**Detector, smoke:** An approved, listed detector for sensing visible or invisible particles of combustion (see Section 1716.0).

**Door, fire:** A door and its assembly, so constructed and assembled in place as to give protection against the passage of fire (see Section 1415.0).

**Door assembly, fire:** The assembly of a fire door and its accessories, including all hardware and closing devices and their anchors; and the door frame, when required, and its anchors (see Section 1415.0).

**Door, automatic collapsible revolving:** A door which is designed, supported and constructed so that the wings will release and fold back in the direction of egress under pressure exerted by persons under panic conditions, providing a means of travel on both sides of the door pivot (see Section 813.0).

**Door, automatic fire:** A fire door or other opening protective constructed and arranged so that, if open, it shall close when subjected to a predetermined temperature, a predetermined rate of temperature rise, smoke or other products of combustion (see Section 1415.0).

**Draft regulator:** A device which functions to maintain a desired draft in the appliance by automatically reducing the draft to the desired value.

**Draftstopping:** Building materials installed to prevent the movement of air, smoke, gases and flame to other areas of the building through large concealed passages such as attic spaces and floor assemblies with suspended ceilings or open web trusses (see Section 1420.0).

**Dumbwaiter:** A hoisting and lowering mechanism with a car of limited capacity and size which moves in guides in a substantially vertical direction and is used exclusively for carrying material.

**Dwellings**

**Boarding house, lodging house and tourist house:** A building arranged or used for lodging, with or without meals, for compensation, by more than five and not more than 20 individuals.

**Dormitory:** A space in a building where group sleeping accommodations are provided for persons not members of the same family group, in one room, or in a series of closely associated rooms.

**Hotel:** Any building containing six or more guest rooms, intended or designed to be used, or which are used, rented or hired out to be occupied or which are occupied for sleeping purposes by guests.

**Multi-family apartment house:** A building or portion thereof containing more than two dwelling units and not classified as a one or two family dwelling.

**One family dwelling:** A building containing one dwelling unit with not more than five lodgers or boarders.

**Two family dwelling:** A building containing two dwelling units with not more than five lodgers or boarders per family.

**Dwelling unit:** A single unit providing complete, independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking, and sanitation.

**Elevator:** A hoisting and lowering mechanism equipped with a car or platform which moves in guides for the transportation of individuals or freight in a substantially vertical direction through successive floors or levels of a building or structure (see Section 2107.0).

**Freight elevator:** An elevator primarily used for carrying freight and on which only the operator and the persons necessary for loading or unloading and employees having special permission of the building official are permitted to ride.

**Hand elevator:** A freight elevator that is driven by manual power.

**Hydraulic elevator:** A power elevator in which the motion of the car is obtained through the application of force from liquid under pressure.

**Passenger elevator:** An elevator for the transportation of individuals.

**Power elevator:** An elevator in which the motion of the car is obtained through the application of force other than by hand or gravity.

**Sidewalk elevator:** A freight elevator which operates between a sidewalk or other area exterior to the building and floor levels inside the building below such area, which does not have a landing opening into the building at its upper limit of travel and which is not used to carry automobiles.

**Elevator repairs:** All work necessary to maintain present elevator equipment in a safe and serviceable condition and to adjust or replace defective, broken or worn parts with parts made of equivalent material, strength and

design, and only where the replacing part performs the same function as the replaced part.

**Equipment:** Facilities or installations including but not limited to, heating, electrical, ventilating, air conditioning, and refrigerating facilities or installations.

**Equipment, existing:** Any equipment covered by this code which was installed prior to the effective date of this code, or for which an application for permit to install was filed with the building official prior thereto.

**Escalator:** A power driven, inclined, continuous stairway used for raising and lowering passengers (see Section 2118.0).

**Exit:** That portion of a means of egress which is separated from all other spaces of a building or structure by construction or equipment as required in this code to provide a protected way of travel to the exit discharge (see Section 807.0).

**Exit access:** Exit access is that portion of a means of egress which leads to an entrance to an exit (see Section 810.0).

**Exit discharge:** That portion of a means of egress between the termination of an exit and a public way (see Section 807.2.1).

**Exit, horizontal:** A way of passage from one building to an area of refuge in another building on approximately the same level, or a way of passage through or around a wall or partition to an area of refuge on approximately the same level in the same building, which affords safety from fire or smoke from the area of incidence and areas communicating therewith (see Section 814.0).

**Exterior envelope:** The elements of a building which enclose conditioned spaces through which thermal energy may be transferred to or from the exterior (see Section 2502.0).

**Extinguishing system ($CO_2$), carbon dioxide:** A system to supply $CO_2$ from a pressurized vessel through fixed pipes and nozzles. The system includes an automatic detection and actuating mechanism (see Section 1708.0).

**Extinguishing system, dry chemical:** A system consisting of dry chemical and expellant gas storage tanks, fixed piping, and nozzles used to assure proper distribution of an approved extinguishing agent on a specific fire hazard or into a potential fire area. The system includes an automatic detection and actuating mechanism (see Section 1710.0).

**Extinguishing system, foam:** A special system to discharge, either mechanically or chemically, a foam made from concentrates, over the area to be protected (see Section 1707.0).

**Extinguishing system, halogenated:** A system of pipes, nozzles, an actuating mechanism and a container of halogenated agent under pressure (see Section 1709.0).

**Fire area:** The floor area enclosed and bounded by fire walls, fire separation assemblies or exterior walls of a building to restrict the spread of fire.

**Fire department connection:** A connection for fire department use in supplementing or supplying water for standpipes or sprinkler systems (see Section 1713.0).

**Fire grading:** The fire hazard classification of a building or structure in hours or fractions thereof established for its use group and occupancy in Table 1402.

**Fire hazard:** The potential degree of fire severity existing in the use and occupancy of a building, classified as high, moderate or low.

**High:** All uses which involve the storage, sale, manufacture or processing of highly combustible, volatile flammable or explosive products which are likely to burn with extreme rapidity and produce explosions or large volumes of smoke, poisonous fumes or gases in the event of fire.

**Moderate:** All uses which involve the storage, sale, manufacture or processing of materials which are likely to burn with moderate rapidity and a considerable volume of smoke, but which do not produce either poisonous fumes or explosions, in the event of fire.

**Low:** All uses which involve the storage, sale or manufacture of materials that do not ordinarily burn rapidly, nor produce excessive smoke, poisonous fumes or explosions in the event of fire.

**Fire limits:** The territories defined and limited by the provisions of this code for the restriction of types of construction (see Section 501.0).

**Fire protection:** The provision of construction safeguards and exit facilities; and the installation of fire alarm, fire detecting and fire extinguishing service equipment, to reduce the fire risk and the conflagration hazard.

**Fire protection system:** A system including systems, devices and equipment to detect a fire, actuate an alarm or suppress or control a fire or any combination thereof.

**Fireresistance:** That property of materials or their assemblies which prevents or retards the passage of excessive heat, hot gases or flames under conditions of use.

**Fireresistance rating:** The time in hours or fractions thereof that materials or their assemblies will resist fire exposure as determined by the fire test specified in this code (see Section 1403.1.1).

**Fire separation, exterior fire exposure:** The distance in feet measured from the building face to the closest interior lot line, to the center line of a street or public way or to an imaginary line between two buildings on the same property.

**Firestopping:** Building materials installed to prevent the movement of flame and gases to other areas of a building through small concealed passages in building components such as floors, walls and stairs.

**Fire suppression system:** A mechanical system designed and equipped to detect a fire, actuate an alarm and suppress or control a fire.

**Flameresistance:** That property of materials or combinations of component materials which restricts the spread of flame as determined by the flame-resistance tests specified in this code (see Section 1404.0).

**Flame spread:** The propagation of flame over a surface.

**Flame spread rating:** The measurement of flame spread on the surface of materials or their assemblies as determined by the tests specified in this code (see Section 1404.0).

**Flammable:** Subject to easy ignition and rapid flaming combustion.

**Floor area, gross:** Gross floor area shall be the floor area within the perimeter of the outside walls of the building under consideration, without deduction for hallways, stairs, closets, thickness of walls, columns, or other features.

**Floor area, net:** For the purpose of determining the number of persons for whom exits are to be provided, net floor area shall be the actual occupied area, not including accessory unoccupied areas or thickness of walls.

**Floor fill:** The fill between the structural floor arch or slab and the finished flooring.

**Floor filling:** The type of short-span floor construction in fireresistive buildings installed between structural steel framing to serve as a combination structural floor slab or arch and fireproof protection of the framing.

**Floor finish:** The finish placed on top of the floor arch, slab or other structural floor element.

**Foyer:** The enclosed space surrounding or in the rear of the auditorium of a theater or other place of assembly which is completely shut off from the auditorium and is used as an assembly or waiting space for the occupants.

**Garage, private:** A garage for four or less passenger motor vehicles without provision for repairing or servicing such vehicles for profit (see Section 613.0).

**Garages, public:** A building or structure for the storage or parking of more than four passenger motor vehicles or motor powered boats, or more than one commercial motor vehicle; and in which provision may be made for the dispensing of gasoline, oil or similar products for the servicing of such vehicles. Public garages shall be classified according to their specific use in one of the following groups (see Section 614.0).

**Group 1:** A public garage in which provision is made for the care, storage, repair or painting of motor vehicles.

**Group 2:** A public garage used exclusively for passenger vehicles that will accommodate not more than nine passengers.

**Grade:** A reference plane representing the average of finished ground level adjoining the building at all exterior walls.

**Grade hallway, grade lobby, grade passageway:** An enclosed hallway or corridor that is an element of an exit; and terminating at a street or an open space or court communicating with a street.

**Grandstand:** Any structure, except movable seating and sectional benches, intended primarily to support individuals for the purposes of assembly, but this definition shall not apply to the permanent seating in theatres, churches, auditoriums and similar buildings (see Section 619.0).

**Gross leasable area:** The gross leasable area is the total floor area designed for tenant occupancy and exclusive use. The area of tenant occupancy is measured from the center lines of joint partitions to the outside of the tenant walls (see Section 630.0).

**Habitable space:** Space in a structure for living, sleeping, eating, or cooking. Bathrooms, toilet compartments, closets, halls, storage or utility spaces and similar areas are not considered habitable space.

**Heated space:** A space within a building which is provided with a positive heat supply to maintain air temperature of 50 degrees F. (10 degrees C.) or higher.

**Height**

**Building:** The vertical distance from the grade to the top of the highest roof beams of a flat roof, or the mean level of the highest gable or slope of a hip roof. When the building faces on more than one street, the height shall be measured from the average of the grades at the center of each street front.

**Court:** The vertical distance from the lowest level of the court to the mean height of the top of the enclosing walls.

**Story:** The vertical distance from top to top of two successive tiers of beams or finished floor surfaces; and, for the topmost story, from the top of the floor finish to the top of the ceiling joists, or, when there is not a ceiling, to the top of the roof rafters.

**Walls:** The vertical distance from the foundation wall or other immediate support of such wall to the top of the wall.

**Hereafter:** After the time that this code becomes effective.

**Heretofore:** Before the time that this code became effective.

**Hoist, material platform:** A power or manually operated suspended platform conveyance operating in guide rails for the exclusive raising or lowering of materials, which is operated and controlled from a point outside the conveyance.

**Hoisting and elevating equipment, miscellaneous:** All power operated hoisting and elevating equipment for raising, lowering and moving persons or merchandise from one level to another such as inclined elevators, slings and hooks, tiering and piling machines not permanently located in a fixed

position, mine elevators, skip hoists for blast furnaces, stage and orchestra lifts, lift bridges and temporary builders' hoists and similar equipment.

**Hoisting and conveying equipment, special:** Manually or power operated hoisting, lowering or conveying mechanisms, other than elevators, escalators or dumbwaiters for the transport of persons or freight in a vertical, inclined or horizontal direction on one floor or in successive floors.

**Automotive lift:** A fixed mechanical device for raising an entire motor vehicle above the floor level, but not through successive floors of the building or structure.

**Conveyors:** A system of machinery and manual or mechanized devices other than elevator and dumbwaiter equipment, consisting of belts, chains, rollers, buckets, aprons, slides and chutes and other miscellaneous equipment for hoisting, lowering and transporting materials and merchandise in packages or in bulk in any direction in a building or structure.

**Freight lift:** A power operated raising and lowering device for transporting freight vertically, operating entirely within one story of the building or structure.

**Manlifts:** A power operated belt device with steps and handholds for transporting persons in a vertical position through successive floors or levels of the building or structure.

**Jurisdiction:** The governmental unit which has adopted this code under due legislative authority.

**Lintel:** A beam placed over an opening or recess in a wall which supports the wall construction above.

**Load**

**Dead load:** The weight of all permanent structural and nonstructural components of a building, such as walls, floors, roofs, and fixed service equipment.

**Duration of load:** The period of continuous application of a given load, or the aggregate of periods of intermittent applications of the same load.

**Earthquake load:** The assumed lateral load acting in any horizontal direction on the structural frame due to the kinetic action of earthquakes.

**Impact load:** The load resulting from moving machinery, elevators, craneways, vehicles, and other similar forces and kinetic loads.

**Internal load:** The forces resulting from the restraint of movement of construction materials or differential movement of a combination of materials caused by the effects of expansion or contraction due to temperature changes, shrinkage, moisture changes, creep, differential settlement or combinations thereof.

**Lateral soil load:** The lateral pressure in pounds per square foot (psf) [kilograms per square meter (kg/ $m^2$)] due to the weight of the adjacent soil, including due allowance for hydrostatic pressure and possible surcharge from fixed or moving loads.

**Live load:** The weight superimposed by the use and occupancy of the

building, not including the wind load, earthquake load, or dead load.
**Wind load:** The lateral pressure on the building or structure in pounds per square foot (psf) [kilograms per square meter (kg/ $m^2$)] due to wind blowing in any direction.

**Loading ramp:** A hinged, nonportable device, either mechanical or hydraulic, hand or power operated, used for spanning gaps or adjusting heights between loading surface and carrier or between loading surface and loading surface.

**Lobby:** The enclosed vestibule between the principal entrance to the building and the doors to the main floor of the auditorium or assembly room of the theatre or place of assembly, or to the main floor corridor of a business building.

**Lot:** A portion or parcel of land considered as a unit.
**Corner lot:** A lot with two adjacent sides abutting upon streets or other public spaces.
**Interior lot:** A lot which faces on one street or with opposite sides on two streets.

**Lot line:** A line dividing one lot from another, or from a street or any public place.

**Lot line, interior:** Any lot line other than one adjoining a street or public space.

**Lot line, street:** The lot line dividing a lot from a street or other public way.

**Mall:** A mall is a roofed over common pedestrian area serving more than one tenant located within a covered mall building (see Section 630.0).

**Mall building, covered:** A building enclosing a number of tenants and occupancies such as retail stores, drinking and dining establishments, entertainment and amusement facilities, offices, and other similar uses wherein two or more tenants have a main entrance into one or more malls. Anchor stores shall not be considered as part of the covered mall building (see Section 630.0).

**Masonry:** A built up construction or combination of building units or materials of clay, shale, concrete, glass, gypsum, stone or other approved units bonded together with mortar or monolithic concrete. Reinforced concrete is not classed as masonry.
**Ashlar masonry:** Masonry composed of bonded, rectangular units, larger in size than brick, with sawed, dressed or squared beds and mortar joints.
**Ashlar facing masonry:** Facing of solid rectangular units larger in size than brick of burned clay or shale, natural or cast stone, with sawed, dressed and squared beds and mortar joints.
**Solid masonry:** Masonry consisting of solid masonry units laid continguously with the joints between the units filled with mortar, or consisting of plain concrete.

**Masonry unit**

**Clay:** A building unit larger in size than a brick, composed of burned clay, shale, fire clay or mixtures thereof.

**Concrete:** A building unit or block larger in size than 12 by 4 by 4 inches (305 mm by 102 mm by 102 mm) made of cement and suitable aggregates.

**Hollow:** A masonry unit whose net cross sectional area in any plane parallel to the bearing surface is less than 75 percent of its gross cross sectional area measured in the same plane.

**Solid:** A masonry unit whose net cross sectional area in every plane parallel to the bearing surface is 75 percent or more of its gross cross sectional area measured in the same plane.

**Means of egress:** A continuous and unobstructed path of travel from any point in a building or structure to a public way, and consisting of three separate and distinct parts: (a) the exit access, (b) the exit and (c) the exit discharge. A means of egress comprises the vertical and horizontal means of travel and shall include intervening room spaces, doors, hallways, corridors, passageways, balconies, ramps, stairs, enclosures, lobbies, escalators, horizontal exits, courts and yards (see Article 8).

**Member**

**Primary:** Any member of the structural frame of a building or structure used as a column, grillage beam, or to support masonry walls and partitions, including trusses, isolated lintels spanning an opening of 8 feet (2438 mm) or more, and any other member required to brace a column or a truss.

**Secondary:** Any member of the structural framework other than a primary member, including filling-in beams of floor systems.

**Mezzanine:** An intermediate level between the floor and ceiling of any story, and covering not more than 33 percent of the floor area of the room in which it is located.

**Mobile unit:** A structure of vehiclular, portable design built on a chassis and designed to be moved from one site to another, and to be used with or without a permanent foundation.

**Mortar:** A plastic mixture of approved cementitious materials, fine aggregates and water used to bond masonry or other structural units.

**Motel:** A hotel as defined in this code.

**Moving walk:** A type of passenger carrying device on which passengers stand or walk, and in which the passenger carrying surface remains parallel to its direction of motion and is uninterrupted.

**Noncombustible:** This is a general, relative term. Its precise meaning is defined in this code for specific applications.

**Noncombustible building material:** See Section 1403.0.

**Nominal dimension**

**Lumber:** A dimension that may vary from actual dimensions as provided

in DOC PS 20 listed in Appendix A.

**Masonry:** A dimension that may vary from actual masonry dimensions by the thickness of a mortar joint but not to exceed one-half inch (13 mm).

**Occupancy:** The purpose for which a building, or part thereof, is used or intended to be used.

**Occupant load:** The total number of persons that are permitted to occupy a building, or portion thereof, at any one time (see Section 806.0).

**Occupiable room:** A room or enclosed space designed for human occupancy in which individuals congregate for amusement, educational or similar purposes, or in which occupants are engaged at labor; and which is equipped with means of egress, light, and ventilation facilities meeting the requirements of this code.

**Occupied:** As applied to a building, shall be construed as though followed by the words "or intended, arranged or designed to be occupied."

**Open well:** A floor opening, series of floor openings or an atrium connecting two or more stories which does not meet requirements for a covered shaft with respect to enclosure (see Section 631.0).

**Ordinary material:** Material that does not conform to the requirements of this code for controlled material.

**Owner:** Any person, agent, firm, or corporation having a legal or equitable interest in the property.

**Panel:** (Part of a structure) The section of a floor or wall comprised between the supporting frame of two adjacent rows of columns and girders or column bands of floor construction.

**Parking structure, open:** A structure for the parking of passenger cars wherein two or more sides of such structure are not less than 50 percent open on each floor or level for 50 percent of the distance from the floor to the ceiling, and wherein provision for the repairing of such vehicles is not made. Such open parking structures are not classified as public garages, but shall comply with the requirements of Section 628.0.

**Penthouse:** An enclosed structure above the roof of a building, other than a roof structure or bulkhead, occupying not more than 33 1/3 percent of the roof area.

**Permit:** An official document or certificate issued by the authority having jurisdiction authorizing performance of a specified activity.

**Person:** Includes a corporation or co-partnership as well as an individual.

**Plastic**

**Light diffusing system:** A suspended construction consisting in whole or in part of lenses, panels, grids or baffles suspended below independently mounted electrical lighting sources.

**Plastic glazing:** Plastic materials which are glazed or set in frame or sash and not held by mechanical fasteners which pass through the glazing material.

**Plastic roof panels:** Plastic materials which are fastened to structural members, or to structural panels or sheathing, and which are used as light transmitting media in roofs.

**Plastic wall panels:** Plastic materials which are fastened to structural members, or to structural panels or sheathing, and which are used as light transmitting media in exterior walls.

**Pyroxylin plastic:** Any nitrocellulose product or compound soluble in a volatile, flammable liquid, including such substances as celluloid, pyroxylin, fiberloid and other cellulose nitrates (other than nitrocellulose film) which are susceptible to explosion from rapid ignition of the gases emitted therefrom.

**Reinforced plastic, glass fiber:** Plastic reinforced with glass fiber having not less than 20 percent of glass fibers by weight.

**Thermosetting material:** A plastic material which is capable of being changed into a substantially nonreformable product when cured.

**Thermoplastic material:** A plastic material which is capable of being repeatedly softened by increase of temperature and hardened by decrease of temperature.

**Plenum:** An air compartment or chamber to which one or more ducts are connected, and which forms part of an air distribution system.

**Posted use and occupancy:** The posted classification of a building in respect to use, fire grading, floor load and occupant load (see Section 118.0).

**Posted sign:** The tablet, card, or plate which defines the use, occupancy, fire grading and floor loads of each story, floor or parts thereof for which the building or part thereof has been approved.

**Prefabricated:** Construction materials or assembled units fabricated prior to erection or installation in a building or structure (see Article 23).

**Prefabricated building:** The completely assembled and erected building or structure, including the service equipment, of which the structural parts consist of prefabricated individual units or subassemblies using ordinary or controlled materials; and in which the service equipment may be either prefabricated or installed on-site.

**Prefabricated subassembly:** A built-up combination of several structural elements designed and fabricated as an assembled section of wall, ceiling, floor or roof, to be incorporated into the structure by field erection of two or more such subassemblies.

**Prefabricated unit:** A built-up section forming an individual structural element of the building, such as a beam, girder, plank, strut, column or truss; the integrated parts of which are prefabricated prior to incorporation into the structure, including the necessary means for erection and connection at the site to complete the structural frame.

**Prefabricated unit service equipment:** A prefabricated assembly of mechanical units, fixtures and accessories comprising a complete service unit of mechanical equipment, including bathroom and kitchen plumbing assemblies, unit heating and air conditioning systems and loop wiring assemblies of electric circuits.

**Preservative treatment (treated material):** Unless otherwise noted, is impregnation under pressure with a wood preservative. Wood preservative is any suitable substance that is toxic to fungi, insects, borers, and other living wood destroying organisms.

**Professional engineer or architect:** An individual technically and legally qualified to practice the profession of engineering or architecture in Kentucky.

**Proprietary (local) system:** An electrical alarm system capable of automatically notifying building supervisory personnel of a water flow or an impairment of a sprinkler system (see Section 1718.0).

**Protected construction:** That in which all structural members are constructed, chemically treated, covered or protected so that the individual unit or the combined assemblage of all such units has the required fireresistance rating specified for its particular use or application in Table 401; and includes protected combustible and protected noncombustible construction.

**Public way:** Any street, alley or other parcel of land open to the outside air leading to a public street; deeded, dedicated, or otherwise permanently appropriated to the public for public use and having a clear width of not less than 10 feet (3048 mm).

**Reconstruction:** The process of reproducing by new construction the exact form and detail of a vanished building, structure or object or a part thereof as it appeared at a specific period of time.

**Rehabilitation:** The process of returning a property to a state of utility through repair or alteration which makes possible an efficient contemporary use of while preserving those portions or features of the property which are significant to historical, architectural and cultural values.

**Remote station system:** An electric alarm system capable of automatically notifying the public or private fire department, or other constantly attended location, when the system is activated (see Section 1718.0).

**Repair:** The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

**Repair shop, motor vehicle:** A building, structure or enclosure in which the general business of repairing motor vehicles is conducted, including a public garage (see Section 616.0).

**Required:** Shall be construed to be mandatory by provisions of this code.

**Restoration:** The process of accurately recovering the form and details of the

property and its setting as it appeared at a particular period of time by means of the removal of later work or by the replacement of missing earlier work.

**Riser:** The vertical supply pipes in a sprinkler system or standpipe system.

**Roof:** The roof slab or deck with its supporting members, not including vertical supports.

**Roof covering:** The covering applied to the roof for weather resistance, fireresistance or appearance (see Section 1427.0).

**Roof structure:** An enclosed structure on or above the roof of any part of a building (see Section 1426.0).

**Rubble**

**Coursed rubble:** Masonry composed of roughly shaped stones fitting approximately on level beds and well bonded.

**Random rubble:** Masonry composed of roughly shaped stones laid without regularity of coursing but well bonded and fitted together to form well defined joints.

**Rough or ordinary rubble:** Masonry composed of unsquared field stones laid without regularity of coursing but well bonded.

**Rubble masonry:** Masonry composed of roughly shaped stones.

**Runway:** An aisle or walkway constructed or maintained as a temporary passageway for pedestrians or vehicles.

**Scaffold:** Any elevated platform which is used for supporting workmen, materials or both (see Section 1814.0).

**Self closing:** As applied to a fire door or other opening protective, means normally closed and equipped with an approved device which will insure closing after having been opened for use.

**Service station, motor fuel:** A structure, building or premises or any portion thereof where a flammable fluid is stored, housed or sold for supply to motor vehicles (see Section 615.0).

**Shaft, covered:** An interior enclosed space extending through one or more stories of a building, connecting openings in successive floors, or floors and roof; and covered at the top.

**Shaft, open:** An exterior, enclosed space extending through one or more stories of a building, enclosed with walls of the required weather and fireresistance rating for exterior walls, and open to the sky at the top.

**Shall:** The term, when used in this code, shall be construed as mandatory.

**Slidescape:** A straight or spiral chute, erected on the interior or exterior of a building, which is designed as a means of human egress direct to a street or other public way.

**Smokeproof enclosure:** An enclosed stairway, with access from the floor area of the building either through outside balconies or ventilated vestibules,

opening on a street, yard or open court; and with a separately enclosed direct exit to the street at the grade floor (see Section 818.0).

**Sprinkler, automatic:** A device, connected to a water supply system, that opens automatically at a predetermined fixed temperature and disburses a spray of water (see Section 1704.0).

**Sprinkler system, automatic:** A sprinkler system, for fire protection purposes, is an integrated system of underground or overhead piping designed in accordance with fire protection engineering standards. The system includes a suitable water supply. The portion of the system above ground is a network of specially or hydraulically designed piping installed in a building, structure or area, generally overhead, and to which automatic sprinklers are connected in a systematic pattern. The system is usually activated by heat from a fire and discharges water over the fire area (see Section 1704.0).

**Sprinkler system, limited area:** An automatic sprinkler system consisting of not more than 20 sprinklers for use in a room or space enclosed by construction assemblies as required by this code (see Section 1705.0).

**Sprinkler system, occupancy:** An automatic sprinkler system servicing a use group in a building enclosed by construction assemblies as required by this code (see Section 1704.2).

**Stabilization:** The process of applying measures designed to re-establish a weather resistant enclosure and the structural stability of an unsafe or deteriorated property while maintaining the essential form as it exists.

**Stage:** A partially enclosed portion of a building which is designed or used for the presentation of plays, demonstrations or other entertainment wherein scenery, drops or other effects may be installed or used.

**Stairway:** One or more flights of stairs, and the necessary landings and platforms connecting them, to form a continuous and uninterrupted passage from one floor to another. A flight of stairs, for the purposes of this code, shall have at least three risers.

**Standpipe:** A wet or dry fire pipe line, extending from the lowest to the topmost story of a building or structure, equipped with a shutoff valve with hose outlets at every story (see Section 1711.0).

**Steel construction, cold formed:** That type of construction made up entirely, or in part, of steel structural members cold formed to shape from sheet or strip steel such as roof deck, floor and wall panels, studs, floor joists, roof joists and other structural elements.

**Steel joist:** Any secondary steel member of a building or structure made of hot or cold formed solid or open web sections, or riveted or welded bar, strip or sheet steel members, or slotted and expanded, or otherwise deformed rolled sections.

**Steel member, structural:** Any primary or secondary member of a building or

structure consisting of a rolled steel structural shape other than cold formed steel, light gage steel or steel joist members.

**Story:** That portion of a building comprised between a floor and the floor or roof next above which is not a basement or attic (also see "Mezzanine").

**Street:** A public thoroughfare (such as street, avenue or boulevard) which has been dedicated for public use.

**Structure:** That which is built or constructed.

**Thermal resistance (*R*):** A measure of the ability to retard the flow of heat. The *R* value is the reciprocal of a heat transfer coefficient as expressed by *U*; thus $R = 1/U$ (see Article 25).

**Thermal transmittance (*U*):** Overall coefficient of heat transmission or thermal transmittance (air to air) expressed in units of Btu per hour per square foot per degrees F. (watts per square meter per degree K.). It is the time rate of heat flow. The *U* value applies to combinations of different materials used in series along the heat flow path and also to single materials that comprise a building section and includes cavity air spaces and surface air films on both sides.

**Thermal transmittance ($U_o$):** Overall (average) heat transmission or thermal transmittance of a gross area of the exterior building envelope, expressed in units of Btu per hour per square foot per degrees F. (watts per square meter per degree K.). The $U_o$ value applies to the combined effect of the time rate of heat flows through the various parallel paths, such as windows, doors and opaque construction areas, comprising the gross area of one or more exterior building components, such as walls, floor or roof/ceiling.

**Tile:** A ceramic surface unit, usually relatively thin in relation to facial area, made from clay or a mixture of clay and other ceramic materials, called the body of the tile, having either "glazed" or "unglazed" face and fired above red heat in the course of manufacture to a temperature sufficiently high to produce specific physical properties and characteristics.

**Tile, structural clay:** A hollow masonry unit composed of burned clay, shale, fire clay or mixtures thereof, and having parallel cells.

**Use (used):** The purpose for which the building or structure is designed, used or intended to be used.

**Use, accessory:** A use incidental to the principal use of a building as defined or limited by the provisions of the local zoning laws.

**Use group:** The classification of a building or structure based on the purpose for which it is used as listed in Article 3.

Use Group A assembly (see Section 302.0).
Use Group B business (see Section 303.0).
Use Group F factory and industrial (see Section 304.0).
Use Group H high hazard (see Section 305.0).
Use Group I institutional (see Section 306.0).

Use Group M mercantile (see Section 307.0).
Use Group R residential (see Section 308.0).
Use Group S storage (see Section 309.0).
Use Group T temporary and miscellaneous (see Section 310.0).

**Ventilation:** The process of supplying air to, or removing air from, any space. Such air may or may not have been conditioned.

**Ventilation, mechanical:** The mechanical process of supplying air to, or removing air from, any space.

**Vertical opening:** An opening through a floor or roof.

**Wall**

**Apron wall:** That portion of a skeleton wall below the sill of a window.

**Bearing wall:** A wall supporting any vertical load in addition to its own weight.

**Cavity wall:** A wall built of masonry units or of plain concrete, or a combination of these materials, arranged to provide an air space within the wall, and in which the inner and outer parts of the wall are tied together with metal ties.

**Composite wall:** A wall built of a combination of two or more masonry units of different materials bonded together, one forming the backup and the other the facing elements.

**Curtain wall:** A nonbearing enclosure wall not supported at each story.

**Faced wall:** A wall in which the masonry facing and backing are so bonded as to exert common action under load.

**Fire separation wall:** A fireresistance rated assembly of materials having protected openings, and designed to restrict the spread of fire (see Section 1409.0).

**Fire wall:** A fireresistance rated wall, having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof (see Section 1407.0).

**Foundation wall:** A wall below the floor nearest grade serving as a support for a wall, pier, column or other structural part of a building.

**Hollow wall:** A wall built of masonry units so arranged as to provide an air space within the wall, and in which the facing and backing of the wall are bonded together with masonry units.

**Nonbearing wall:** A wall which does not support vertical loads other than its own weight.

**Parapet wall:** That part of any wall entirely above the roof line.

**Party wall:** A fire wall on an interior lot line used or adapted for joint service between two buildings (see Section 1407.0).

**Retaining wall:** A wall designed to resist the lateral displacement of soil or other material.

**Skeleton or panel wall:** A nonbearing wall supported by each story on a skeleton frame.

**Spandrel wall:** That portion of a skeleton wall above the head of a window or door.

**Veneered wall:** A wall having a facing of masonry or other weather resisting noncombustible materials securely attached to the backing, but not so bonded as to exert common action under load.

**Water spray fixed system:** A system using water in a form having a predetermined pattern, particle size, velocity and density discharged from specially designed nozzles or devices.

**Water supply, automatic:** Water supplied through a gravity or pressure tank or automatically operated fire pumps, or from a direct connection to an approved municipal water main (see Section 1712.0).

**Width**

**Inner court:** As applied to an inner court, means its least horizontal dimension.

**Outer court:** As applied to an outer court, means the shortest horizontal dimension measured in a direction substantially parallel with the principal open end of such court.

**Winder:** A step in a winding stairway.

**Window**

**Bay window:** A window projecting beyond the wall line of the building and down to the foundation.

**Fire window:** A window constructed and glazed to give protection against the passage of fire (see Section 1416.0).

**Oriel window:** A window projected beyond and suspended from the wall of the building or cantilevered therefrom.

**Writing:** The term shall be construed to include handwriting, typewriting, printing, photo offset or any other form of reproduction in legible symbols or characters.

**Written notice:** A notification in writing delivered in person to the individual or parties intended; or delivered at, or sent by certified or registered mail to the last residential or business address of legal record.

**Yard:** An unoccupied open space other than a court.

**Zoning:** The reservation of certain specified areas within a community or city for building and structures, or use of land, for certain purposes with other limitations such as height, lot coverage and other stipulated requirements.

# ARTICLE 3

## USE GROUP CLASSIFICATION

### SECTION 300.0 GENERAL

**300.1 Scope:** The provisions of this article shall control the classification of all buildings and structures as to use group.

**300.2 Application of other laws:** The provisions of this article shall not be deemed to nullify any provisions of the zoning law or any other law of a jurisdiction pertaining to the location or use of buildings, except as may be specifically required by the provisions of this code.

### SECTION 301.0 CLASSIFICATION

**301.1 General:** All buildings and structures shall be classified with respect to use in one of the use groups listed below.

1. Use Group A assembly (see Section 302.0).
2. Use Group B business (see Section 303.0).
3. Use Group F factory and industrial (see Section 304.0).
4. Use Group H high hazard (see Section 305.0).
5. Use Group I institutional (see Section 306.0).
6. Use Group M mercantile (see Section 307.0).
7. Use Group R residential (see Section 308.0).
8. Use Group S storage (see Section 309.0).
9. Use Group T temporary and miscellaneous (see Section 310.0).

**301.2 Fire grading of buildings:** All buildings and structures shall be graded in accordance with the degree of fire hazard of their use in terms of hours and fractions of an hour and as regulated by Section 1402.0.

**301.3 New uses:** The building official shall establish by approved rules the degree of hazard involved and the fire grading of any use not specifically provided for in this code.

### SECTION 302.0 USE GROUP A, ASSEMBLY BUILDINGS

**302.1 General:** All buildings and structures, or parts thereof, shall be classified in Use Group A which are used or designed for places of assembly as defined in this code. Assembly type uses with a total occupant load less than 50 shall be classified as Use Group B.

**302.2 Use Group A-1, theaters:** Buildings of Use Group A-1 shall be further classified as described in Sections 302.2.1 and 302.2.2.

**302.2.1 Use Group A-1-A structures:** This use group shall include all theaters and other buildings used primarily for theatrical or operatic performances and exhibitions, arranged with a raised stage, proscenium curtain, fixed or portable scenery loft, lights, motion picture booth, mechanical appliances or other theatrical accessories and equipment, and provided with fixed seats.

**302.2.2 Use Group A-1-B structures:** This use group shall include all theaters without a stage and equipped with fixed seats used for motion picture performances.

**302.3 Use Group A-2 structures:** This use group shall include all buildings and places of public assembly, without theatrical stage accessories, designed for use as dance halls, night clubs and for similar purposes including all rooms, lobbies and other spaces connected thereto with a common means of egress and entrance.

**302.4 Use Group A-3 structures:** This use group shall include all buildings with or without an auditorium in which persons assemble for amusement, entertainment or recreation, and incidental motion picture, dramatic, theatrical or educational presentations, lectures or other similar purposes without theatrical stage other than a raised platform; and principally used without permanent seating facilities, including art galleries, exhibition halls, museums, lecture halls, libraries, restaurants other than night clubs, and recreation centers; and buildings designed for other similar assembly purposes including passenger terminals.

**302.5 Use Group A-4 structures:** This use group shall include all buildings used as churches, schools, colleges, child day care centers and for similar educational and religious purposes.

**302.6 Use Group A-5 structures:** This use group shall include grandstands, bleachers, coliseums, stadiums, drive-in theaters, tents and similar structures for outdoor assembly use; and shall comply with the provisions of this code for special uses and occupancies (see Article 6).

**302.7 Regulations guide:** The following listing contained in Table 302.7 is a guide to the principal requirements of this code applicable to Use Group A. They are not necessarily the only, nor all, of the provisions with which compliance is required. Omission of reference to any provision shall not nullify any requirement of this code, nor exempt any structure from such requirement.

**Table 302.7**
**ASSEMBLY BUILDINGS REGULATIONS GUIDE**

| | |
|---|---|
| Types of construction: | Construction classification 401.0<br>Historic buildings 516.0<br>Places of public assembly 617.0<br>Stadiums and grandstands 619.0<br>Drive-in motion picture theaters 620.0 |

**Table 302.7 (cont'd.)**
**ASSEMBLY BUILDINGS REGULATIONS GUIDE**

| | |
|---|---|
| Allowable area: | General area limitations 505.0<br>Area exceptions 506.0<br>Subdivision of attic spaces 1420.0<br>Unlimited areas 507.0<br>Unlimited area, school bldg. 507.1.1<br>Unlimited area, indoor recreation 507.1.2 |
| Allowable height: | General height limitations 505.0<br>Height exceptions 508.0 |
| Fire separations: | Fire walls and party walls 1407.0<br>Fire separation walls 1409.0<br>Elevator opening protectives 2112.0<br>Automatic fire doors and dampers 1403.0<br>Mixed use and occupancy 312.0<br>Vertical shafts 1410.0<br>Fireresistance rated floor/roof assemblies 1412.0 |
| Exterior wall protection: | Exterior walls 1406.0<br>Exterior opening protectives 1414.0<br>Glazing of unprotected openings 2402.0 |
| Fire limit requirements: | Restrictions within fire limits 502.0<br>Restrictions outside fire limits 503.0<br>Roof structures 1426.0 |
| Fireresistance: | Fire hazard classification 1402.0<br>Fireresistance tests 1403.0<br>Skylights 1426.3<br>Opening protectives 1403.3<br>Fire-retardant treated wood 1403.5<br>Fireresistance of structural members 1411.0<br>Fireresistance rated floor/roof assemblies 1412.0<br>Roof construction 1413.0<br>Fire windows and shutters 1416.0<br>Firestopping 1420.0<br>Balconies 1425.4<br>Roof structures 1426.0<br>Roof coverings 1427.0<br>Refuse vaults, enclosure requirements 1608.0<br>Grade floor protection 1405.7 |
| Interior finish: | Interior finish and trim 1421.0<br>Application of interior finish 1422.0<br>Flameresistance tests 1404.0<br>Decorative material restrictions 1424.0 |
| Means of egress: | Occupant load 806.0<br>Location 807.0<br>Capacity 808.0<br>Number of exits 809.0<br>Exit access corridors 810.0<br>Grade passageways 811.0<br>Means of egress doorways 812.0<br>Horizontal exits 814.0<br>Interior exit stairways 816.0<br>Access to roof 817.0<br>Exit signs 823.0 |

**Table 302.7 (cont'd.)**
**ASSEMBLY BUILDINGS REGULATIONS GUIDE**

| | |
|---|---|
| Means of egress: (continued) | Means of egress lighting 824.0<br>Elevator, exit restrictions 2109.0<br>Smokeproof enclosures 818.0<br>Exterior exit stairways 819.0<br>Panic hardware 812.5.4 (see also Section 617.0) |
| Fire protection systems: | Water sprinkler systems 1704.0<br>Fire suppression systems 1702.0<br>Standpipe systems 1711.0<br>Fire department connections 1713.0<br>Water supply 1714.0<br>Manual fire alarm systems 1717.0<br>Supervision 1718.0 |
| Vertical openings: | Shafts 1410.0<br>Firestopping 1420.0<br>Vertical shafts and hoistways 1410.0<br>Hoistway enclosures and venting 2108.0<br>Open wells and atriums 631.0 |
| Hazardous area: | Boiler and equipment rooms 600.5<br>Segregation of storage space 600.6<br>Existing buildings 605.0<br>Pyroxylin plastics 607.0<br>Inspection of hazardous uses 603.1 |
| Light and ventilation: | Bath and toilet rooms 711.0<br>Ventilation of shafts 1410.0<br>Artificial light and ventilation 704.0<br>Natural light and ventilation 706.0<br>Air conditioning, refrigeration and mechanical ventilation (see mechanical code listed in Appendix A)<br>Skylights 2405.0 |
| Sanitation: | Plumbing and drainage Article 22<br>Termite protection 1317.0<br>Handicapped, plumbing fixtures 515.8 |
| Electrical wiring: | Article 20 |
| Motion picture projection rooms: | Use and storage of flammable films 608.0<br>Projection rooms, construction 608.3 |
| Stages and platforms: | Stage construction 617.6<br>Dressing rooms 617.7 |
| Provisions for the handicapped and aged: | Section 515.0 |
| Energy conservation: | Article 25 |

## SECTION 303.0 USE GROUP B, BUSINESS BUILDINGS

**303.1 General:** All buildings and structures, or parts thereof, shall be classified in Use Group B which are used for the transaction of business, for the rendering of professional services, or for other services that involve stocks of goods, wares or merchandise in limited quantities for use incidental to office uses or sample purposes; including among others offices, banks, civic admin-

istration activities, fire houses, outpatient clinics, police stations, professional services, testing and research laboratories, radio stations, telephone exchanges, motor fuel service stations and similar establishments.

**303.2 Regulations guide:** The following listing contained in Table 303.2 is a guide to the principal requirements of this code applicable to Use Group B. They are not necessarily the only, nor all, of the provisions with which compliance is required. Omission of reference to any provision shall not nullify any requirement of this code, nor exempt any structure from such requirement.

**Table 303.2**
**BUSINESS BUILDINGS REGULATIONS GUIDE**

| | |
|---|---|
| Types of construction: | Construction classification 401.0<br>Mixed use and occupancy 312.0<br>Historic buildings 516.0<br>Motor fuel service stations 615.0<br>Open parking structures 628.0<br>High rise buildings 629.0 |
| Allowable area: | General area limitations 505.0<br>Area exceptions 506.0<br>Subdivision of attic spaces 1420.0<br>Unlimited area buildings 507.0 |
| Allowable height: | General height limitations 505.0<br>Height exceptions 508.0 |
| Fire separations: | Fire walls and party walls 1407.0<br>Fire separation walls 1409.0<br>Elevator opening protectives 2112.0<br>Automatic fire doors and dampers 1403.0<br>Mixed use and occupancy 312.0<br>Vertical shafts 1410.0<br>Fireresistance rated floor/roof assemblies 1412.0 |
| Exterior wall protection: | Exterior walls 1406.0<br>Exterior opening protectives 1414.0<br>Glazing of unprotected openings 2402.0 |
| Fire limit requirements: | Restrictions within fire limits 502.0<br>Restrictions outside fire limits 503.0<br>Roof structures 1426.0 |
| Fireresistance: | Fire hazard classification 1402.0<br>Fireresistsance tests 1403.0<br>Skylights 1426.3<br>Opening protectives 1403.3<br>Fire-retardant treated wood 1403.5<br>Fireresistance of structural members 1411.0<br>Fireresistance rated floor/roof assemblies 1412.0<br>Roof construction 1413.0<br>Fire windows and shutters 1416.0<br>Firestopping 1420.0<br>Balconies 1425.4<br>Roof structures 1426.0<br>Roof coverings 1427.0 |

Table 303.2 (cont'd.)
BUSINESS BUILDINGS REGULATIONS GUIDE

| | |
|---|---|
| Fireresistance (continued) | Refuse vaults, enclosure requirements 1608.0<br>Shipping areas 1405.5<br>Grade floor protection 1405.7 |
| Interior finish: | Interior finish and trim 1421.0<br>Application of interior finish 1422.0<br>Flameresistance tests 1404.0 |
| Means of egress: | Occupant load 806.0<br>Location 807.0<br>Capacity 808.0<br>Number of exits 809.0<br>Exit access corridors 810.0<br>Grade passageways 811.0<br>Means of egress doorways 812.0<br>Horizontal exits 814.0<br>Interior exit stairways 816.0<br>Access to roof 817.0<br>Exit signs 823.0<br>Means of egress lighting 824.0<br>Elevator, exit restrictions 2109.0<br>Smokeproof enclosures 818.0<br>Exterior exit stairways 819.0<br>Buildings with one exit 809.3 |
| Fire protection systems: | Water sprinkler systems 1704.0<br>Fire suppression systems 629.0 and Article 17<br>Standpipe systems 1711.0<br>Fire department connections 1713.0<br>Water supply 1714.0<br>Automatic fire alarm systems 1716.0<br>Manual fire alarm systems 1717.0<br>Supervision 1718.0 |
| Vertical openings: | Shafts 1410.0<br>Firestopping 1420.0<br>Vertical shafts and hoistways 1410.0<br>Hoistway enclosures and venting 2108.0<br>Open wells and atriums 631.0 |
| Hazardous area: | Boiler and equipment rooms 600.5<br>Segregation of storage space 600.6<br>Existing buildings 605.0<br>Pyroxylin plastics 607.0 |
| Light and ventilation: | Bath and toilet rooms 711.0<br>Ventilation of shafts 1410.0<br>Artificial light and ventilation 704.0<br>Natural light and ventilation 706.0<br>Air conditioning, refrigeration and mechanical ventilation (see mechanical code listed in Appendix A)<br>Skylights 2405.0 |
| Sanitation: | Plumbing and drainage Article 22<br>Termite protection 1317.0<br>Handicapped, plumbing fixtures 515.8 |
| Electrical wiring: | Article 20 |

Table 303.2 (cont'd)
BUSINESS BUILDINGS REGULATIONS GUIDE

| | |
|---|---|
| Provisions for the handicapped and aged: | Section 515.0 |
| Energy conservation: | Article 25 |

## SECTION 304.0 USE GROUP F, FACTORY AND INDUSTRIAL BUILDINGS

**304.1 General:** All buildings and structures, or parts thereof, in which occupants are engaged in performing work or labor in the fabricating, assembling or processing of products or materials, shall be classified in Use Group F; including, among others, factories, assembling plants, industrial laboratories and all other industrial and manufacturing uses, except those of Use Group H involving highly combustible, flammable or explosive products and materials.

**304.2 List of factory and industrial uses:** The manufacturing processes listed in the following Table 304.2 shall be indicative of, and include, the uses permitted in Use Group F buildings.

Table 304.2
USE GROUP F, FACTORY AND INDUSTRIAL USES

| | |
|---|---|
| Bakeries | Ice plants |
| Boiler works | Leather and tanneries, excluding enameling or japanning |
| Breweries | Millwork and woodworking |
| Canneries, including food products | Sugar refineries |
| Condensed and powdered milk manufacture | Tenant factories, excluding ladies' dresses and other high hazard uses |
| Dry cleaning using other than volatile flammable liquids in cleaning or dyeing operations or other than classified in Table 305.2 | Textile mills, including canvas, cotton cloth, bagging, burlap, carpets and rags |
| Electric light plants and power houses | Upholstery and manufacturing shops |
| Electrolytic reducing works | Water pumping plants |
| Glass plants | |

**304.3 Special industrial uses:** All buildings and structures designed to house low hazard industrial processes, including, among others, the production and distribution of electric, gas or steam power and rolling mills and foundries, requiring large areas and unusual heights to accommodate craneways or special machinery and equipment, shall be exempt from the height and area limitations of Table 505.

**304.3.1 Construction:** Buildings and structures for such special industrial uses shall comply with the requirements of Section 507.0, except as to height and fire separation, and when of Types 1 or 2 construction may have balconies and mezzanine floors which do not exceed two thirds the area of the main floor in any one tier.

**304.3.2 Exterior walls:** The exterior walls of buildings of such low hazard industrial uses shall be constructed of approved noncombustible and weather

resisting materials, and, when located with a fire separation of less than 30 feet (9144 mm) shall be protected or constructed to provide a fireresistance rating of not less than two hours.

**304.3.3 Fire protection systems:** Special use industrial buildings as herein defined shall comply with the requirements of Article 17 for fire protection systems; except that the provisions of Section 507.0 for automatic fire suppression systems in unlimited area buildings may be waived by the building official when such installations would be detrimental or dangerous to the specific use and occupancy.

**304.4 Regulations guide:** The following listing contained in Table 304.4 is a guide to the principal requirements of this code applicable to Use Group F. They are not necessarily the only, nor all, of the provisions with which compliance is required. Omission of reference to any provision shall not nullify any requirement of this code, nor exempt any structure from such requirement.

**Table 304.4**
**FACTORY AND INDUSTRIAL BUILDINGS REGULATIONS GUIDE**

| | |
|---|---|
| Types of construction: | Construction classification 401.0<br>Mixed use and occupancy 312.0<br>Historic buildings 516.0 |
| Allowable area: | General area limitations 505.0<br>Area exceptions 506.0<br>Subdivision of attic spaces 1420.0<br>Unlimited area buildings 507.0 |
| Allowable height: | General height limitations 505.0<br>Height exceptions 508.0 |
| Fire separations: | Fire walls and party walls 1407.0<br>Fire separation walls 1409.0<br>Elevator opening protectives 2112.0<br>Automatic fire doors and dampers 1403.0<br>Mixed use and occupancy 312.0<br>Vertical shafts 1410.0<br>Fireresistance rated floor/roof assemblies 1412.0 |
| Exterior wall protection: | Exterior walls 1406.0<br>Exterior opening protectives 1414.0<br>Glazing of unprotected openings 2402.0 |
| Fire limit requirements: | Restrictions within fire limits 502.0<br>Restrictions outside fire limits 503.0<br>Roof structures 1426.0 |
| Fireresistance: | Fire hazard classification 1402.0<br>Fireresistance tests 1403.0<br>Skylights 1426.3<br>Opening protectives 1403.3<br>Fire-retardant treated wood 1403.5<br>Fireresistance of structural members 1411.0<br>Fireresistance rated floor/roof assemblies 1412.0 |

Table 304.4 (cont'd.)
FACTORY AND INDUSTRIAL BUILDINGS REGULATIONS GUIDE

| | |
|---|---|
| Fireresistance: (continued) | Roof construction 1413.0<br>Fire windows and shutters 1416.0<br>Firestopping 1420.0<br>Balconies 1425.0<br>Roof structures 1426.0<br>Roof coverings 1427.0<br>Refuse vaults, enclosure requirements 1608.0<br>Grade floor protection 1405.7 |
| Interior finish: | Interior finish and trim 1421.0<br>Application of interior finish 1422.0<br>Flameresistance tests 1404.0 |
| Means of egress: | Occupant load 806.0<br>Location 807.0<br>Capacity 808.0<br>Number of exits 809.0<br>Exit access corridors 810.0<br>Grade passageways 811.0<br>Means of egress doorways 812.0<br>Horizontal exits 814.0<br>Interior exit stairways 816.0<br>Access to roof 817.0<br>Exit signs 823.0<br>Means of egress lighting 824.0<br>Elevator, exit restrictions 2109.0<br>Smokeproof enclosures 818.0<br>Exterior exit stairways 819.0 |
| Fire protection systems: | Water sprinkler systems 1704.0<br>Fire suppression systems 1702.0<br>Standpipe systems 1711.0<br>Fire department connections 1713.0<br>Water supply 1714.0<br>Supervision 1718.0 |
| Vertical openings: | Shafts 1410.0<br>Firestopping 1420.0<br>Vertical shafts and hoistways 1410.0<br>Hoistway enclosures and venting 2108.0 |
| Hazardous area: | Boiler and equipment rooms 600.5<br>Segregation of storage space 600.6<br>Existing buildings 605.0<br>Pyroxylin plastics 607.0<br>Special permits 604.0<br>Paint spraying 611.0<br>Dry cleaning establishments 612.0 |
| Light and ventilation: | Bath and toilet rooms 711.0<br>Ventilation of shafts 1410.0<br>Artificial light and ventilation 704.0<br>Natural light and ventilation 706.0<br>Air conditioning, refrigeration and mechanical ventilation (see mechanical code listed in Appendix A)<br>Skylights 2405.0<br>Drying rooms 1606.0 |

Table 304.4 (cont'd.)
FACTORY AND INDUSTRIAL BUILDINGS REGULATIONS GUIDE

| | |
|---|---|
| Sanitation: | Plumbing and drainage Article 22<br>Termite protection 1317.0<br>Handicapped, plumbing fixtures 515.8 |
| Electrical wiring: | Article 20 |
| Provisions for the handicapped and aged: | Section 515.0 |
| Energy conservation: | Article 25 |

## SECTION 305.0 USE GROUP H, HIGH HAZARD BUILDINGS

**305.1 General:** All buildings and structures, or parts thereof, shall be classified in Use Group H which are used for the storage, manufacture or processing of highly combustible or explosive products or materials, which are likely to burn with extreme rapidity, or which may produce poisonous fumes or explosions; for storage or manufacturing which involves highly corrosive, toxic or noxious alkalies, acids or other liquids or chemicals producing flame, fumes, poisonous, irritant or corrosive gases; and for the storage or processing of any materials producing explosive mixtures of dust, or which result in the division of matter into fine particles subject to spontaneous ignition.

**305.2 List of high hazard uses:** The processes, materials and manufactures listed in the following Table 305.2 are indicative of and shall be classified as Use Group H.

Table 305.2
USE GROUP H, HIGH HAZARD USES

Acetylene gas and gases under pressure of 15 pounds (103.43 kPa) or more and in quantities of greater than 2500 cubic feet (70 $m^3$); including hydrogen, illuminating, natural, ammonia, chlorine, phosgene, sulphur dioxide, carbon monoxide, methyl oxide and all gases subject to explosion, fume or toxic hazard

Ammunition, explosives and fireworks manufacture

Artifical flowers and synthetic leather manufacture

Celluloid and celluloid products

Cereal, feed, flour and grist mills

Cotton batting and cotton waste processes

Cotton dressmaking

Dry cleaning establishments using or storing more than 3 gallons (0.011 $m^3$) of gasoline or other hazardous liquids with a flash point under 100 degrees F. (37.78 degrees C.), or more than 60 gallons (0.23 $m^3$) of volatile flammable liquids with flash point between 100 degrees F. (37.78 degrees C.) and 140 degrees F. (60 degrees C.) in a closed-cup tester (ASTM D56).

Feather renovating

Fruit ripening processes

Grain elevators

Hydrogenation processes

Industries employing solids or substances which ignite or produce flammable gases on contact with water

Kerosene, fuel, lubricating, or any oil storage with a flash point under 200 degrees F. (93.33 degrees C.)

Match manufacture or storage

Metal enameling or japanning

Nitrocellulose film exchanges and laboratories

Paint and varnish manufacture

Paint spraying or dipping

Petroleum manufacture

Processing of paper or cardboard in loose form

**Table 305.2 (cont'd.)**
**USE GROUP H, HIGH HAZARD USES**

| | |
|---|---|
| Pyroxylin products manufacture and storage | Straw goods manufacture or broom corn storage |
| Rag sorting and storage | Sugar and starch pulverizing mills |
| Refrigerating systems using high hazard refrigerants as defined in the mechanical code | Tar, pitch or resin processing |
| | Tanneries with enameling or japanning |
| Shoddy mills | Tire storage warehouse |
| Shoe polish manufacture | Waste paper sorting, shredding, storage or baling |
| Smoke houses (industrial) | |

**305.3 Regulations guide:** The following listing contained in Table 305.3 is a guide to the principal requirements of this code applicable to Use Group H. They are not necessarily the only, nor all, of the provisions with which compliance is required. Omission of reference to any provision shall not nullify any requirement of this code, nor exempt any structure from such requirement.

**Table 305.3**
**HIGH HAZARD BUILDINGS REGULATIONS GUIDE**

| | |
|---|---|
| Types of construction: | Construction classification 401.0<br>Mixed use and occupancy 312.0<br>Historic buildings 516.0<br>Special high hazards 600.2 |
| Allowable area: | General area limitations 505.0<br>Area exceptions 506.0<br>Subdivision of attic spaces 1420.0 |
| Allowable height: | General height limitations 505.0<br>Height exceptions 508.0 |
| Fire separations: | Fire walls and party walls 1407.0<br>Fire separation walls 1409.0<br>Elevator opening protectives 2112.0<br>Automatic fire doors and dampers 1403.0<br>Mixed use and occupancy 312.0<br>Vertical shafts 1410.0<br>Fireresistance rated floor/roof assemblies 1412.0 |
| Exterior wall protection: | Exterior walls 1406.0<br>Exterior opening protectives 1414.0<br>Glazing of unprotected openings 2402.0 |
| Fire limit requirements: | Restrictions within fire limits 502.0<br>Restrictions outside fire limits 503.0<br>Roof structures 1426.0 |
| Fireresistance: | Fire hazard classification 1402.0<br>Fireresistance tests 1403.0<br>Skylights 1426.3<br>Opening protectives 1403.3<br>Fire-retardant treated wood 1403.5<br>Fireresistance of structural members 1411.0<br>Fireresistance rated floor/roof assemblies 1412.0<br>Roof construction 1413.0 |

**Table 305.3 (cont'd.)**
**HIGH HAZARD BUILIDNGS REGULATIONS GUIDE**

| | |
|---|---|
| Fireresistance (continued): | Fire windows and shutters 1416.0<br>Firestopping 1420.0<br>Balconies 1425.0<br>Roof structures 1426.0<br>Roof coverings 1427.0<br>Refuse vaults, enclosure requirements 1608.0<br>Grade floor protection 1405.7 |
| Interior finish: | Interior finish and trim 1421.0<br>Application of interior finish 1422.0<br>Flameresistance tests 1404.0 |
| Means of egress: | Occupant load 806.0<br>Location 807.0<br>Capacity 808.0<br>Number of exits 809.0<br>Exit access corridors 810.0<br>Grade passageways 811.0<br>Means of egress doorways 812.0<br>Horizontal exits 814.0<br>Interior exit stairways 816.0<br>Access to roof 817.0<br>Exit signs 823.0<br>Means of egress lighting 824.0<br>Elevator, exit restrictions 2109.0<br>Exterior exit stairway 819.0<br>Slidescapes 822.0 |
| Fire protection systems: | Water sprinkler systems 1704.0<br>Fire suppression systems 1702.0<br>Standpipe systems 1711.0<br>Fire department connections 1713.0<br>Water supply 1714.0<br>Supervision 1718.0 |
| Vertical openings: | Shafts 1410.0<br>Firestopping 1420.0<br>Vertical shafts and hoistways 1410.0<br>Hoistway enclosures and venting 2108.0<br>Open wells and atriums 631.0 |
| Hazardous area: | Boiler and equipment rooms 600.5<br>Segregation of storage space 600.6<br>Existing buildings 605.0<br>Pyroxylin plastics 607.0<br>Explosion hazards 601.0<br>Volatile flammables 602.0<br>Inspection of hazardous uses 603.1<br>Special permits 604.0<br>Combustible dusts, grain processing and storage 610.0<br>Combustible fibers, construction requirements 609.2<br>Paint spraying 611.0<br>Dry cleaning establishments 612.0 |
| Light and ventilation: | Bath and toilet rooms 711.0<br>Ventilation of shafts 1410.0<br>Artificial light and ventilation 704.0<br>Natural light and ventilation 706.0 |

Table 305.3 (cont'd.)
HIGH HAZARD BUILIDNGS REGULATIONS GUIDE

| | |
|---|---|
| Light and ventilation: (continued) | Air conditioning, refrigeration and mechanical ventilation (see mechanical code listed in Appendix A)<br>Skylights 2405.0 |
| Sanitation: | Plumbing and drainage Article 22<br>Termite protection 1317.0<br>Handicapped, plumbing fixtures 515.8 |
| Electrical wiring: | Article 20 |
| Provisions for the handicapped and aged: | Section 515.0 |
| Energy conservation: | Article 25 |

## SECTION 306.0 USE GROUP I, INSTITUTIONAL BUILDINGS

**306.1 General:** All buildings and structures, or parts thereof, shall be classified in Use Group I in which people suffering from physical limitations because of health or age are harbored for medical or other care or treatment, or in which people are detained for penal or correction purposes, or in which the liberty of the inmates is restricted.

**306.2 Use Group I-1:** This use group shall include all buildings designed for the detention of people under restraint, including, among others, jails, prisons, reformatories, insane asylums and similar uses.

**306.3 Use Group I-2:** This use group shall include all buildings used for housing people suffering from physical limitations because of health or age, including, among others, day nurseries, hospitals, sanitariums, infirmaries, orphanages and homes for aged and infirm.

**306.4 Regulations guide:** The following listing contained in Table 306.4 is a guide to the principal requirements of this code applicable to Use Group I. They are not necessarily the only, nor all, of the provisions with which compliance is required. Omission of reference to any provision shall not nullify any requirement of this code, nor exempt any structure from such requirement.

Table 306.4
INSTITUTIONAL BUILDINGS REGULATIONS GUIDE

| | |
|---|---|
| Types of construction: | Construction classification 401.0<br>Mixed use and occupancy 312.0<br>Historic buildings 516.0 |
| Allowable area: | General area limitations 505.0<br>Area exceptions 506.0<br>Subdivision of attic spaces 1420.0<br>Unlimited area buildings 507.0 |
| Allowable height: | General height limitations 505.0<br>Height exceptions 508.0 |

Table 306.4 (cont'd.)
INSTITUTIONAL BUILDINGS REGULATIONS GUIDE

| | |
|---|---|
| Fire separations: | Fire walls and party walls 1407.0<br>Fire separation walls 1409.0<br>Elevator opening protectives 2112.0<br>Automatic fire doors and dampers 1403.0<br>Mixed use and occupancy 312.0<br>Vertical shafts 1410.0<br>Fireresistance rated floor/roof assemblies 1412.0 |
| Exterior wall protection: | Exterior walls 1406.0<br>Exterior opening protectives 1414.0<br>Glazing of unprotected openings 2402.0 |
| Fire limit requirements: | Restrictions within fire limits 502.0<br>Restrictions outside fire limits 503.0<br>Roof structures 1426.0 |
| Fireresistance: | Fire hazard classification 1402.0<br>Fireresistance tests 1403.0<br>Skylights 1426.3<br>Opening protectives 1403.3<br>Fire-retardant treated wood 1403.5<br>Fireresistance of structural members 1411.0<br>Fireresistance rated floor/roof assemblies 1412.0<br>Roof construction 1413.0<br>Fire windows and shutters 1416.0<br>Firestopping 1420.0<br>Balconies 1425.0<br>Roof structures 1426.0<br>Roof coverings 1427.0<br>Refuse vaults, enclosure requirements 1608.0<br>Grade floor protection 1405.7 |
| Interior finish: | Interior finish and trim 1421.0<br>Application of interior finish 1422.0<br>Flameresistance tests 1404.0 |
| Means of egress: | Occupant load 806.0<br>Location 807.0<br>Capacity 808.0<br>Number of exits 809.0<br>Exit access corridors 810.0<br>Grade passageways 811.0<br>Means of egress doorways 812.0<br>Horizontal exits 814.0<br>Interior exit stairways 816.0<br>Access to roof 817.0<br>Exit signs 823.0<br>Means of egress lighting 824.0<br>Elevator, exit restrictions 2109.0<br>Smokeproof enclosures 818.0<br>Slidescapes 822.0<br>Revolving doors 813.0 |
| Fire protection systems: | Water sprinkler systems 1704.0<br>Fire suppression systems 1702.0<br>Standpipe systems 1711.0<br>Fire department connections 1713.0<br>Water supply 1714.0 |

Table 306.4 (cont'd.)
INSTITUTIONAL BUILDINGS REGULATIONS GUIDE

| | |
|---|---|
| Fire protection systems: (continued) | Fire emergency ventilating system 716.0<br>Automatic fire alarm systems 1716.0<br>Supervision 1718.0 |
| Vertical openings: | Shafts 1410.0<br>Firestopping 1420.0<br>Vertical shafts and hoistways 1410.0<br>Hoistway enclosures and venting 2108.0<br>Open wells 631.0 |
| Hazardous area: | Boiler and equipment rooms 600.5<br>Segregation of storage space 600.6<br>Existing buildings 605.0<br>Pyroxylin plastics 607.0 |
| Light and ventilation: | Bath and toilet rooms 711.0<br>Ventilation of shafts 1410.0<br>Artificial light and ventilation 704.0<br>Natural light and ventilation 706.0<br>Air conditioning, refrigeration and mechanical ventilation (see mechanical code listed in Appendix A)<br>Skylights 2405.0 |
| Sanitation: | Plumbing and drainage Article 22<br>Termite protection 1317.0<br>Handicapped, plumbing fixtures 515.8 |
| Electrical wiring: | Article 20 |
| Provisions for the handicapped and aged: | Section 515.0 |
| Energy conservation: | Article 25 |

## SECTION 307.0 USE GROUP M, MERCANTILE BUILDINGS

**307.1 General:** All buildings and structures, or parts thereof, shall be classified in Use Group M which are used for display and sales purposes involving stocks of goods, wares or merchandise incidental to such purposes and accessible to the public; including, among others, retail stores, shops and salesrooms and markets. Highly combustible goods, such as merchandise made of pyroxylin products, shall be limited to small quantities that do not constitute a high hazard; and if not so limited, the construction shall comply with the requirements for Use Group H as set forth in the provisions of Article 6 and Tables 401 and 505.

**307.2 Regulations guide:** The following listing contained in Table 307.2 is a guide to the principal requirements of this code applicable to Use Group M. They are not necessarily the only, nor all, of the provisions with which compliance is required. Omission of reference to any provision shall not nullify any requirement of this code, nor exempt any structure from such requirement.

**Table 307.2**
**MERCANTILE BUILDINGS REGULATIONS GUIDE**

| | |
|---|---|
| Types of construction: | Construction classification 401.0<br>Mixed use and occupancy 312.0<br>Historic buildings 516.0<br>Tents and air supported structures 621.0<br>Radio and television towers 625.0<br>Radio and television antennae 626.0<br>Open parking structures 628.0<br>Covered malls 630.0 |
| Allowable area: | General area limitations 505.0<br>Area exceptions 506.0<br>Subdivision attic spaces 1420.0<br>Unlimited area buildings 507.0 |
| Allowable height: | General height limitations 505.0<br>Height exceptions 508.0 |
| Fire separations: | Fire walls and party walls 1407.0<br>Fire separation walls 1409.0<br>Elevator opening protectives 2112.0<br>Automatic fire doors and dampers 1403.0<br>Retail business use 1405.6.3<br>Mixed use and occupancy 312.0<br>Vertical shafts 1410.0<br>Fireresistance rated floor/roof assemblies 1412.0 |
| Exterior wall protection: | Exterior walls 1406.0<br>Exterior opening protectives 1414.0<br>Glazing of unprotected openings 2402.0 |
| Fire limit requirements: | Restrictions within fire limits 502.0<br>Restrictions outside fire limits 503.0<br>Roof structures 1426.0 |
| Fireresistance: | Fire hazard classification 1402.0<br>Fireresistance tests 1403.0<br>Skylights 1426.3<br>Opening protectives 1403.3<br>Fire-retardant treated wood 1403.5<br>Fireresistance of structural members 1411.0<br>Fireresistance rated floor/roof assemblies 1412.0<br>Roof construction 1413.0<br>Fire windows and shutters 1416.0<br>Firestopping 1420.0<br>Balconies 1425.0<br>Roof structures 1426.0<br>Roof coverings 1427.0<br>Refuse vaults, enclosure requirements 1608.0<br>Packing and shipping rooms 1405.4<br>Grade floor protection 1405.7 |
| Interior finish: | Interior finish and trim 1421.0<br>Application of interior finish 1422.0<br>Flameresistance tests 1404.0 |
| Means of egress: | (also see Section 630.0)<br>Occupant load 806.0<br>Location 807.0 |

Table 307.2 (cont'd.)
MERCANTILE BUILDINGS REGULATIONS GUIDE

| | |
|---|---|
| Means of egress: (continued) | Capacity 808.0<br>Number of exits 809.0<br>Exit access corridors 810.0<br>Grade passageways 811.0<br>Means of egress doorways 812.0<br>Horizontal exits 814.0<br>Interior exit stairways 816.0<br>Access to roof 817.0<br>Exit signs 823.0<br>Means of egress lighting 824.0<br>Elevator, exit restrictions 2109.0<br>Smokeproof enclosures 818.0<br>Exterior exit stairways 819.0 |
| Fire protection systems: | Water sprinkler systems 1704.0<br>Fire suppression systems 1702.0<br>Standpipe systems 1711.0<br>Fire department connections 1713.0<br>Water supply 1714.0<br>Supervision 1718.0 |
| Vertical openings: | Shafts 1410.0<br>Firestopping 1420.0<br>Vertical shafts and hoistways 1410.0<br>Hoistway enclosures and venting 2108.0<br>Open wells and atriums 631.0 |
| Hazardous area: | Boiler and equipment rooms 600.5<br>Segregation of storage space 600.6<br>Existing buildings 605.0<br>Pyroxylin plastics 607.0 |
| Light and ventilation: | Bath and toilet rooms 711.0<br>Ventilation of shafts 1410.0<br>Artificial light and ventilation 704.0<br>Natural light and ventilation 706.0<br>Air conditioning, refrigeration and mechanical ventilation (see mechanical code listed in Appendix A)<br>Skylights 2405.0<br>Business and work rooms 708.0 |
| Sanitation: | Plumbing and drainage Article 22<br>Termite protection 1317.0<br>Handicapped, plumbing fixtures 515.8 |
| Electrical wiring: | Article 20 |
| Provisions for the handicapped and aged: | Section 515.0 |
| Energy conservation: | Article 25 |

## SECTION 308.0 USE GROUP R, RESIDENTIAL BUILDINGS

**308.1 General:** All buildings and structures, or parts thereof, shall be classified in Use Group R in which families or households live, or in which sleeping accommodations are provided for individuals with or without dining facilities, excluding those that are classified as institutional buildings.

**308.2 Use Group R-1 structures:** This use group shall include all hotel, motel and dormitory buildings arranged for the shelter and sleeping accommodations of more than 20 individuals.

**308.3 Use Group R-2 structures:** This use group shall include all multiple family dwellings having more than two dwelling units; and shall also include all dormitories, boarding and lodging houses arranged for shelter and sleeping accommodations of more than five and not more than 20 individuals.

**308.4 Use Group R-3 structures:** This use group shall include all buildings arranged for the use of one or two family dwelling units, including not more than five lodgers or boarders per family.

**308.5 Use Group R-4 structures:** This use group shall include all detached one or two family dwellings not more than three stories in height, and their accessory structures as indicated in the *One and Two Family Dwelling Code* listed in Appendix A. All such structures shall be designed and built in accordance with the requirements of this code for a Use Group R-3 structure, or with the requirements of the *One and Two Family Dwelling Code,* except that the requirements of the State Plumbing Code (Article 22) shall supersede those conflicting requirements of the *One and Two Family Dwelling Code.* This choice shall be made by the builder at the time of plans submission.

**308.6 Regulations guide:** The following listing contained in Table 308.6 is a guide to the principal requirements of this code applicable to Use Group R. They are not necessarily the only, nor all, of the provisions with which compliance is required. Omission of reference to any provision shall not nullify any requirement of this code, nor exempt any structure from such requirement.

**Table 308.6**
**RESIDENTIAL BUILDINGS REGULATIONS GUIDE**

| | |
|---|---|
| Types of construction: | Construction classification 401.0<br>Historic buildings 516.0<br>Motels 624.0<br>High rise buildings 629.0<br>Mobile units 623.0 |
| Allowable area: | General area limitations 505.0<br>Area exceptions 506.0<br>Subdivision of attic spaces 1420.0 |
| Allowable height: | General height limitations 505.0<br>Height exceptions 508.0 |
| Fire separations: | Fire walls and party walls 1407.0<br>Fire separation walls 1409.0<br>Elevator opening protectives 2112.0<br>Automatic fire doors and dampers 1403.0<br>Private garages 613.0<br>Lot line separation 503.2<br>Mixed use and occupancy 312.0<br>Vertical shafts 1410.0<br>Fireresistance rated floor/roof assemblies 1412.0 |

**Table 308.6 (cont'd)**
**RESIDENTIAL BUILDINGS REGULATIONS GUIDE**

| | |
|---|---|
| Exterior wall protection: | Exterior walls 1406.0<br>Exterior opening protectives 1414.0<br>Glazing of unprotected openings 2402.0 |
| Fire limit requirements: | Restrictions within fire limits 502.0<br>Restrictions outside fire limits 503.0<br>Roof structures 1426.0 |
| Fireresistance: | Fire hazard classification 1402.0<br>Fireresistance tests 1403.0<br>Skylights 1426.3<br>Opening protectives 1403.3<br>Fire-retardant treated wood 1403.5<br>Fireresistance of structural members 1411.0<br>Fireresistance rated floor/roof assemblies 1412.0<br>Roof construction 1413.0<br>Fire windows and shutters 1416.0<br>Firestopping 1420.0<br>Balconies 1425.0<br>Roof structures 1426.0<br>Roof coverings 1427.0<br>Refuse vaults, enclosure requirements 1608.0 |
| Interior finish: | Interior finish and trim 1421.0<br>Application of interior finish 1422.0<br>Flameresistance tests 1404.0 |
| Means of egress: | Occupant load 806.0<br>Location 807.0<br>Capacity 808.0<br>Number of exits 809.0<br>Exit access corridors 810.0<br>Grade passageways 811.0<br>Means of egress doorways 812.0<br>Horizontal exits 814.0<br>Interior exit stairways 816.0<br>Access to roof 817.0<br>Exit signs 823.0<br>Means of egress lighting 824.0<br>Elevator, exit restrictions 2109.0<br>Smokeproof enclosures 818.0<br>Exterior exit stairways 819.0<br>Buildings with one exit 809.3 |
| Fire protection systems: | Water sprinkler systems 1704.0<br>Fire suppression systems 629.0 and Article 17<br>Standpipe systems 1711.0<br>Fire department connections 1713.0<br>Water supply 1714.0<br>Fire emergency ventilating system 716.0<br>Automatic fire alarm systems 1716.0<br>Manual fire alarm systems 1717.0 |
| Vertical openings: | Shafts 1410.0<br>Firestopping 1420.0<br>Vertical shafts and hoistways 1410.0<br>Hoistway enclosures and venting 2108.0<br>Open wells and atriums 631.0 |

Table 308.6 (cont'd.)
RESIDENTIAL BUILDINGS REGULATIONS GUIDE

| | |
|---|---|
| Hazardous area: | Boiler and equipment rooms 600.5<br>Segregation of storage space 600.6<br>Existing buildings 605.0<br>Pyroxylin plastics 607.0<br>Incinerator 1508.0 |
| Light and ventilation: | Bath and toilet rooms 711.0<br>Ventilation of shafts 1410.0<br>Artifical light and ventilation 704.0<br>Natural light and ventilation 706.0<br>Air conditioning, refrigeration and mechanical ventilation (see mechanical code listed in Appendix A)<br>Skylights 2405.0 |
| Sanitation: | Plumbing and drainage Article 22<br>Termite protection 1317.0<br>Handicapped plumbing fixtures 515.8 |
| Electrical wiring: | Article 20 |
| Provisions for the handicapped and aged: | Section 515.0 |
| Sound transmission control: | Section 718.0 |
| Energy conservation: | Article 25 |

## SECTION 309.0 USE GROUP S, STORAGE BUILDINGS

**309.1 General:** All buildings and structures, or parts thereof, shall be classified in Use Group S which are used primarily for the storage of goods, wares or merchandise, except those of Use Group H that involve highly combustible or explosive products or materials; including, among others, warehouses, storehouses and freight depots.

**309.2 List of moderate hazard uses:** Buildings used for the storage of moderate hazard contents which are likely to burn with moderate rapidity, but which do not produce either poisonous gases, fumes or explosives, including, among others, the materials listed in the following Table 309.2, shall be classified in Use Group S-1.

Table 309.2
USE GROUP S-1 STORAGE USES, MODERATE HAZARD

| | |
|---|---|
| Bags, cloth, burlap and paper | Cordage |
| Bamboo and rattan | Furniture |
| Baskets | Furs |
| Belting, canvas and leather | Glue, mucilage, paste and size |
| Books and paper in rolls or packs | Horn and combs, other than celluloid |
| Boots and shoes | Leather, enameling or japanning |
| Buttons, including cloth covered, pearl or bone | Linoleum |
| Cardboard and cardboard boxes | Livestock shelters |
| Clothing, woolen wearing apparel | Lumber yards |
| | Motor vehicle repair shops |

**Table 309.2 (cont'd.)**
**USE GROUP S-1 STORAGE USES, MODERATE HAZARD**

| | |
|---|---|
| Petroleum warehouses for storage of lubricating oils with a flash point of 200 degrees F. (93.33 degrees C.) or higher (see Section 1405.3) | Silk<br>Soap<br>Sugar<br>Tobacco, cigars, cigarettes and snuff |
| Photo engraving | Upholstering and mattress manufacturing |
| Public garages (Group 1) and stables | Wax candles |

**309.3 List of low hazard uses:** Buildings used for the storage of noncombustible materials, and of low hazard wares that do not ordinarily burn rapidly, shall be classified in Use Group S-2 unless otherwise classified, including, among others, the materials listed in the following Table 309.3.

**Table 309.3**
**USE GROUP S-2 STORAGE USES, LOW HAZARD**

| | |
|---|---|
| Asbestos | Ivory |
| Chalk and crayons | Metals |
| Food products | Porcelain and pottery |
| Glass | Public garages (Group 2) |
| | Talc and soapstones |

**309.3.1 Tobacco Auction Warehouses:** Warehouses, for the sale of tobacco only, of Type 1, Type 2, or Type 3 construction, may be constructed without a sprinkler system when all of the following requirements have been met:

1. The initial submission of plans to the Department of Housing, Buildings and Construction shall include a signed certificate by the owner that the warehouse will be used solely for the sale of tobacco on a seasonal basis or for the storage of noncombustibles.
2. A manual fire alarm and automatic fire and smoke detection system with notification to the local fire service shall be provided with installation in accordance with Section 1717.0 of this code.
3. An 18 foot paved and posted fire lane surrounding the entire perimeter of the building shall be provided and be accessible from a public street.
4. A 50 foot fire separation shall be maintained between the warehouse and the lot line and the warehouse and the nearest building.

**309.4 Regulations guide:** The following listing contained in Table 309.4 is a guide to the principal requirements of this code applicable to Use Group S. They are not necessarily the only, nor all, of the provisions with which compliance is required. Omissions of reference to any provision shall not nullify any requirement of this code, nor exempt any structure from such requirement.

**Table 309.4**
**STORAGE BUILDINGS REGULATIONS GUIDE**

| | |
|---|---|
| Types of construction: | Construction classification 401.0<br>Historic buildings 516.0<br>Motor vehicle repair shops 616.0<br>Open parking structures 628.0 |
| Allowable area: | General area limitations 505.0<br>Area exceptions 506.0<br>Subdivision of attic spaces 1420.0<br>Unlimited area buildings 507.0 |
| Allowable height: | General height limitations 505.0<br>Height exceptions 508.0 |
| Fire separations: | Fire walls and party walls 1407.0<br>Fire separation walls 1409.0<br>Elevator opening protectives 2112.0<br>Automatic fire doors and dampers 1403.0<br>Public garages 614.0<br>Mixed use and occupancy 312.0<br>Vertical shafts 1410.0<br>Fireresistance rated floor/roof assemblies 1412.0 |
| Exterior wall protection: | Exterior walls 1406.0<br>Exterior opening protectives 1414.0<br>Glazing of unprotected openings 2402.0 |
| Fire limit requirements: | Restrictions within fire limits 502.0<br>Restrictions outside fire limits 503.0<br>Roof structures 1426.0 |
| Fireresistance: | Fire hazard classification 1402.0<br>Fireresistance tests 1403.0<br>Skylights 1426.3<br>Opening protectives 1403.3<br>Fire-retardant treated wood 1403.5<br>Fireresistance of structural members 1411.0<br>Fireresistance rated floor/roof assemblies 1412.0<br>Roof construction 1413.0<br>Fire windows and shutters 1416.0<br>Firestopping 1420.0<br>Balconies 1425.0<br>Roof structures 1426.0<br>Roof coverings 1427.0<br>Refuse vaults, enclosure requirements 1608.0<br>Grade floor protection 1405.7 |
| Interior finish: | Interior finish and trim 1421.0<br>Application of interior finish 1422.0<br>Flameresistance tests 1404.0 |
| Means of egress: | Occupant load 806.0<br>Location 807.0<br>Capacity 808.0<br>Number of exits 809.0<br>Exit access corridors 810.0<br>Grade passageways 811.0<br>Means of egress doorways 812.0<br>Horizontal exits 814.0<br>Interior exit stairways 816.0 |

**Table 309.4 (cont'd.)**
**STORAGE BUILDINGS REGULATIONS GUIDE**

| | |
|---|---|
| Means of egress: (continued) | Access to roof 817.0<br>Exit signs 823.0<br>Means of egress lighting 824.0<br>Elevator, exit restrictions 2109.0<br>Exterior exit stairways 819.0 |
| Fire protection systems: | Water sprinkler systems 1704.0<br>Fire suppression systems 1702.0<br>Standpipe systems 1711.0<br>Fire department connections 1713.0<br>Water supply 1714.0<br>Supervision 1718.0 |
| Vertical openings: | Shafts 1410.0<br>Firestopping 1420.0<br>Vertical shafts and hoistways 1410.0<br>Hoistway enclosures and venting 2108.0<br>Open wells and atriums 631.0 |
| Hazardous area: | Boiler and equipment rooms 600.5<br>Segregation of storage space 600.6<br>Existing buildings 605.0<br>Pyroxylin plastics 607.0<br>Inspection of hazardous uses 603.1<br>Special permits 604.4 |
| Light and ventilation: | Bath and toilet rooms 711.0<br>Ventilation of shafts 1410.0<br>Artificial light and ventilation 704.0<br>Natural light and ventilation 706.0<br>Air conditioning, refrigeration and mechanical ventilation (see mechanical code listed in Appendix A)<br>Skylights 2405.0<br>Drying rooms 1606.0 |
| Sanitation: | Plumbing and drainage Article 22<br>Termite protection 1317.0<br>Handicapped, plumbing fixtures 515.8 |
| Electrical wiring: | Article 20 |
| Provisions for the physically handicapped and aged: | Section 515.0 |
| Energy conservation: | Article 25 |

## SECTION 310.0 USE GROUP T, TEMPORARY AND MISCELLANEOUS USES

**310.1 General:** Structures and buildings of a temporary character and miscellaneous structures not classified in any specific use group shall be constructed, equipped and maintained to meet the requirements of this code commensurate with the fire and life hazard incidental to their use. Miscellaneous uses shall include all accessory buildings and structures used as private garages, sheds, fences and similar purposes.

**310.2 Regulations guide:** The following listing contained in Table 310.2 is a guide to the principal requirements of this code applicable to Use Group T.

They are not necessarily the only, nor all of the provisions with which compliance is required. Omission of reference to any provision shall not nullify any requirement of this code, nor exempt any structure from such requirement.

**Table 310.2**
**TEMPORARY AND MISCELLANEOUS BUILDINGS REGULATIONS GUIDE**

| | |
|---|---|
| Types of construction: | Construction classification 401.0<br>Mixed use and occupancy 312.0<br>Temporary structures 514.0<br>Tents and air supported structures 621.0<br>Builder's shanties and reviewing stands 502.4<br>Signs Article 19 |
| Allowable area: | General area limitations 505.0<br>Area exceptions 506.0<br>Subdivision of attic spaces 1420.0<br>Temporary projections 512.0 |
| Allowable height: | General height limitations 505.0<br>Height exceptions 508.0<br>Bins, tanks and towers 502.5<br>Storm enclosures 502.3 |
| Fire separations: | Fire walls and party walls 1407.0<br>Fire separation walls 1409.0<br>Elevator opening protectives 2112.0<br>Automatic fire doors and dampers 1403.0<br>Mixed use and occupancy 312.0<br>Vertical shafts 1410.0<br>Fireresistance rated floor/roof assemblies 1412.0 |
| Exterior wall protection: | Exterior walls 1406.0<br>Exterior opening protectives 1414.0<br>Glazing of unprotected openings 2402.0 |
| Fire limit requirements: | Restrictions within fire limits 502.0<br>Restrictions outside fire limits 503.0<br>Roof structures 1426.0 |
| Fireresistance: | Fire hazard classification 1402.0<br>Fireresistance tests 1403.0<br>Roof coverings 1426.3<br>Opening protectives 1403.3<br>Fire-retardant treated wood 1403.5<br>Fireresistance of structural members 1411.0<br>Fireresistance rated floor/roof assemblies 1412.0<br>Roof construction 1413.0<br>Fire windows and shutters 1416.0<br>Firestopping 1420.0<br>Balconies 1425.0<br>Roof structures 1426.0<br>Roof coverings 1427.0<br>Refuse vaults, enclosure requirements 1608.0 |
| Interior finish: | Interior finish and trim 1421.0<br>Application of interior finish 1422.0<br>Flameresistance tests 1404.0 |

Table 310.2 (cont'd.)
TEMPORARY AND MISCELLANEOUS BUILDINGS REGULATIONS GUIDE

| | |
|---|---|
| Means of egress: | Occupant load 806.0<br>Location 807.0<br>Capacity 808.0<br>Number of exits 809.0<br>Exit access corridors 810.0<br>Grade passageways 811.0<br>Means of egress doorways 812.0<br>Horizontal exits 814.0<br>Interior exit stairways 816.0<br>Access to roof 817.0<br>Exit signs 823.0<br>Means of egress lighting 824.0<br>Elevator, exit restrictions 2109.0<br>Exterior exit stairways 819.0 |
| Fire protection systems: | Water sprinkler systems 1704.0<br>Fire suppression systems 1702.0<br>Standpipe systems 1711.0<br>Fire department connections 1713.0<br>Water supply 1714.0 |
| Vertical openings: | Shafts 1410.0<br>Firestopping 1420.0<br>Vertical shafts and hoistways 1410.0<br>Hoistway enclosures and venting 2108.0<br>Open wells and atriums 631.0 |
| Hazardous area: | Boiler and equipment rooms 600.5<br>Refrigeration of storage space 600.6<br>Existing buildings 605.0 |
| Light and ventilation: | Bath and toilet rooms 711.0<br>Ventilation of shafts 1410.0<br>Artificial light and ventilation 704.0<br>Natural light and ventilation 706.0<br>Air conditioning, refrigeration and mechanical ventilation (see mechanical code listed in Appendix A)<br>Skylights 2405.0 |
| Sanitation: | Plumbing and drainage Article 22<br>Termite protection 1317.0 |
| Electrical wiring: | Article 20 |

## SECTION 311.0 DOUBTFUL USE CLASSIFICATION

**311.1 General:** When a building or structure is proposed for a use not specifically provided for in this code or the classification of which is doubtful, such building or structure shall be included in the use group which it most nearly resembles in respect to the existing or proposed life and fire hazard, and it shall be so classified by the building official.

## SECTION 312.0 MIXED USE AND OCCUPANCY

**312.1 Two or more uses:** When a building is occupied for two or more uses,

not included in the same use group, one of the following shall apply.

1. The provisions of the code applying to each use shall apply to such parts of the building as come within that use group; and if there are conflicting provisions, the requirements securing the greater public safety shall apply to the entire building.
2. The mixed uses shall be completely separated, both horizontally and vertically, by fire separation walls and floor/ceiling assemblies having a fireresistance rating corresponding to the highest fire grading prescribed in Table 1402 for the separate uses. Each part of the building shall be separately classified to use. The most restrictive height and area limitations in this code for the mixed uses shall apply to the entire building, or except as otherwise provided for in this code.
3. The mixed uses shall be completely separated by fire walls having a fireresistance rating corresponding to the highest fire grading prescribed in Table 1402 for the separate uses. Each use group shall then comply with the provisions of this code applicable to that group.

**312.2 Incidental uses:** Where the use is supplemental to the main use of the building and the area devoted to such use does not occupy more than 10 percent of the area of any floor nor more than the basic area permitted by Table 505, the building shall be classified according to the main use. Where the incidental use is a higher hazard than the main use, it shall be constructed and segregated by fireresistance rated construction as required in Section 312.1.

# ARTICLE 4

## TYPES OF CONSTRUCTION CLASSIFICATION

### SECTION 400.0 GENERAL

**400.1 Scope:** The provisions of this article shall control the classification of all buildings as to type of construction.

**400.2 Application of other laws:** The provisions of this article shall not be deemed to nullify any provisions of the zoning law or any other statute of the jurisdiction pertaining to the location, or type of construction of buildings, except as may be specifically required by the provisions of this code.

### SECTION 401.0 CONSTRUCTION CLASSIFICATION

**401.1 General:** All buildings and structures erected or to be erected, altered or extended in height or area shall be classified in any one or in a combination of the four construction types defined in Sections 402.0 through 405.0.

**401.2 False designation:** A building shall not be designated a given type of construction unless it conforms to the minimum requirements for that type. It shall be unlawful to post, or use, or designate, or advertise a building as of a given type of construction unless it complies with the minimum code requirements for that type.

**401.3 Minimum requirements:** When a superior type of construction is used than the minimum herein required for any specified use, height and area of the building, nothing in this code shall be construed to require full compliance with the specifications for the higher type; but the designated construction classification of the building shall be that of the lesser requirement, unless all the requirements for the higher type are fulfilled.

### SECTION 402.0 TYPE 1 CONSTRUCTION

**402.1 General:** Buildings and structures of Type 1 construction are those in which the walls, partitions, structural elements, floors, ceilings, roofs, and the exits are constructed and protected with approved noncombustible materials to afford the fireresistance rating specified in Table 401, except as otherwise specificially regulated by the provisions of Article 14. Type 1 buildings shall

## Table 401
## FIRERESISTANCE RATINGS OF STRUCTURAL ELEMENTS (IN HOURS)

| Structural element Note a | | Type of construction Section 401.0 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Noncombustible | | | | | Noncombustible/Combustible | | | Combustible | |
| | | Type 1 Section 402.0 | | Type 2 Section 403.0 | | | Type 3 Section 404.0 | | | Type 4 Section 405.0 | |
| | | Protected | | Protected | | Unprotected | Heavy timber | Protected | Unprotected | Protected | Unprotected |
| | | 1A | 1B | 2A | 2B | 2C | 3A | 3B | 3C | 4A | 4B |
| Exterior walls | (Section 1406.0 and Note b) | | | | | | | | | | |
| 1 Fire separation of 30′ or more | Bearing | 4 | 3 | 2 | 1 | 0 | 2 | 2 | 2 | 1 | 0 |
| | Nonbearing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Fire separation of less than 6′ | Bearing | 4 | 3 | 2 | 1½ | 1 | 2 | 2 | 2 | 1 | 1 see Sec. 503.2 |
| | Nonbearing | 2 | 2 | 1½ | 1 | 1 | 2 | 2 | 2 | 1 | 1 see Sec. 503.2 |
| Fire separation of 6′ or more but less than 11′ | Bearing | 4 | 3 | 2 | 1 | 0 | 2 | 2 | 2 | 1 | 0 |
| | Nonbearing | 2 | 2 | 1½ | 1 | 0 | 2 | 2 | 2 | 1 | 0 |
| Fire separation of 11′ or more but less than 30′ | Bearing | 4 | 3 | 2 | 1 | 0 | 2 | 2 | 2 | 1 | 0 |
| | Nonbearing | 1½ | 1½ | 1 | 1 | 0 | see Sec. 404.0 | 1½ | 1½ | 1 | 0 |
| 2 Fire walls and party walls (Section 1407.0) | | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | | ← Not less than fire grading of use group—(See Table 1402) → | | | | | | | | | |
| 3 Fire separation assemblies (Sections 312.0, 1409.0 and 1412.0) | | ← Fireresistance rating corresponding to fire grading of use group—(see Table 1402) → | | | | | | | | | |
| 4 Fire enclosures of exits, exit hallways and stairways (Section 816.9.2, 1409.0 and Note c). | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 5 Shafts (other than exits) and elevator hoistways (Section 1410.0 and Note c) | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| | | ← Noncombustible → | | | | | | | | | |
| 6 Exit access corridors (Note g) | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | ← Note e → | | | | | | | | | |
| Vertical separation of tenant spaces | | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 0 |
| | | ← Note e → | | | | | | | | | |
| 7 Dwelling unit separations | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| | | ← Note e → | | | | | | | | | |
| Other nonbearing partitions | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | ← Note e → | | | | | | | | | |

## Table 401 (cont'd.)
## FIRERESISTANCE RATINGS OF STRUCTURAL ELEMENTS (IN HOURS)

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | Interior bearing walls, bearing partitions, columns, girders, trusses (other than roof trusses) and framing (Section 1411.0) | Supporting more than one floor | 4 | 3 | 2 | 1 | 0 | see Sec. 404.0 | 1 | 0 | 1 | 0 |
| | | Supporting one floor only | 3 | 2 | 1½ | 1 | 0 | see Sec. 404.0 | 1 | 0 | 1 | 0 |
| | | Supporting a roof only | 3 | 2 | 1½ | 1 | 0 | see Sec. 404.0 | 1 | 0 | 1 | 0 |
| 9 | Structural members supporting wall (Section 1411.0) | | 3 | 2 | 1½ | 1 | 0 | 1 | 1 | 0 | 1 | 0 |
| | | | ← Not less than fireresistance rating of wall supported → | | | | | | | | | |
| 10 | Floor construction including beams (Section 1412.0) | | 3 | 2 | 1½ | 1 | 0 | Note d see Sec. 404.0 | 1 | 0 | 1 | 0 |
| *11 | Roof construction, including beams, trusses and framing, arches and roof deck (Section 1412.0 and Note f) | 15' or less in height to lowest member | 2 | 1½ | 1 | 1 | 0 | see Sec. 404.0 Note d | 1 | 0 | 1 | 0 |
| | | | | | ← Note e → | | | | | | | |
| | | More than 15' but less than 20' in height to lowest member | 1 | 1 | 1 | 0 | 0 | see Sec. 404.0 Note d | 0 | 0 | 1 | 0 |
| | | | ← Note e → | | | | | | | | | |
| | | 20' or more in height to lowest member | 0 | 0 | 0 | 0 | 0 | see Sec. 404.0 Note d | 0 | 0 | 0 | 0 |
| | | | ← Note e → | | | | | | | | | |

**Notes applicable to Table 401**

**Note a.** For special high hazard uses involving a higher degree of fire severity and higher concentration of combustible contents, the fireresistance rating requirements for structural elements shall be increased accordingly (see Section 600.2).

**Note b.** The fire separation or fire exposure in feet as herein limited applies to the distance measured from the building face to the closest interior lot line, the center line of a street or public space or an imaginary line between two buildings on the same property (see definition of fire separation, exterior fire exposure in Section 201.0).

**Note c.** Exit and shaft enclosures connecting three floor levels or less shall have a fireresistance rating of not less than one hour (see Sections 1409.1.3 and 1410.3).

**Note d.** In Type 3A construction, members which are of material other than heavy timber shall have a fireresistance rating of not less than one hour (see Section 1224.2).

**Note e.** Fire-retardant treated wood, complying with Section 1403.5.1 may be used as provided in Section 1403.5.2 (see Section 1405.9).

**Note f.** Where the omission of fire protection from roof trusses, roof framing and decking is permitted, horizontal or sloping roofs in buildings of Type 1 and Type 2 construction immediately above such members shall be constructed of noncombustible materials of the required strength without a specified fireresistance rating, or of Type 3A construction in buildings not over five stories or 65 feet in height (see Section 1413.3).

**Note g.** Exit access corridors serving 30 or fewer occupants may have a zero fireresistance rating (see Section 810.4).

**Note h.** 1 foot = 304.8 mm.

***KY. BLDG. CODE INTERP. NO. 1** Question: Line 11 of Table 401 requires various fireresistance ratings for structural elements in the different types of construction. Is it the intent of the (*Kentucky*) *Basic Building Code* that only *tested roof/ceiling* assemblies can comply? If so, how does a trussed roof system meet this provision? Answer: Yes, it is the intent of the code that a fireresistance rating can only be applied to assemblies which have been tested in a specific manner. For example, in 4A type construction with a truss roof system, there is no tested assembly for a one hour roof/ceiling assembly. Therefore, if a truss system is to be employed in a 4A structure and will require a one hour assembly, some method of equivalency must be sought. This can often be accomplished by using the ceiling membrane of a rated roof/ceiling assembly which provides an equivalent protection to the bottom chord of the truss. An assembly which provides a finish rating of 60 minutes or more can be utilized to determine equivalency.

be further classified as Types 1A and 1B. Fire-retardant treated wood may be used as specified in Table 401 and Section 1403.5.

## SECTION 403.0 TYPE 2 CONSTRUCTION

**403.1 General:** Buildings and structures of Type 2 construction are those in which the walls, partitions, structural elements, floors, ceilings, roofs, and the exits are constructed of approved noncombustible materials meeting the fireresistance rating requirements specified in Table 401, except as modified by the fire limit restrictions of Article 5, and as further regulated in Article 14. Type 2 buildings shall be further classified as Types 2A, 2B, and 2C. Fire-retardant treated wood may be used as specified in Table 401 and Section 1403.5.

## SECTION 404.0 TYPE 3 CONSTRUCTION

**404.1 General:** Buildings and structures of Type 3 construction are those in which the exterior, fire and party walls are constructed of masonry or other approved noncombustible materials of the required fireresistance rating and structural properties; and the floors, roofs and interior framing are wholly or partly of wood or of metal or other approved construction; the fire and party walls are ground supported, except that girders and their supports carrying walls of masonry shall be protected to afford the same degree of fireresistance rating of the walls supported thereon; and all structural elements have the required fireresistance rating specified in Table 401.

**404.2 Type 3A:** Buildings and structures of Type 3A construction are those in which the fireresistance rating is attained by placing limitations on the minimum sizes of wood structural members and on minimum thickness and composition of wood floors and roofs; by the avoidance, or by the proper protection by firestopping or other acceptable means, of concealed spaces under floors and roofs; by the use of approved fastenings, construction details, and adhesives for structural members; and by providing the required degree of fireresistance rating in exterior and interior walls (see Section 1224.0 for construction details).

**404.2.1 Columns:** Wood columns may be sawn or glued laminated and shall be not less than 8 inches, nominal, in any dimension when supporting floor loads and not less than 6 inches, nominal, in width and not less than 8 inches, nominal, in depth when supporting roof and ceiling loads only.

**404.2.2 Floor framing:** Beams and girders of wood may be sawn or glued laminated and shall be not less than 6 inches, nominal, in width and not less than 10 inches, nominal, in depth. Framed or glued laminated arches which spring from the floor line and support floor loads shall be not less than 8 inches, nominal, in any dimension. Framed timber trusses supporting floor loads shall have members of not less than 8 inches, nominal, in any dimension.

**404.2.3 Roof framing:** Framed or glued laminated arches for roof construction which spring from the floor line or from grade and do not support floor loads shall have members not less than 6 inches, nominal, in width and not less than 8 inches, nominal, in depth for the lower half of the height and not less than 6 inches, nominal, in depth for the upper half. Framed or glued laminated arches for roof construction which spring from the top of walls or wall abutments, framed timber trusses, and other roof framing which does not support floor loads, shall have members not less than 4 inches, nominal, in width and not less than 6 inches, nominal, in depth. Spaced members may be composed of two or more pieces not less than 3 inches, nominal, in thickness when blocked solidly throughout their intervening spaces or when such spaces are tightly closed by a continuous wood cover plate of not less than 2 inches, nominal, in thickness, secured to the underside of the members. Splice plates shall be not less than 3 inches, nominal, in thickness. When protected by approved automatic sprinklers under the roof deck, framing members shall be not less than 3 inches, nominal, in width.

**404.2.4 Flooring:** Floors shall be without concealed spaces and shall be of sawn or glued laminated plank, splined, or tongue and groove, of not less than 3 inches, nominal, in thickness covered with 1 inch, nominal, dimension tongue and groove flooring, laid crosswise or diagonally, or ½ inch plywood or ½ inch particle board; or of planks not less than 4 inches, nominal, in width, set on edge close together and well spiked, and covered with 1 inch nominal, dimension flooring, or ½ inch plywood, or ½ inch particle board.

**404.2.5 Roof decking:** Roofs shall be without concealed spaces and roof decks shall be sawn or glued laminated, splined or tongue and groove plank, not less than 2 inches, nominal, in thickness, 1⅛ inches thick interior plywood (exterior glue), or of planks not less than 3 inches, nominal, in width, set on edge close together and laid as required for floors. Other types of decking may be used if providing equivalent fireresistance rating and structural properties.

**404.2.6 Bearing walls:** Bearing portions of exterior and interior walls shall be of approved noncombustible material and shall have a fireresistance rating of not less than two hours.

**404.2.7 Nonbearing walls:** Nonbearing portions of exterior walls shall be of approved noncombustible materials, except as otherwise noted; and where a fire separation of less than 20 feet (6096 mm) is provided, nonbearing exterior walls shall have a fireresistance rating of not less than two hours. Where a fire separation of 20 feet (6096 mm) to 30 feet (9144 mm) is provided, nonbearing exterior walls shall have a fireresistance rating of not less than one hour. Where a fire separation of 30 feet (9144 mm) is provided, fireresistance rating is not required. Where a fire separation of 20 feet (6096 mm) or more is provided, wood columns and arches conforming to heavy timber sizes may be used externally.

**404.3 Type 3B:** Structures of Type 3B construction shall include all Type 3 buildings in which the interior structural elements are wholly or partly of fire

protected wood of not less than 2 inch nominal thickness, or of other approved protected combustible materials, or of metal protected and insulated to afford the fireresistance rating specified in Table 401.

**404.4 Type 3C:** Structures of Type 3C construction shall include all Type 3 buildings in which the interior structural members are of wood of not less than 2 inch nominal thickness or consist of other combustible or noncombustible materials with protection of less than one hour fireresistance rating.

## SECTION 405.0 TYPE 4 CONSTRUCTION

**405.1 General:** Buildings and structures of Type 4 construction are those in which the exterior walls, bearing walls, partitions, floor and roof construction are constructed wholly or partly of wood stud and joist assemblies with a minimum nominal dimension of 2 inches, or of other approved combustible materials; with firestopping at all vertical and horizontal draft openings as regulated in Section 1420.0 and in which the structural elements have the required fireresistance ratings specified in Table 401. Type 4 buildings shall be further classified as Types 4A and 4B.

# ARTICLE 5

## GENERAL BUILDING LIMITATIONS

### SECTION 500.0 GENERAL

**500.1 Scope:** The provisions of this article shall control the division of Kentucky into fire limits and the general limitations of height and area of all buildings hereafter erected, and extensions to existing buildings hereafter altered or enlarged as affected by the fire and life hazard incident to type of construction, use group, density of development, exterior exposure and accessibility of buildings and structures to fire fighting facilities and equipment.

### SECTION 501.0 FIRE LIMITS

**501.1 General:** For the purpose of control of use and construction of buildings to prevent conflagration from fire, the building official may establish limiting districts designated "fire limits" and "outside fire limits," under the legal procedure of the local jurisdiction for creating and establishing fire limits.

**501.2 Fire limits:** The fire limits shall comprise the areas containing congested business, commercial, manufacturing and industrial uses or in which such uses are developing.

**501.3 Outside fire limits:** All other areas not included in the fire limits shall be designated as outside fire limits.

### SECTION 502.0 RESTRICTIONS WITHIN THE FIRE LIMITS

**502.1 General:** All buildings and structures, and all additions to existing buildings and structures, hereafter erected within the boundaries of the fire limits shall be of Type 1, 2A, 2B, 3A or 3B construction as defined in Article 4 and regulated in Table 401; and shall be constructed within the height and area limitations of Table 505 except as herein provided. Open parking structures may be constructed as permitted under Section 628.0.

**502.1.1 Use not permitted:** Buildings of Use Group H shall not be permitted within the fire limits.

**502.2 Type 2C, 3C or 4A construction permitted:** Buildings and structures, and additions to existing buildings and structures, hereafter erected within

the fire limits may be of Type 2C, 3C, or 4A construction as defined in Article 4 and regulated in Tables 401 and 505 when constructed and located in accordance with the requirements of Table 502.

**Table 502**
**EXTERIOR WALL FIRERESISTANCE RATING REQUIREMENTS**

| Width of fire separation adjacent to exterior wall | Fireresistance rating of exterior wall[a] or barrier | Fireresistance rating of exterior opening protectives | Minimum classification of roof covering |
|---|---|---|---|
| On lot lines or less than 3 ft. therefrom or from any building | 4 hour | Not permitted | B |
| More than 3 ft. but less than 6 ft. | 3 hour | 3 hour | B |
| 6 ft. or more but less than 11 ft. | 2 hour | 1½ hour | B |
| 11 ft. or more but less than 30 ft. | 1 hour | ¾ hour | B |
| 30 ft. or more | 0 hour | 0 hour | C |

**Note a.** Not less than required by Table 401. The exterior wall or barrier shall extend to the height of the building and be so constructed that it will remain structurally in place for the duration of time indicated by the required fireresistance rating. When the exterior wall or barrier is adjacent to a flat roof, it shall be constructed with a parapet (see Section 1406.4).
**Note b.** 1 foot = 0.305 m.

**502.3 Storm enclosures:** Storm enclosures may be erected of Type 2C or 4 construction not more than 10 feet (3048 mm) in height and not more than 3 feet (914 mm) wider than the entrance doors which they serve, provided they do not project more than 6 feet (1829 mm) beyond the building line.

**502.4 Builders' shanties and reviewing stands:** Temporary builders' shanties erected in connection with approved building operations, platforms, reviewing stands and other similar miscellaneous structures may be erected of Type 2C or 4 construction for a limited period of time as approved by the building official.

**502.5 Bins, tanks, towers and roof structures:** Coal and material bins, water towers, tank structures and trestles may be erected of Type 3A construction with dimensions not less than required for Type 3A construction, not over 35 feet (10668 mm) in height when located 30 feet (9144 mm) from the interior lot lines or any building, except when located on lot lines along a railroad right of way or waterfront.

**502.5.1 Erection on buildings:** Aerial supports not more than 12 feet (3658 mm) in height, water tanks and flag poles may be erected of wood on buildings not more than three stories nor more than 40 feet (12192 mm) in height, and drip bars in cooling towers may be constructed of wood.

**502.6 Motor fuel service stations:** Gasoline service stations, and structures of

similar business uses, not including Use Group H, may be erected of Type 2C construction within the height and area limits for Use Group B of Table 505 provided they are located not less than 11 feet (3353 mm) from the lot line of any building.

**502.7 Bus and passenger terminals:** Roofs over parking lots, bus and passenger terminals may be erected one story and not over 20 feet (6096 mm) in height and not more than 11,000 square feet (1023 $m^2$) in area of Type 2C or 3A construction.

**502.8 Wood veneers:** Wood veneers of 1 inch nominal thickness or exterior grade plywood not less than ⅜ inch thick may be used on exterior walls when facing a fire separation of a minimum of 30 feet (9144 mm); provided the veneer does not exceed one story in height and is applied to noncombustible backing or is furred not to exceed 1⅝ inch (41 mm) and firestopped in accordance with Section 1420.0. Where all wood veneers comply with Section 1403.5.2 for exterior use, the height may be increased to two stories.

## SECTION 503.0 RESTRICTIONS OUTSIDE FIRE LIMITS

**503.1 General:** Outside the fire limits all types of construction, except as herein specifically prohibited or for which special approval is required in connection with special uses and occupancies in Article 6, shall be permitted within the height and area limitations of Table 505.

**503.2 Fire separation:** Exterior walls with a fire separation of less than 6 feet (1829 mm) shall be of at least one hour fireresistance rated construction, including opening protectives, except store front and window and door openings in buildings of Use Group R-3. Exterior walls with a fire separation of 3 feet (914 mm) or less shall not have openings of any type.

**503.3 Roof coverings:** Roof coverings shall conform to the fireresistive requirements for Class A, B, C or nonrated roofings complying with the provisions of Section 1427.0.

## SECTION 504.0 EXISTING BUILDINGS

**504.1 Alteration limitations:** These provisions shall not be deemed to prohibit alterations within the limitations of Section 106.0, provided an unlawful change of use is not involved.

**504.1.1 Minor changes:** Changes, alterations or repairs to the interior of a building or to the front facing a street or other public space may be permitted, provided such changes, in the opinion of the building official, do not increase the size or the fire hazard of the building, or endanger the public safety, and are not specifically prohibited by this code.

**504.1.2 Existing projections:** A change or enlargement shall not be made to an existing part of a building now projecting beyond the street lot line or building line where such is established by law, except in conformity to the provisions of Section 510.0 governing new construction.

**504.2 Increase in height and area:** It shall be unlawful to increase the height or area of an existing building or structure, unless it is of a type of construction permitted for new buildings of the increased height and area, and of a use group permitted within the fire limits in which it is located and as regulated by Table 505.

## SECTION 505.0 GENERAL AREA AND HEIGHT LIMITATIONS

**505.1 General:** The areas and heights of all buildings and structures between exterior walls, or between exterior walls and fire walls, shall be governed by the type of construction and the use group classification as defined in Articles 3 and 4 and shall not exceed the limits fixed in Table 505, except as these may be specifically modified by other provisions of this code.

**505.2 Area limit:** The area limitations specified in Table 505 shall apply to all buildings fronting on a street, or public space not less than 30 feet (9144 mm) in width acccessible to a public street.

**505.3 Height limit:** The height in feet and number of stories specified in Table 505 shall apply to all buildings and to all separate parts of a building enclosed within lawful fire walls complying with the provisions of Article 14.

**505.4 Multi-story buildings:** Buildings two stories in height may be built to the same area limits provided in Table 505 for one story buildings. In buildings over two stories in height, the area limits of Table 505 for one story buildings shall be reduced as specified in the following Table 505.4.

**Table 505.4**
**PERCENT REDUCTION OF AREA LIMITS**

| No. of stories | Type of construction | | |
|---|---|---|---|
| | 1A & 1B | 2A | 2B, 2C, 3A, 3B, 3C, 4A, 4B |
| 1 | None | None | None |
| 2 | None | None | None |
| 3 | None | 5% | 20% |
| 4 | None | 10% | 20% |
| 5 | None | 15% | 30% |
| 6 | None | 20% | 40% |
| 7 | None | 25% | 50% |
| 8 | None | 30% | 60% |
| 9 | None | 35% | 70% |
| 10 | None | 40% | 80% |

## SECTION 506.0 AREA EXCEPTIONS

**506.1 General:** The provisions of this section shall modify the area limits of Table 505 as herein specified.

**506.2 Street frontage increase:** When a building or structure has more than 25 percent of the building perimeter fronting on a street or other unoccupied space not less than 30 feet (9144 mm) in width accessible from a street by a

## Table 505
## HEIGHT AND AREA LIMITATIONS OF BUILDINGS

**Height limitations of buildings (shown in upper figure as stories and feet above grade), and area limitations of one or two story buildings facing on one street or public space not less than 30 feet wide (shown in lower figure as area in square feet per floor). See Note a.**

N.P.—Not permitted
Unlimited

| Use group | | Type of construction | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Noncombustible | | | | | Noncombustible/Combustible | | | Combustible | |
| | | Type 1 | | Type 2 | | | Type 3 | | | Type 4 | |
| | | Protected Note b | | Protected | | Unprotected | Heavy Timber | Protected | Unprotected | Protected | Unprotected |
| | Note a | 1A | 1B | 2A | 2B | 2C | 3A | 3B | 3C | 4A | 4B |
| A-1-A Assembly, theaters | With stage and scenery | | 6 St. 75′ 14,400 | 4 St. 50′ 11,400 | 2 St. 30′ 7,500 | 1 St. 20′ 4,800 | 2 St. 30′ 7,200 | 2 St. 30′ 6,600 | 1 St. 20′ 4,800 | 1 St. 20′ 5,100 | N.P. |
| A-1-B Assembly, theaters | Without stage (motion picture theaters) | | | 5 St. 65′ 19,950 | 3 St. 40′ 13,125 | 2 St. 30′ 8,400 | 3 St. 40′ 12,600 | 3 St. 40′ 11,550 | 2 St. 30′ 8,400 | 1 St. 20′ 8,925 | 1 St. 20′ 4,200 |
| A-2 Assembly, night clubs and similar uses | | | 4 St. 50′ 7,200 | 3 St. 40′ 5,700 | 2 St. 30′ 3,750 | 1 St. 20′ 2,400 | 2 St. 30′ 3,600 | 2 St. 30′ 3,300 | 1 St. 20′ 2,400 | 1 St. 20′ 2,550 | 1 St. 20′ 1,200 |
| A-3 Assembly | Lecture halls, recreation centers, terminals, restaurants other than night clubs | | | 5 St. 65′ 19,950 | 3 St. 40′ 13,125 | 2 St. 30′ 8,400 | 3 St. 40′ 12,600 | 3 St. 40′ 11,550 | 2 St. 30′ 8,400 | 1 St. 20′ 8,925 | 1 St. 20′ 4,200 |
| A-4 Assembly, churches, schools | Note c | | | 5 St. 65′ 34,200 | 3 St. 40′ 22,500 | 2 St. 30′ 14,400 | 3 St. 40′ 21,600 Note d | 3 St. 40′ 19,800 | 2 St. 30′ 14,400 | 1 St. 20′ 15,300 Note d | 1 St. 20′ 7,200 Note d |
| B Business | | | | 7 St. 85′ 34,200 | 5 St. 65′ 22,500 | 3 St. 40′ 14,400 | 5 St. 65′ 21,600 | 4 St. 50′ 19,800 | 3 St. 40′ 14,400 | 3 St. 40′ 15,300 | 2 St. 30′ 7,200 |
| F Factory and industrial | | | | 6 St. 75′ 22,800 | 4 St. 50′ 15,000 | 2 St. 30′ 9,600 | 4 St. 50′ 14,400 | 3 St. 40′ 13,200 | 2 St. 30′ 9,600 | 2 St.30′ 10,200 | 1 St. 20′ 4,800 |
| H High hazard | Note e | 5 St. 65′ 16,800 | 3 St. 40′ 14,400 | 3 St. 40′ 11,400 | 2 St. 30′ 7,500 | 1 St. 20′ 4,800 | 2 St.30′ 7,200 | 2 St.30′ 6,600 | 1 St. 20′ 4,800 | 1 St. 20′ 5,100 | N.P. |
| I-1 Institutional, restrained | | | 6 St. 75′ 18,000 | 4 St. 50′ 14,250 | 2 St. 30′ 9,375 | 1 St. 20′ 6,000 | 2 St. 30′ 9,000 | 2 St. 30′ 8,250 | 1 St. 20′ 6,000 | 1 St. 20′ 6,375 | N.P. |
| I-2 Institutional, incapacitated | | | 8 St. 90′ 21,600 | 4 St. 50′ 17,100 | 2 St. 30′ 11,250 | 1 St. 20′ 7,200 | 2 St. 30′ 10,800 | 2 St. 30′ 9,900 | 1 St. 20′ 7,200 | 1 St. 20′ 7,650 | N.P. |
| M Mercantile | | | | 6 St. 75′ 22,800 | 4 St. 50′ 15,000 | 2 St. 30′ 9,600 | 4 St. 50′ 14,400 | 3 St. 40′ 13,200 | 2 St. 30′ 9,600 | 2 St. 30′ 10,200 | 1 St. 20′ 4,800 |
| R-1 Residential, hotels | | | | 9 St. 100′ 22,800 | 4 St. 50′ 15,000 | 3 St. 40′ 9,600 | 4 St. 50′ 14,400 | 4 St. 50′ 13,200 | 3 St. 40′ 9,600 | 3 St. 40′ 10,200 | 2 St. 35′ 4,800 |
| R-2 Residential, multi-family | | | | 9 St. 100′ 22,800 | 4 St. 50′ 15,000 Note f | 3 St. 40′ 9,600 | 4 St. 50′ 14,400 | 4 St. 50′ 13,200 Note f | 3 St. 40′ 9,600 | 3 St. 40′ 10,200 | 2 St. 35′ 4,800 |
| R-3 Residential, one and two family | | | | 4 St. 50′ 22,800 | 4 St. 50′ 15,000 | 3 St. 40′ 9,600 | 4 St. 50′ 14,400 | 4 St. 50′ 13,200 | 3 St. 40′ 9,600 | 3 St. 40′ 10,200 | 2 St. 35′ 4,800 |
| S-1 Storage, moderate | Note h | | | 5 St. 65′ 19,950 | 4 St. 50′ 13,125 | 2 St. 30′ 8,400 | 4 St. 50′ 12,600 | 3 St. 40′ 11,550 | 2 St. 30′ 8,400 | 2 St. 30′ 8,925 | 1 St. 20′ 4,200 |
| S-2 Storage, low | Note g | | | 7 St. 85′ 34,200 | 5 St. 65′ 22,500 | 3 St. 40′ 14,400 | 5 St. 65′ 21,600 | 4 St. 50′ 19,800 | 3 St. 40′ 14,400 | 3 St. 40′ 15,300 | 2 St. 30′ 7,200 |
| T Temporary, miscellaneous | | | | | | | | | | | |

**Notes applicable to Table 505**

**Note a.** See the following sections for general exceptions to Table 505.
Section 505.4 Allowable area reduction for multi-story buildings.
Section 506.2 Allowable area increase due to street frontage.
Section 506.3 Allowable area increase due to automatic fire suppression system installation.
Section 507.0 Unlimited area one story buildings.
Section 508.1 Allowable height increase due to automatic fire suppression system installation.

**Note b.** Type 1 buildings permitted unlimited tabular heights and areas are not subject to special requirements that allow increased heights and areas for other types of construction (see Section 506.5).

**Note c.** The tabular area of one story school buildings of Use Group A-4 may be increased 200 percent provided every classroom has at least one door opening directly to the exterior of the building. Not less than one half of the required exits from any assembly room included in such buildings shall also open directly to the exterior of the building (see Section 506.4).

**Note d.** Auditoriums in buildings of Use Group A-4 of Type 1, 2A, 2B, 3A, 3B or 4A construction may be erected to 65 feet in height, and of Type 2C, 3C or 4B construction to 45 feet in height (see Section 508.2).

**Note e.** For exceptions to height and area limitations of buildings of Use Group H see Article 6 governing the specific use. For other special fireresistive requirements governing specific uses, see Section 1405.0.

**Note f.** For exceptions to height of buildings of Use Group R-2 of Types 2B and 3B construction, see Section 1405.6.

**Note g.** For height and area exceptions covering open parking structures, see Section 628.0.

**Note h.** For height and area exceptions covering petroleum bulk storage buildings, see Section 1405.3.

**Note i.** 1 foot = 304.8 mm; 1 foot$^2$ = 0.093 m$^2$.

posted fire lane not less than 18 feet (5486 mm) in width, the tabular areas may be increased 2 percent for each 1 percent of such excess frontage.

**506.3 Automatic fire suppression system:** When a building of other than Use Group H is equipped with an approved automatic fire suppression system, the tabular areas may be increased by 200 percent for one story buildings and 100 percent for buildings more than one story in height.

**506.4 School buildings:** When every classroom of a one story school building of Use Group A-4 has at least one door opening directly to the exterior of the building, the tabular area of Table 505 may be increased 200 percent. Not less than one half of the required exits from any assembly room included in such buildings shall also open directly to the exterior of the building.

**506.5 Type 1 construction:** Buildings of Type 1 construction permitted to be of unlimited tabular heights and areas in Table 505 are not subject to the special requirements that allow increased heights and areas for other types of construction.

## SECTION 507.0 UNLIMITED AREAS

**507.1 One story buildings:** In other than Type 4 construction, the area of all buildings of Use Groups A-3, B, F, M and S not including high hazard uses, which do not exceed one story or 85 feet (25908 mm) in height shall not be limited provided the exit facilities comply with the provisions of Article 8, an automatic fire suppression system is provided complying with the provisions of Section 1702.0 and the building is isolated as specified in Section 507.2. A fire suppression system shall not be required for buildings of Type 2 or Type 3A construction used exclusively for storage of noncombustible material, not packed or crated in combustible material, or as exempted by Section 304.3 for special industrial uses.

**507.1.1 School buildings:** One story school buildings of Use Group A-4 of Type 2, 3A or 3B construction may be unlimited in area when a direct exit to the outside of the building is provided from each classroom and the building is equipped with an approved automatic fire suppression system throughout. A fire separation shall be provided on all sides of such buildings as specified in Section 507.2.

**507.1.2 Indoor recreation buildings:** Indoor participant sport areas such as tennis courts, skating rinks, swimming pools and equestrian clubs may be unlimited in area and exempt from the automatic fire suppression system requirements provided the requirements of Sections 507.1.2.1 through 507.1.2.4 are met.

**507.1.2.1 Exits:** Direct exits to the outside are provided for all the occupants of the recreation area.

**507.1.2.2 Posting:** The recreation area is conspicuously posted as to use and occupant load.

**507.1.2.3 Fire alarm system:** The building is equipped with a manual fire alarm system.

**507.1.2.4 Fire suppression:** All other areas are equipped with an automatic fire suppression system.

**507.1.3 Travel distance:** The maximum length of exit access travel distance in unlimited area buildings shall be 400 feet (122 m).

**507.2 Fire separation:** The minimum fire separation on all sides of one story buildings of unlimited area shall be determined by the type of construction and fireresistance rating of the exterior wall adjacent thereto as specified in the following Table 507.

**Table 507**
**MINIMUM FIRE SEPARATION FOR TYPE OF CONSTRUCTION**

| Type of construction | Fire-resistance rating of exterior bearing walls | Minimum fire separation | Bearing and non-bearing portions of exterior walls | | Minimum fire separation |
|---|---|---|---|---|---|
| | | | Fireresistance rating of wall | Fireresistance rating of opening protective | |
| 2A | 2 hr. | 30 ft. | — | — | — |
| 2B | 1 hr. | 40 ft. | 2 hr. | 1½ hr. | 30 ft. |
| 2C | 0 hr. | 50 ft. | 3 hr. | 3 hr. | 30 ft. |
| 3A | 2 hr. | 40 ft. | 3 hr. | 3 hr. | 30 ft. |
| 3B | 2 hr. | 40 ft. | 3 hr. | 3 hr. | 30 ft. |
| 3C | 2 hr. | 50 ft. | 4 hr. | 3 hr. | 30 ft. |

**Note a.** 1 foot = 304.8 mm.

**507.3 Roof vents:** The roof system of one story buildings of unlimited area when of Type 2 or Type 3 construction shall be provided with smoke and heat vents in accordance with Sections 230 and 240 of NFiPA 204 listed in Appendix A.

**507.4 Fire access panels:** Grade level doors or fire access panels, as specified in Section 1406.4.3, shall be provided and spaced not more than 150 feet (45720 mm) apart in exterior walls adjacent to a required fire separation less than 40 feet (12192 mm).

## SECTION 508.0 HEIGHT EXCEPTIONS

**508.1 Automatic fire suppression systems:** When a building of other than Use Group H is equipped with an approved automatic fire suppression system, the building may be erected one story or 20 feet (6096 mm) higher than specified in Table 505.

**508.2 Auditoriums:** Auditoriums in Use Group A-4 of Type 1, 2A, 2B, 3A, 3B or 4A construction may be erected to 65 feet (19812 mm) in height and of Type 2C, 3C or 4B construction to 45 feet (13716 mm) in height.

## SECTION 509.0 STREET ENCROACHMENTS

**509.1 General:** Except as herein provided, a part of any building hereafter erected and additions to an existing building heretofore erected shall not project beyond the lot lines or beyond the building line when such line is established by the zoning law or any other statute controlling building construction.

**509.2 Below grade:** A part of a building hereafter erected below grade that is necessary for structural support of the building shall not project beyond the lot lines, except that the footings of street walls or their supports located at least 8 feet (2438 mm) below grade may project not more than 12 inches (305 mm) beyond the street lot line.

**509.3 Above grade:** All projections hereafter permitted beyond the street lot line or the building line above grade shall be so constructed as to be readily removable without endangering the safety of the building.

**509.4 Projections necessary for safety:** In any specific application, the building official may designate by approved rules such architectural features and accessories which are deemed desirable or necessary for the health or safety of the public and the extent to which they may project beyond the street lot line or the building line where such is established by statute, subject to all provisions and restrictions that may otherwise be prescribed by law, ordinance or rule of the authorities having jurisdiction over streets or public spaces.

**509.5 Permit revocable:** Any permit granted or permission expressed or implied in the provisions of this code to construct a building so as to project beyond the street lot line or building line shall be revocable by the jurisdiction at will.

**509.6 Existing encroachments:** Parts of existing buildings and structures which already project beyond the street lot line or building line may be maintained as constructed until their removal is directed by the proper authorities of the jurisdiction.

## SECTION 510.0 PERMISSIBLE STREET PROJECTIONS

**510.1 General:** Subject to such provisions as may be otherwise prescribed by law or ordinance, or by rules of the authorites having jurisdiction over streets, highways, and public spaces, the following projections, as described in Sections 510.2 through 510.11.1, shall be permitted beyond the street lot line or the building line, as the case may be.

**510.2 Cornices and eaves:** Main cornices or roof eaves located at least 12 feet (3658 mm) above the curb level shall project not more than 3 feet (914 mm).

**510.3 Architectural decorations:** Belt courses, lintels, sills, architraves, pediments and similar architectural decorations shall project not more than 4 inches (102 mm) when less than 10 feet (3048 mm) above the curb level, and

not more than 10 inches (254 mm) when 10 feet (3048 mm) or more above the curb level.

**510.4 Ornamental columns:** Ornamental columns, or pilasters, including the bases and moldings which emphasize the main entrance of the building, shall project not more than 12 inches (305 mm).

**510.5 Entrance steps:** Entrance steps and doors shall project not more than 12 inches (305 mm) and shall be guarded by check pieces not less than 3 feet (914 mm) high, or shall be located between ornamental columns or pilasters.

**510.6 Oriel windows:** Oriel windows with the lowest portion at least 10 feet (3048 mm) above the curb level shall project not more than 2½ feet (762 mm).

**510.7 Balconies:** Balconies located at least 10 feet (3048 mm) above the curb level shall project not more than 3 feet (914 mm), except that when the balcony is required in connection with a fire escape or exterior stairway as an element of a means of egress, the projection shall not exceed 4 feet (1219 mm).

**510.8 Awnings:** Retractable or fixed awnings shall have clearances above the grade, and shall be installed in accordance with the requirements of Section 513.0.

**510.9 Awning covers or boxes:** Awning covers or boxes located at least 8 feet (2438 mm) above the curb level shall not project more than 3 feet (914 mm).

**510.10 Marquees:** For the purpose of this section, a marquee shall include any object or decoration attached to or a part of said marquee.

**510.10.1 Projection and clearance:** The horizontal clearance between a marquee and the curb line shall be not less than 2 feet (610 mm). A marquee projecting more than two thirds of the distance from the property line to the curb line shall be not less than 10 feet (3048 mm) above the ground or pavement below.

**510.10.2 Thickness:** The maximum height or thickness of a marquee measured vertically from its lowest to its highest point shall not exceed 3 feet (914 mm) when the marquee projects more than two thirds of the distance from the property line to the curb line, and shall not exceed 9 feet (2743 mm) when the marquee is less than two thirds of the distance from the property line to the curb line.

**510.10.3 Roof construction:** The roof or any part thereof may be a skylight of approved plastics, or wired glass not less than ¼ inch thick with a single pane not more than 18 inches (457 mm) wide. Every roof and skylight of a marquee shall be sloped to downspouts which shall conduct any drainage from the marquee in a manner not to spill over the sidewalk.

**510.10.4 Location prohibited:** Every marquee shall be so located as not to interfere with the operation of any exterior standpipe, and not to obstruct the clear passage of stairways or exit discharge from the building or the installation or maintenance of street lighting.

**510.10.5 Construction:** A marquee shall be supported entirely from the

building and constructed of noncombustible material. Marquees shall be designed and constructed to withstand wind or other lateral loads and live loads as required in Article 9 of this code. Structural members shall be protected to prevent deterioration.

**510.11 Vaults:** Vaults below the sidewalk level shall extend not closer than 3 feet (914 mm) to the curb line; and the construction and use of such vaults shall be subject to the terms and conditions of the authority or legislative body having jurisdiction.

**510.11.1 Areaways:** Areaways shall not project beyond the street lot line more than 4 feet (1219 mm); provided that every such areaway shall be covered over at the street grade by an approved grating of metal or other noncombustible material.

## SECTION 511.0 PERMISSIBLE YARD AND COURT ENCROACHMENTS

**511.1 General:** A part of any building or structure shall not extend into side courts, inner courts or yards required for light and ventilation of habitable and occupiable rooms by the provisions of Article 7, or by the zoning law or other statutes controlling building construction, except as hereinafter provided; but the encroachment shall not exceed 20 percent of the legal area of yard or court required for light and ventilation purposes.

**511.2 Roof eaves:** Roof eaves shall project not more than 3 feet (914 mm) beyond the face of the wall.

**511.3 Steps and architectural features:** Steps, window sills, belt courses and similar architectural features, rain leaders and chimneys shall project not more than 2 feet (610 mm) beyond the face of the wall.

**511.4 Exterior stairways and fire escapes:** Outside stairways, smokeproof tower balconies, fire escapes or other required elements of a means of egress shall not project more than 4 feet (1219 mm) beyond the face of the wall.

## SECTION 512.0 SPECIAL AND TEMPORARY PROJECTIONS

**512.1 Alley projections:** The permissible projection beyond street lot lines shall apply in general to building projections into alleyways, except as may be modified by the authority having jurisdiction or by special deed restriction.

**512.2 Special permits:** When authorized by special permit, vestibules and storm doors may be erected for periods of time not exceeding seven months in any one year, and shall not project more than 3 feet (914 mm) nor more than one fourth the width of the sidewalk beyond the street lot line. Temporary entrance awnings may be erected with a minimum clearance of 7 feet (2134 mm) to the lowest portion of the hood or awning when supported on removable steel, or other approved noncombustible supports.

## SECTION 513.0 AWNINGS AND CANOPIES

**513.1 Permit:** A permit shall be obtained from the building official for the

erection, repair or replacement of any fixed awning, canopy or hood except as provided in Section 513.1.1, and for any retractable awning located at the first story level and extending over the public street or over any portion of a court or yard beside a building serving as a passage from a required exit or exit discharge to a public street.

**513.1.1 Exemption from permit:** A permit shall not be required for the erection, repair or replacement of fixed or retractable awnings installed on buildings of Use Groups R-3 unless they project over public property, or for retractable awnings installed above the first story or where the awning does not project over the public street or over any court or yard serving as a passage from a required exit to a public street.

**513.2 Retractable awnings:** There shall be a minimum clearance of 7 feet (2134 mm) from the sidewalk to the lowest part of the framework or any fixed portion of any retractable awning, except that the bottom of the valance of canvas awnings may extend to 6 feet 9 inches (2057 mm) above the sidewalk. Retractable awnings shall be securely fastened to the building and shall not extend closer than 12 inches (305 mm) from the curb line. They shall be equipped with a mechanism or device for raising and holding the awning in a retracted or closed position against the face of the building.

**513.3 Fixed or permanent awnings:** The clearance from the sidewalk to the lowest part of any fixed or permanent awning shall be the same as required in Section 513.2 for retractable awnings. Fixed or permanent awnings installed above the first story shall not project more than 4 feet (1219 mm).

**513.4 Canopies:** Canopies shall be constructed of a metal framework, with an approved covering, attached to the building at the inner end and supported at the outer end by not more than two stanchions with braces anchored in an approved manner and placed not less than 2 feet (610 mm) in from the curb line. The horizontal portion of the framework shall be not less than 8 feet (2438 mm) nor more than 12 feet (3658 mm) above the sidewalk and the clearance between the covering or valance and the sidewalk shall be not less than 7 feet (2134 mm). The width of canopies shall not exceed 8 feet (2438 mm).

**513.5 Special applications of awnings:** Rigid awnings supported in whole or part by members resting on the ground and used for patio covers, car ports, summer houses or other similar uses shall comply with the requirements of Section 513.6 for design and construction. Such structures shall be braced as required to provide rigidity.

**513.6 Design and construction:** Fixed awnings, canopies and similar structures shall be designed and constructed to withstand wind or other lateral loads and live loads as required by Article 9 of this code with due allowance for shape, open construction and similar features that relieve the pressures or loads. Structural members shall be protected to prevent deterioration.

## SECTION 514.0 TEMPORARY STRUCTURES

**514.1 General:** The building official may issue a permit for temporary construction. Such permits shall be limited as to time of service, but such temporary construction shall not be permitted for more than one year.

**514.2 Special approval:** All temporary construction shall conform to structural strength, fire safety, means of egress, light, ventilation and sanitary requirements of this code necessary to insure the public health, safety and general welfare.

**514.3 Termination of approval:** The building official is hereby authorized to terminate such special approval and to order the demolition of any such construction at his discretion, or as directed by the decision of the board of appeals.

## SECTION 515.0 PHYSICALLY HANDICAPPED AND AGED

**515.1 Purpose and Scope.** It is the express intention of this regulation to achieve uniformity in the technical design criteria necessary to establish a barrier free environment thereby allowing a physically disabled person to get to, enter and use a building or facility, so that they may have access to education, employment, living and recreational opportunities and be as self sufficient as possible.

**515.1 (1) New construction.** This regulation shall be mandatory to and in all new buildings and facilities, including both rooms and spaces, site improvements, exterior facilities and public walks as follows:

(a) Storage, miscellaneous and temporary occupancies in which the total occupant load is in excess of 100 persons or 20,000 square feet or three stories.

(b) Factory and industrial occupancies in which the total occupant load is in excess of 100 persons or 20,000 square feet.

(c) Business occupancies in which the total occupant load is in excess of 100 persons, or 10,000 square feet.

(d) Mercantile occupancies in which the total occupant load is in excess of 100 persons, 3,000 square feet of consumer area or 10,000 square feet of the total floor area.

(e) Churches, parochial and private schools and other similar nonpublic assembly type occupancies in which the total occupant load is in excess of 250 persons or 3,200 square feet.

(f) Assembly occupanies [other than those in subsection (e)] in which the total occupant load is in excess of 50 persons or 1,500 square feet total area.

(g) Residential occupancies, with the exception of single family dwellings, duplexes and multi-family housing projects of less than 25 units. The common areas of condominiums are required to be accessible, but not the interior of the condominium units.

(h) Institutional occupancies, with the exception of child day care facilities providing care for less than 13 children.

(i) All buildings and facilities which are leased or owned by the state, county, city or other municipal corporation, regardless of type of use, occupant load or total square footage. Only new leases will be treated as new facilities.

(j) Any establishment which is physically located within any building or facility otherwise covered by this section or within the premises of which is physically located any such covered establishment; and which also holds itself out as serving patrons of such covered establishment.

(k) All gasoline service stations, regardless of size or occupant capacity.

(l) Any building of an ocupant load, occupancy type or size not listed in this section shall be exempted from the requirements of this regulation as a "small business concern."

**515.1 (2) Existing buildings.** This regulation shall be mandatory for existing buildings of the categories listed in 515.1 (1), as follows:

(a) Alterations and repairs may be made to any structure without requiring other areas of the existing structure to comply with the accessibility requirement of this regulation provided such new work conforms to that of a new structure.

(b) Additions to an existing facility shall comply with the standards established by this regulation; however, the existing portion need not comply provided such addition does not result in decreased accessibilty.

(c) Remodeling involving major structural changes to a building shall require full compliance with all applicable provisions of this regulation.

(d) The restoration or authentic reconstruction of buildings designated as historic properties by the Kentucky Heritage Commission or the National Register of Historic Places are exempt from the requirements of this regulation.

**515.1 (3) Modifications** of the technical provisions of this regulation may be allowed where such modification provides equal facilitation.

**515.1 (4) Problem sites.** It is not the intent of this regulation to discourage development of sites with extreme conditions, for example, where housing would be built on steep slopes or recreation facilities provided in natural terrain, and where full accessiblity might prove impractical.

**515.1 (5) Interpretive decisions.** Where any provision of this regulation can be shown to be clearly unreasonable or impractical as applied to a particular building or use, or if full compliance would create a safety hazard, because of a particular use or condition, any person may request to appear before the Architectural Barriers Advisory Committee of the Department of Housing, Buildings and Construction. After advice from the committee, the department shall render its decision in the matter and said decision shall be appealable to the Board of Housing, Buildings and Construction.

**515.1 (6) Enforcement.** It shall be the duty of the local building official or the state building official having plan review and inspection responsibility under the Kentucky Building Code to enforce the provisions of this regulation.

**515.1 (7) Distribution of accessible elements.** Residential units accessible to

the physically handicapped must not be segregated from other units. For example, in large apartment complexes, hotels or motels, all the units or rooms for the disabled may not be placed in one building but must be dispersed throughout the complex.

**515.1 (8) Appendix.** All figures, tables and charts which are not included under a specific section of this regulation shall be found in Appendix J. Any figures or numbers not in agreement with the written language of this regulation shall be superceded by said written words or numbers.

**515.2 Definitions:** The following terms shall, for the purpose of this regulation, have the meaning indicated in this section.

**Access aisle.** An accessible pedestrian space between elements such as parking spaces, seating, and desks, that provides clearances appropriate for use of the elements.

**Accessible.** Describes a site, building, facility, or portion thereof that complies with this section and that can be approached, entered, and used by physically disabled people.

**Accessible element.** Part of an accessible route or accessible functional space; an item specified by this regulation (for example, telephone, controls, and the like).

**Accessible route.** A continuous unobstructed path connecting all accessible elements and spaces in a building or facility that can be negotiated by a severely disabled person using a wheelchair and that is also safe for and usable by people with other disabilities. Interior accessible routes may include corridors, floors, ramps, elevators, and clear floor space at fixtures. Exterior accessible routes may include parking access aisles, curb ramps, walks and ramps.

**Adaptability.** The ability of certain building elements, such as kitchen counters and sinks to be added to, raised, lowered, or otherwise altered so as to accommodate the needs of either the disabled or nondisabled, or to accommodate the needs of persons with different types or degrees of disability.

**Assembly area.** A room or space accomodating 50 or more individuals for religious, recreational, educational, political, social or amusement purposes, or for the consumption of food and drink, including all connected rooms or spaces with a common means of egress and ingress. Such areas as conference rooms would have to be accessible in accordance with other parts of this standard but would not have to meet all of the criteria associated with assembly areas.

**Automatic door.** A door equipped with a power operated mechanism and controls that open and close the door automatically upon receipt of a momentary actuating signal. The switch that begins the automatic cycle may be a photoelectric device, floor mat, or manual switch mounted on or near the door itself (see power assisted door).

**Circulation path.** An exterior or interior way of passage from one place to another for pedestrians including, but not limited to, walks, hallways, courtyards, stairways and stair landings.

**Clear.** Unobstructed.

**Common use.** Refers to those interior and exterior rooms, spaces, or elements that are made available for the use of a restricted group of people (for example, residents of an apartment building, occupants of an office building, or guests of such residents or occupants).

**Coverage.** The extent or range of accessibility that a particular administrative authority adopts and requires.

**Cross slope.** The slope of a pedestrian way that is perpendicular to the direction of travel (see running slope).

**Curb ramp.** A short ramp cutting through a curb.

**Detectable.** Perceptible by one or more of the senses.

**Disability.** A limitation or loss of use of a physical, mental, or sensory body part or function.

**Dwelling unit.** A single unit providing complete, independent living facilities for one or more persons including permanent provisions for living, sleeping, eating, cooking, and sanitation.

**Egress, means of.** A continuous and unobstructed path of travel from any point in a building or structure to a public way and consists of three separate and distinct parts;
(a) The exitway access;
(b) The exitway; and
(c) The exitway discharge; a means of egress comprises the vertical and horizontal means of travel and shall include intervening room spaces, doors, hallways, corridors, passageways, balconies, ramps, stairs, enclosures, lobbies, escalators, horizontal exits, courts, and yards.

**Emergency.** Refers to facilities resulting from or anticipating unforeseen combinations of circumstances, for example, storm shelters, bomb shelters, and comparable refuges.

**Functional spaces.** The rooms and spaces in a building or facility that house the major activities for which the building or facility is intended.

**Handicapped.** Those with significant limitations in using specific parts of the environment.

**Housing.** A building, facility, or portion thereof, excluding inpatient health care facilities, that contains one or more dwelling units or sleeping accommodations. Housing may include, but is not limited to, one and two family dwellings, apartments, group homes, hotels, motels, dormitories, and mobile homes.

**Marked crossing.** A crosswalk or other identified path intended for pedestrian use in crossing a vehicular way.

**Operable part.** A part of a piece of equipment or appliance used to insert or withdraw objects, or to activate, deactivate, or adjust the equipment or appliance (for example, coin slot, pushbutton, handle).

**Power assisted door.** A door with a mechanism that helps to open the door, or relieve the opening resistance of a door, upon the activation of a switch or a continued force applied to the door itself. If the switch or door is released, such doors immediately begin to close or close completely within three to 30 seconds (see automatic door).

**Principal entrance.** An entrance intended to be used by the residents or users to enter or leave a building or facility. This may include, but is not limited to, the main entrance.

**Public use.** Describes interior and exterior rooms or spaces that are made available to the general public. Public use may be provided at a building or facility that is privately or publicly owned.

**Ramp.** A walking surface that has a running slope greater than 1:20.

**Reasonable number.** A number that is sufficient to accommodate the disabled users of a site, building, facility, or element.

**Running slope.** The slope of a pedestrian way that is parallel to the direction of travel (see cross slope).

**Service entrance.** An entrance intended primarily for delivery or service.

**Signage.** Verbal, symbolic, and pictorial information.

**Site.** A parcel of land bounded by a property line or a designated portion of a public right-of-way.

**Site improvements.** Landscaping, paving for pedestrian and vehicular ways, outdoor lighting, recreational facilities, and the like, added to a site.

**Sleeping accommodations.** Rooms in which people sleep, for example, dormitory and hotel or motel guest rooms, but not including dwelling units.

**Tactile.** Describes an object that can be perceived using the sense of touch.

**Tactile warning.** A standardized surface texture applied to or built into walking surfaces or other elements to warn visually impaired people of hazards in the path of travel.

**Temporary.** Applies to facilities that are not of permanent construction but are extensively used or essential for public use for a given (short) period of time; for example, temporary classrooms or classroom buildings at schools and colleges, or facilites around a major construction site to make passage accessible, usable, and safe for everybody. Structures directly associated with the actual process of major construction, such as port-a-potties, scaffolding, bridging, trailers, and the like, are not included.

**Vehicular way.** A route intended for vehicular traffic, such as a street, driveway, or parking lot.

**Walk.** An exterior pathway with a prepared surface intended for pedestrian

use, including general pedestrian areas such as plazas and courts.

**Walking aid.** A device used by a person who has difficulty walking (for example, a cane, crutch, walker or brace).

**515.3 Minimum requirements**

**515.3 (1) Accessible site and exterior facilities.** An accessible site shall meet the following minimum requirements:

(a) At least one ***accessible route*** complying with Section 515.5 shall be provided from public transporation stops, accessible parking spaces, accessible passenger loading zones if provided, and public streets or sidewalks to an accessible building entrance.

(b) At least one accessible route complying with Section 515.5 shall connect ***accessible buildings,*** facilities, elements, and spaces that are on the same site.

(c) All ***objects that protrude*** from surfaces or posts into circulation paths shall comply with Section 515.5(3).

(d) ***Ground surfaces*** along accessible routes and in accessible spaces shall comply with Section 515.5(2).

(e) When ***parking*** is provided, parking spaces and access aisles shall comply with Section 515.6.

(f) ***Stairs*** shall comply with Section 515.9.

(g) All ***passenger elevators*** shall comply with Section 515.10

(h) All ***doors*** or gates to accessible spaces and elements and along accessible routes shall comply with Section 515.13.

(i) All ***drinking fountains*** along accessible routes shall comply with Section 515.15

(j) All ***toilet rooms*** provided for public use or as otherwise required by the Kentucky Building Code shall comply with Section 515.22. Bathing facilities on accessible routes shall comply with Section 515.23

(k) ***Tactile warnings*** shall be provided at hazardous conditions as specified in Section 515.24.

(l) All ***signs*** shall comply with Section 515.30

(m) If public ***telephones*** are provided, they shall comply with Section 515.31.

(n) If ***seating,*** tables, or work surfaces are provided in accessible spaces, they shall comply with Section 515.32.

(o) If ***places of assembly*** are provided, they shall comply with Section 515.33.

**515.3 (2) Accessible buildings.** Accessible buildings and facilities shall meet the following minimum requirements:

(a) At least one ***accessible route*** complying with Section 515.5(1) shall connect accessible building or facility entrances with all accessible spaces and elements within the building or facility.

(b) All ***objects*** that overhang circulation paths shall comply with Section 515.5(3).

(c) Ground and floor ***surfaces*** along accessible routes and in accessible

rooms and spaces shall comply with Section 515.5(2).

(d) ***Stairs*** shall comply with Section 515.9. This requirement is not mandatory within dwelling units.

(e) All passenger ***elevators*** shall comply with Section 515.10.

(f) If ***windows*** intended to be operated by occupants are provided, then a reasonable number, but always at least one of the windows in each accessible space, shall comply with Section 515.12.

(g) All ***doors*** to accessible spaces along accessible routes shall comply with Section 515.13.

(h) All ***principal entrances*** shall comply with Section 515.14

(i) All ***drinking fountains*** along accessible routes shall comply with Section 515.15.

(j) All ***toilet rooms*** provided for public use or as otherwise required by the Kentucky Building Code shall comply with Section 515.22. Bathing facilities on accessible routes shall comply with Section 515.23.

(k) If ***storage facilities*** such as cabinets, shelves, closets and drawers are provided in accessible spaces, they shall comply with Section 515.25.

(l) ***Controls and operating mechanisms*** in accessible spaces, along accessible routes, or as parts of accessible elements (for example, light switches and dispenser controls), shall comply with Section 515.27.

(m) If ***emergency warning systems*** are provided, they shall comply with Section 515.28.

(n) ***Tactile warnings*** shall be provided at hazardous conditions as specified in Section 515.29.

(o) If ***signs*** are provided, they shall comply with Section 515.30

(p) If public ***telephones*** are provided, they shall comply with Section 515.31.

(q) If ***seating*** tables, or work surfaces are provided in accessible spaces, they shall comply with Section 515.32.

(r) If ***places of assembly*** are provided, they shall comply with Section 515.33.

(s) If ***sleeping accommodations*** are provided, they shall comply with Section 515.34.

**515.3 (3) Accessible housing.** Accessible housing shall comply with the minimum requirements in subsections (1) and (2) of this section. It shall also meet the following requirements:

(a) Accessible ***dwelling units*** shall comply with Section 515.35.

(b) Each accessible dwelling unit shall be connected to an accessible entrance complying with Section 515.14 by an accessible route complying with Section 515.5.

(c) ***Common use spaces*** and facilities (for example, swimming pools, playgrounds, entrances, rental offices, lobbies, elevators, mail box areas, lounges, storage rooms, halls, corridors, and the like) that serve one or more accessible dwelling units shall comply with subsections (1) and (2) of this section. At least one accessible route shall connect all accessible entrances to each accessible dwelling unit.

**515.4 Space allowances and reach ranges**

**515.4 (1) Wheelchair passage width.** The minimum clear width for single wheelchair passage shall be 32 inches at a point and 35 inches continuously.

**515.4 (2) Width for wheelchair passing.** The minimum width for two wheelchairs to pass is 60 inches.

**515.4 (3) Wheelchair turning space.** The space required for a wheelchair to make a 180 degree turn is a clear space of 60 inches diameter or a T-shaped space with a minimum clear width of 36 inches.

**515.4 (4) Clear floor or ground space for wheelchairs**

(a) ***Size and approach.*** The minimum clear floor or ground space required to accommodate a single, stationary wheelchair and occupant is 30 inches by 48 inches. The minimum clear floor or ground space for wheelchairs may be positioned for forward or parallel approach to an object. Clear floor or ground space for wheelchairs may be part of the knee space required under some objects.

(b) Relationship of ***maneuvering clearances*** to wheelchair spaces. One full unobstructed side of the clear floor or ground space for a wheelchair shall adjoin or overlap an accessible route or adjoin another wheelchair clear floor space. If a clear floor space is located in an alcove or otherwise confined in all or part of three sides, additional maneuvering clearances shall be provided (see Appendix J, Figure 1).

(c) ***Surfaces*** of wheelchair spaces. Clear floor or ground spaces for wheelchairs shall comply with Section 515.5(2).

**515.4 (5) High forward reach.** If the clear floor space only allows forward approach to an object, the maximum high forward reach allowed shall be 40 inches. If the high forward reach is over an obstruction, reach and clearances shall be shown in Appendix J, Figure 2.

**515.4 (6) Side reach.** If the clear floor space allows parallel approach by a person in a wheelchair, the maximum high side reach allowed shall be 48 inches and the low side reach shall be no less than 9 inches above the floor. If the side reach is over an obstruction, the reach and clearances shall be as shown in Appendix J, Figure 3.

**515.5 Accessible route, ground and floor surfaces, and protruding objects**

**515.5 (1) Accessible route.** All walks, halls, corridors, aisles, and other spaces that are part of an accessible route shall comply with this subsection.

(a) ***Location:***

1. At least one accessible route shall be provided from public transportation stops, accessible parking and accessible passenger loading zones, and public streets or sidewalks to the accessible building entrance they serve.
2. At least one accessible route shall connect accessible buildings, facilities, elements and spaces that are on the same site.
3. At least one accessible route shall connect accessible building or

facility entrances with all accessible spaces and elements and with all accessible dwelling units within the building or facility.

4. An accessible route shall connect at least one accessible entrance of each accessible dwelling unit with those exterior and interior spaces and facilities that serve the accessible dwelling unit.

(b) ***Width.*** The minimum clear width of an accessible route shall be 36 inches except at doors. (See Section 515.13(5). If a person in a wheelchair must make a turn around an obstruction, the minimum clear width of the accessible route shall be as shown in Appendix J, Figure 4.

(c) ***Passing space.*** If an accessible route has less than 60 inches clear width, then passing spaces at least 60 inches by 60 inches shall be located at reasonable intervals not to exceed 200 feet. A T-intersection of two corridors or walks is an acceptable passing place.

(d) ***Head room.*** Accessible routes shall comply with subsection (3)(b) of this section.

(e) ***Surface texture.*** The surface of an accessible route shall comply with subsection (2) of this section.

(f) ***Slope.*** An accessible route with a running slope greater than 1:20 is a ramp and shall comply with Section 515.8. Nowhere shall the cross slope of an accessible route exceed 1:50.

(g) ***Changes in level.*** Changes in level along an accessible route shall comply with subsection (2)(b) of this section. If an accessible route has changes in level greater than ½ inch, then a curb ramp, ramp or elevator shall be provided that complies with Sections 515.7, 515.8 and 515.10, respectively. Stairs shall not be part of an accessible route.

(h) ***Doors.*** Doors along an accessible route shall comply with Section 515.13.

(i) ***Egress.*** At least one accessible route serving any accessible space or element shall also serve as a means of egress.

**515.5 (2) Ground and floor surfaces.** Ground and floor surfaces along accessible routes and in accessible rooms and spaces, including floors, walks, ramps, stairs, and curb ramps, shall be stable, firm and relatively nonslip under all weather conditions and shall comply with this subsection.

(a) ***Changes in level.*** Changes in level up to ¼ inch may be vertical and without edge treatment. Changes in level between ¼ inch and ½ inch shall be beveled with a slope no greater than 1:2. Changes in level greater than ½ inch shall be accomplished by means of a ramp that complies with Sections 515.7 or 515.8.

(b) ***Carpet.*** If carpet or carpet tile is used on a ground or floor surface, then it shall be securely attached; have a firm cushion, pad, or backing or no cushion or pad; and have a level loop, textured loop, level cut pile or level cut/uncut pile texture. The maximum combined thickness of pile, cushion and backing shall be ½ inch. Exposed edges and trim shall be securely fastened in place and shall comply with paragraph (a) of this subsection.

(c) ***Gratings.*** If gratings are located in walking surfaces, then they shall have spaces no greater than ½ inch wide in one direction. If gratings have elongated openings, then they shall be placed so that the long dimension is perpendicular to the dominant direction of travel.

**515.5 (3) Protruding objects:**

(a) Objects projecting from walls (for example, telephones) with their leading edges between 27 inches and 80 inches above the finished floor shall protrude no more than four inches into walks, halls, corridors, passageways, or aisles. Objects mounted with their leading edges at or below 27 inches above the finished floor may protrude any amount. Free standing objects mounted on posts or pylons may overhang 12 inches maximum from 27 inches to 80 inches above the ground or finished floor. Protruding objects shall not reduce the clear width of an accessible route or maneuvering space. (See Appendix J, Figure 5.)

(b) ***Head room.*** Walks, halls, corridors, passageways, aisles, or other circulation spaces shall have 80 inches in minimum clear head room. (See Appendix J, Figures 5).

**515.6 Parking and passenger loading zones:**

**515.6 (1) Minimum number.** Where parking spaces are provided, the minimum number of spaces shall be in accordance with Table 515.6 and shall comply with subsections (2) through (4) of this section. Where passenger loading zones are provided, at least one shall comply with subsection (5) of this section.

**Table 515.6**

| | |
|---|---|
| 1 to 25 | 1 |
| 25 to 50 | 2 |
| 51 to 75 | 3 |
| 76 to 100 | 4 |
| 101 to 150 | 5 |
| 151 to 200 | 6 |
| 201 to 300 | 7 |
| 301 to 400 | 8 |
| 401 to 500 | 9 |
| 501 or over | 2% of total—20 plus 1 for each 200 over 1,000 |

**515.6 (2) Parking spaces.** Parking spaces for disabled people shall be at least 96 inches wide and shall have an adjacent access aisle 60 inches wide minimum (see Appendix J, Figure 6). Parking access aisles shall be part of the accessible route to the building or facility entrance and shall comply with Section 515.5(1). Two accessible parking spaces may share a common access aisle. Parked vehicle overhangs shall not reduce the clear width of an accessible circulation route.

**515.6 (3) Signage.** Accessible parking spaces shall be designated as reserved for the disabled by a sign showing the international symbol of accessiblity. Such signs shall be above grade.

**515.6 (4) Passenger loading zones.** Passenger loading zones shall provide an access aisle at least 48 inches wide and 20 feet long adjacent and parallel to the vehicle pull up space. If there are curbs between the access aisle and the vehicle pull up space, then a curb ramp complying with Section 515.7 shall be provided.

**515.6 (5) Vertical clearance.** Provide minimum vertical clearance of eight feet six inches at accessible parking spaces, at accessible passenger loading zones and along vehicle access route to such areas from site entrances.

**515.7 Curb ramps:**

**515.7 (1) Location.** Curb ramps complying with this section shall be provided wherever an accessible route crosses a curb.

**515.7 (2) Slope.** Slopes of curb ramps shall comply with Table 815. The slope shall be measured at a ratio of rise to horizontal run.

**515.7 (3) Width.** The minimum width of a curb ramp shall be 36 inches, exclusive of flared sides.

**515.7 (4) Surface.** Surfaces of curb ramps shall comply with Section 515.5(2). Transitions from ramps to walks and ramps to gutters or streets shall be flush and free from abrupt changes.

**515.7 (5) Sides or curb ramps.** If a curb ramp is located where pedestrians must walk across the ramp, then it shall have flared sides; the maximum slope of the flare shall be 1:10. Curb ramps with returned curbs may be used where pedestrians would not normally walk across the ramp. Curb ramps shall not have handrails.

**515.7 (6) Built up curb ramps.** Built up curb ramps, or curb ramps that project into a vehicular path, shall not be permitted in new construction. They may be permitted in existing conditions only where such application is determined to be the only reasonable means of access and where the location of the built up curb ramp is not in an uncontrolled vehicular path. Built up curb ramps shall comply with this section.

**515.7 (7) Warning textures.** A curb ramp shall have a tactile warning texture contrasting to adjoining surfaces and complying with Section 515.29, extending the full width and depth of the curb ramps, including any flares.

**515.7 (8) Obstructions.** Curb ramps shall be located or protected to prevent their obstruction by parked vehicles.

**515.7 (9) Location at marked crossings.** Curb ramps at marked crossings shall be wholly contained within the markings, excluding any flared sides.

**515.7 (10) Diagonal curb ramps.** If diagonal (or corner type) curb ramps have returned curbs or other well defined edges, such edges shall be parallel to the direction of pedestrian flow. If diagonal curb ramps have flared sides, they shall also have at least a 24 inch long segment of straight curb located on each side of the curb ramps and within the marked crossing.

**515.7 (11) Islands.** Any raised islands in crossings shall be cut through level with the street or have curb ramps at both sides and a level area at least 48 inches long in the part of the island intersected by the crossings.

**515.7 (12) Uncurbed intersections.** If there is no curb at the intersection of a walk and an adjoining street, parking lot, or busy driveway, then the walk shall have a tactile warning texture complying with Section 515.29(5) at the edge of the vehicular way.

**515.8 Ramps:** Any part of an accessible route with a slope greater than 1:20 shall be considered a ramp and shall comply with Section 815.0.

**515.9 Stairs:** Stairways shall comply with Section 816.0. These specifications are not mandatory for stairs within dwelling units.

**515.10 Elevators**

**515.10 (1)** All public passenger elevators shall be required to be accessible and shall comply with the provisions of Article 21.

**515.10 (2)** At least one public passenger elevator shall be required in buildings three stories or greater in height; except that residential buildings three stories in height and containing no more than 24 units shall not be required to have an elevator.

**515.10 (3)** Elevators are not mandatory for buildings of less than three stories. If an elevator is provided, however, it shall have dimensions sufficient to accommodate a person in a wheelchair. This means the vertical access for wheelchairs from one level to the other is not required except in buildings three stories or more. See p. 96A-R

**515.11 Platform lifts:** Platform lifts may be permitted in buildings built prior to July 15, 1982.

**515.12 Windows**

**515.12 (1) General.** If windows intended to be operated by occupants are provided, at least one operable window in each accessible space shall comply with this section.

**515.12 (2) Window hardware.** Windows requiring pushing, pulling or lifting to open (for example, doublehung, sliding, or casement and awning units without cranks) shall require no more than five pounds to open or close. Locks, cranks, and other window hardware shall comply with Section 515.27.

**515.13 Doors:**

**515.13 (1) General.** All doors to accessible spaces and elements and along accessible routes shall comply with the requirements of this section.

**515.13 (2) Revolving doors and turnstiles.** Revolving doors or turnstiles shall not be the only means of passage at an accessible entrance or along an accessible route.

**515.13 (3) Gates.** Gates, including ticket gates, shall meet applicable specifications of this section.

**515.13 (4) Double leaf doorways.** If doorways have two door leaves, then at least one leaf shall meet the specifications in subsections (5) and (6) of this section. That leaf shall be an active leaf.

**515.13 (5) Clear width.** Doorways shall have a minimum clear opening of 32 inches with the door open 90 degrees, measured between the face of the door and the stop. Openings more than 24 inches in depth shall have a minimum clear opening of 36 inches.

**515.13 (6) Maneuvering clearances at doors.** Minimum maneuvering clearances for doors that are not automatic shall be as shown in Appendix J, Figure 7. The floor or ground area within the required clearances shall be level and clear. Doors required to be a minimum of 44 inches in institutional buildings shall be exempt from the requirements for space at the latch side of the door.

**515.13 (7) Two doors in series.** The minimum space between two doors in series shall be 48 inches plus the width of any door swinging into the space. Doors in series shall swing either in the same direction or away from the space between the doors.

**515.13 (8) Thresholds at doorways.** Thresholds at doorways shall not exceed ½ inch in height except that thresholds at exterior sliding doors shall not exceed ¾ inch. Raised thresholds and floor level changes at accessible doorways shall be beveled with a slope no greater than 1:2, and shall meet the requirements of Section 515.5(2)(a).

**515.13 (9) Door hardware.** Handles, pulls, latches, locks and other operating devices on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist to operate. Lever operated mechanisms, push type mechanisms and U shaped handles are acceptable designs. When sliding doors are fully open, operating hardware shall be exposed and usable from both sides. Doors to hazardous areas shall have hardware complying with Section 515.29(3).

**515.13 (10) Door closers.** If a door has a closer, then the sweep period of the closer shall be adjusted so that from an open position of 70 degrees, the door will take at least three seconds to move to a point three inches from the latch, measured to the leading edge of the door.

**515.13 (11) Door opening force.** The maximum force for pushing or pulling open a door shall be as follows:

(a) ***Fire doors*** shall have the minimum opening force of 15 pounds and as required in Section 812.5.4.

(b) ***Other doors:*** exterior hinged doors, 8.5 pounds; interior hinged doors, five pounds; sliding or folding doors, five pounds. These forces do not apply to the force required to retract latch bolts or disengage other devices that may hold the door in a closed position.

**515.13 (12) Automatic doors and power assisted doors.** If an automatic door is used, then it shall comply with American National Standard for Power-

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Section 10. New subsection, Subsection 3, was added.

Section 10. Elevators. (1) All public passenger elevators shall be required to be accessible and shall comply with the provisions of Article 21 of the Kentucky Building Code as filed in 815 KAR 7:020.

(2) At least one (1) public passenger elevator shall be required in buildings three (3) stories or greater in height; except that residential buildings three (3) stories in height and containing no more than twenty-four (24) units shall not be required to have an elevator.

(3) Elevators are not mandatory for buildings of less than three (3) stories. If an elevator is provided, however, it shall have dimensions sufficient to accommodate a person in a wheelchair. This means the vertical access for wheelchairs from one (1) level to the other is not required except in buildings three (3) stories or more.





Operated Doors, ANSI A156.10-1979. Slowly opening, low powered, automatic doors shall be considered a type of custom design installation as described in paragraph 1.1.1. of ANSI A156.10-1979. Such doors shall not open to back check faster than three seconds and shall require no more than 15 pounds to stop door movement. If a power assisted door is used, its door

opening force shall comply with subsection (11) of this section and its closing shall conform to the requirements in Section 10 of ANSI A156.10-1979.

**515.13 (13) Framed glass doors.** Where framed glass doors are used, the bottom rail shall be a minimum height of 7½ inches.

**515.14 Entrances:**

**515.14 (1) Principal entrances.** Principal entrances to a building or facility shall be part of an accessible route and shall comply with Section 515(1). Such entrances shall be connected by an accessible route to public transportation stops, to accessible parking and passenger loading zones, and to public streets or sidewalks if available. They shall also be connected by an accessible route to all accessible spaces or elements within the building or facility.

**515.14 (2) Service entrances.** A service entrance shall not be the sole accessible entrance unless it is the only entrance to a building or facility (for example, in a factory or garage).

**515.15 Drinking fountains and water coolers:**

**515.15 (1) Minimum number.** Where drinking fountains or water coolers are required, a reasonable number, but always at least one per floor or wing or both, shall comply with this section and shall be on an accessible route.

**515.15 (2) Spout height.** Spouts shall be no higher than 36 inches, measured from the floor or ground surfaces to the spout outlet. Dual units with one spout at 30 inches and another at 36 inches or higher are acceptable.

**515.15 (3) Spout location.** The spouts of drinking fountains and water coolers shall be at the front of the unit and shall direct the water flow in a trajectory that is parallel or nearly parallel to the front of the unit. The spout shall provide a flow of water so as to allow the insertion of a cup or glass under the flow of water.

**515.15 (4) Controls.** Controls shall comply with Section 515.27(4).

**515.15 (5) Clearances.** Wall and post mounted cantilevered units shall have a clear knee space between the bottom of the apron and the floor or ground at least 27 inches high, 30 inches wide, and 17 inches to 19 inches deep. Such units shall also have a minimum clear floor space 30 inches by 48 inches to allow a person in a wheelchair to make a parallel approach to the unit. This clear floor space shall comply with Section 515.4(4).

**515.16 Water closets:** Accessible water closets shall comply with this section. For water closets in adaptable dwelling units, see Section 515.35(4)(b).

**515.16 (1) Clear floor space.** Clear floor space for water closets not in stalls shall comply with Appendix J, Figure 9. Clear floor space may be arranged to allow either a left handed or right handed approach.

**515.16 (2) Height.** The height of water closets shall be 17 inches to 19 inches measured to the top of the toilet seat (see Appendix J, Figure 10). Seats shall not be sprung to return to a lifted position when not in use.

**515.16 (3) Grab bars.** Grab bars for water closets shall comply with Appendix J, Figures 9 and 10, and Section 515.4. Grab bars may be mounted by any desired method as long as they have a gripping surface at the locations shown

and do not obstruct the required floor area.

**515.16 (4) Flush controls.** Flush controls shall be hand operated and shall comply with Section 515.27(4). Controls for flush valves shall be mounted no more than 40 inches above the floor.

**515.16 (5) Dispensers.** Toilet paper dispensers shall be installed within reach as shown in Appendix J, Figure 10. Dispensers shall not control delivery and shall permit continuous paper flow.

**515.17 Toilet stalls:**

**515.17 (1) Location.** Accessible toilet stalls shall be on an accessible route and shall meet the requirements of this section.

**515.17 (2) Water closets.** Water closets in stalls shall comply with Section 515.16.

**515.17 (3) Size and arrangement.** The size and arrangement of the toilet stalls shall comply with Appendix J, Figure 11(a). In existing buildings, alternate stalls (Appendix J, Figure 11b) may be used where available space prohibits installation of the standard stall. Arrangements shown for stalls may be reversed to allow either a left or right handed approach.

**515.17 (4) Toe clearances.** In standard stalls, the front partition and at least one side partition shall provide a toe clearance of at least 9 inches above the floor. If the depth of the stall is greater than 60 inches, then the toe clearance is not required.

**515.17 (5) Doors.** Toilet stall doors shall comply with Section 515.13. Doors of toilet stalls shall be out swinging doors. Doors on toilet stalls shall have either a self closing mechanism or a pull mounted on the hinged side of the stall door.

**515.17 (6) Grab bars.** Provide grab bars at toilet stalls as shown in Appendix J, Figures 10 and 11. Grab bars may be mounted by any desired method as long as they have a gripping surface at the locations shown and do not obstruct the required clear floor area. Grab bars shall comply with Section 515.26.

**515.18 Urinals:**

**515.18 (1) General.** Accessible urinals shall comply with this section.

**515.18 (2) Heights.** Urinals shall be stall type or wall hung with an elongated rim at a maximum of 17 inches above the floor.

**515.18 (3) Clear floor space.** A clear floor space 30 inches by 48 inches shall be provided in front of urinals to allow forward approach. This clear space shall adjoin or overlap an accessible route and shall comply with Section 515.4(4).

**515.18 (4) Flush controls.** Flush controls shall be hand operated, shall comply with Section 515.27(4) and shall be mounted no more than 40 inches above the finished floor.

**515.18 (5) Urinal shields.** Urinal shields that do not extend beyond the front

edge of the urinal rim may be provided with 29 inches clearance between them.

**515.19 Lavatories and mirrors:** The requirements of this section shall apply to lavatory fixtures, vanities, and built in lavatories.

**515.19 (1) Height and clearances.** Lavatories shall be mounted with a clearance of at least 29 inches from the floor to the bottom of the apron. Thirty four inches is the maximum height of the top of the front lip of the lavatory. Knee and toe clearances shall comply with Appendix J, Figure 12.

**515.19 (2) Clear floor space.** A clear floor space 30 inches by 48 inches complying with Section 515.4(4) shall be provided in front of a lavatory to allow a forward approach. Such clear floor space shall adjoin or overlap an accessible route and shall extend a maximum of 19 inches underneath the lavatory.

**515.19 (3) Exposed pipes and surfaces.** If hot water exceeds 120 degrees Fahrenheit, the hot water and drain pipes under lavatories shall be insulated or otherwise covered. There shall be no sharp or abrasive surfaces under lavatories.

**515.19 (4) Faucets.** Faucets shall comply with Section 515.27(4). Lever operated, push type and electronically controlled mechanisms are examples of acceptable designs. Self closing valves are allowed if the faucet remains open for at least ten seconds.

**515.19 (5) Mirrors.** Mirrors shall be mounted with the bottom edge no higher than 40 inches from the floor.

**515.20 Bathtubs:**

**515.20 (1) General.** Accessible bathtubs shall comply with this section. For bathtubs in accessible dwelling units, see Section 515.35(4)(d).

**515.20 (2) Floor space.** Clear floor space in front of bathtubs shall be as shown in Appendix J, Figure 13.

**515.20 (3) Seat.** An in-tub seat or a seat at the head end of the tub shall be provided as shown in Appendix J, Figures 13 and 14. The structural strength of seats and their attachments shall comply with Section 515.26(3). Seats shall be mounted securely and shall not slip during use.

**515.20 (4) Grab bars.** Grab bars complying with Section 515.26 shall be provided as shown in Appendix J, Figures 13 and 14.

**515.20 (5) Controls.** Faucets and other controls complying with Section 515.27(4) shall be located as shown in Appendix J, Figure 14.

**515.20 (6) Shower unit.** A shower spray unit with a hose at least 60 inches long that can be used as a fixed shower head or as a hand held shower shall be provided.

**515.20 (7) Bathtub enclosures.** If provided, enclosures for bathtubs shall not obstruct controls or transfer from wheelchairs onto bathtub seats or into tubs. Enclosures on bathtubs shall not have tracks mounted on their rims.

**515.21 Shower stalls:**

**515.21 (1) General.** Accessible shower stalls shall comply with this section. For shower stalls in accessible dwelling units, see Section 515.35(4)(e).

**515.21 (2) Size and clearances.** Shower stall size and clear floor space shall comply with Appendix J, Figure l5.

**515.21 (3) Seat.** A seat shall be provided in transfer shower stalls as shown in Appendix J, Figure 16. The seat shall be mounted 17 inches to 19 inches from the bathroom floor and shall extend the full depth of the stall. The seat shall be on the wall opposite the controls.The structural strength of seats and their attachments shall comply with Section 515.26(3).

**515.21 (4) Grab bars.** Grab bars complying with Section 515.26 shall be provided as shown in Appendix J, Figure 17.

**515.21 (5) Controls.** Faucets and other controls complying with Section 515.27(4) shall be located as shown in Appendix J, Figure 17. In transfer shower stalls all controls, faucets, and the shower unit shall be mounted on the side wall opposite the seat.

**515.21 (6) Shower unit.** A shower spray unit with a hose at least 60 inches long that can be used as a fixed shower head or as a hand held shower shall be provided.

**515.21 (7) Curbs.** If provided, curbs in transfer shower stalls shall be no higher than 4 inches. Roll in shower stalls shall not have curbs.

**515.21 (8) Shower enclosures.** If provided, enclosures for shower stalls shall not obstruct controls or obstruct transfer from wheelchairs onto shower seats.

**515.22 Toilet rooms:**

**515.22 (1) Minimum number.** All toilet rooms provided for public use or otherwise required by the *Kentucky Building Code* shall be on an accessible route and shall comply with this section.

**515.22 (2) Doors.** All doors to accessible toilet rooms shall comply with Section 515.13. Doors shall not swing into the clear floor space required for any fixture.

**515.22 (3) Clear floor space.** The accessible fixtures and controls required in subsections (4), (5), (6) and (7) of this section shall be on an accessible route. An unobstructed turning space complying with Section 515.4(3) shall be provided within an accessible toilet room. The clear floor space at fixtures and controls, the accessible route, and the turning space may overlap.

**515.22 (4) Water closets.** If toilet seats are provided, then a reasonable number, but always at least one, shall comply with Section 515.17; its water closet shall comply with Section 515.15. If water closets are not in stalls, then a reasonable number, but always at least one, shall comply with Section 515.16.

**515.22 (5) Urinals.** If urinals are provided, then a reasonable number, but always at least one, shall comply with Section 515.18.

**515.22 (6) Lavatories and mirrors.** If lavatories and mirrors are provided, then a reasonable number, but always at least one of each, shall comply with Section 515.19.

**515.22 (7) Controls and dispensers.** If controls, dispensers, receptacles, or other equipment is provided, at least one of each shall be on an accessible route and shall comply with Section 515.27.

**515.22 (8) Emergency lighting.** Where emergency lighting in a building is required by Section 824.0, the emergency lighting shall be provided in accessible toilet rooms.

**515.23 Bathrooms, bathing facilities and shower rooms**

**515.23 (1) Minimum number.** Bathrooms, bathing facilities or shower rooms on an accessible route shall comply with this section. For bathrooms in accessible dwelling units, see Section 515.35(4).

**515.23 (2) Doors.** Doors to accessible bathrooms shall comply with Section 515.13. Doors shall not swing into the floor space required for any fixture.

**515.23 (3) Clear floor space.** The accessible fixtures and controls required in subsections (4), (5), (6), (7), (8) and (9) of this section shall be on an accessible route. An unobstructed turning space complying with Section 515.4(3) shall be provided within an accessible bathroom. The clear floor space at fixtures and controls, the accessible route, and the turning space may overlap.

**515.23 (4) Water closets.** If toilet stalls are provided, then a reasonable number, but always at least one, shall comply with Section 515.17; its water closet shall comply with Section 515.16. If water closets are not in stalls, then a reasonable number, but always at least one, shall comply with Section 515.16.

**515.23 (5) Urinals.** If urinals are provided, then a reasonable number, but always at least one, shall comply with Section 515.18.

**515.23 (6) Lavatories and mirrors.** If lavatories and mirrors are provided, then a reasonable number, but always at least one, shall comply with Section 515.19.

**515.23 (7) Controls and dispensers.** If controls, dispensers, receptacles or other equipment is provided, at least one of each shall be on an accessible route and shall comply with Section 515.27.

**515.23 (8) Bathing and shower facilities.** If tubs or showers are provided, then at least one accessible tub that complies with Section 515.20 or at least one accessible shower that complies with Section 515.20 or at least one accessible shower that complies with Section 515.21 shall be provided.

**515.23 (9) Medicine cabinets.** If medicine cabinets are provided, at least one shall be located with a usable shelf no higher than 40 inches above the floor space. The floor space shall comply with Section 515.4(4).

**515.24 Sinks**

**515.24 (1) General.** If accessible sinks are provided, they shall comply with this section. Sinks in kitchens of accessible dwelling units shall comply with Section 515.35(5)(e).

**515.24 (2) Height.** Sinks shall be mounted with the counter or rim no higher than 34 inches from the floor.

**515.24 (3) Knee clearance.** Knee clearance that is 27 inches high, 30 inches wide, and 19 inches deep shall be provided underneath sinks.

**515.24 (4) Depth.** Each sink shall be a maximum of 6½ inches deep.

**515.24 (5) Clear floor space.** A clear floor space at least 30 inches by 48 inches complying with Section 515.4(4) shall be provided in front of a sink to allow forward approach. The clear floor space shall be on an accessible route and shall extend a maximum of 19 inches underneath the sink.

**515.24 (6) Exposed pipes and surfaces.** If hot water exceeds 120 degrees Fahrenheit, hot water and drain pipes under sinks shall be insulated or otherwise covered. There shall be no sharp or abrasive surfaces under sinks.

**515.24 (7) Faucets.** Faucets shall comply with Section 515.27(4). Lever operated, push type, touch type, or electronically controlled mechanisms are acceptable designs.

**515.25 Storage**

**515.25 (1) General.** Accessible storage facilities such as cabinets, shelves, closets, and drawers shall comply with this section.

**515.25 (2) Clear floor space.** A clear floor space at least 30 inches by 48 inches complying with Section 515.4(4) that allows either a forward or parallel approach by a person using a wheelchair shall be provided at accessible storage facilities.

**515.25 (3) Height.** Accessible storage spaces shall be within at least one of the reach ranges specified in Section 515.4(5) and (6). Clothes rods shall be a maximum of 48 inches from the floor.

**515.25 (4) Hardware.** Hardware for accessible storage facilities shall comply with Section 515.27(4). Touch latches and U shaped pulls are acceptable.

**515.26 Handrails, grab bars and tub and shower seats**

**515.26 (1) General.** All handrails, grab bars, and tub and shower seats shall comply with this section.

**515.26 (2) Size and spacing of grab bars and handrails.** The outside diameter or width of the gripping surfaces of a handrail or grab bar shall be 1¼ inch to 1½ inch or the shape shall provide an equivalent gripping surface. If handrails or grab bars are mounted adjacent to a wall, the space between the wall and the handrail or grab bars shall be 1½ inch (see Appendix J, Figure 18). Handrails may be located in a recess if the recess is a maximum of three inches deep and extends at least 18 inches above the top of the rail (see Appendix J, Figure 18).

**515.26 (3) Structural strength.** Handrails, grab bars, tub and shower seats, fasteners, and mounting devices shall support a minimum concentrated load of 250 pounds and shall not rotate in their fittings.

**515.26 (4) Eliminating hazards.** A handrail or grab bar and any wall or other surface adjacent to it shall be free of any sharp or abrasive elements. Edges shall have a minimum radius of ⅛ inch.

**515.27 Controls and operating mechanisms**

**515.27 (1) General.** Controls and operating mechanisms in accessible spaces, along accessible routes, or as part of accessible elements (for example, light switches, dispenser controls) shall comply with this section.

**515.27 (2) Clear floor space.** Clear floor space complying with Section 515.4(4) that allows a forward or parallel approach by a person using a wheelchair shall be provided at controls, dispensers, receptacles, and other operable equipment.

**515.27 (3) Height.** The highest operable part of all controls, dispensers, receptacles, and other operable equipment shall be placed within at least one of the reach ranges specified in Section 515.4(5) and (6). Except where the use of special equipment dictates otherwise, electrical and communications systems receptacles on walls shall be mounted no less than 15 inches above the floor.

**515.27 (4) Operation.** Controls and operating mechanisms shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls shall be no greater than five pounds of force.

**515.28 Alarms**

**515.28 (1) General.** If emergency warning systems are provided, they shall include both audible alarms complying with subsection (2) of this section and visual alarms complying with subsection (3) of this section. In facilities with sleeping accommodations, accessible sleeping accomodations shall have an auxiliary visual alarm system complying with subsection (4) of this section.

**515.28 (2) Audible alarms.** Audible emergency alarms shall produce a sound that exceeds the ambient room or space noise by at least 15 decibels or exceeds any maximum sound level with a duration of 30 seconds by five decibels, whichever is louder. Sound levels for alarm signals shall not exceed 120 decibels.

**515.28 (3) Visual alarms.** Electronically powered internally illuminated emergency exit signs or adjacent devices shall flash as a visual emergency alarm in conjunction with audible emergency alarms. The flashing frequency of visual alarm devices shall be less than five Hz. If such alarms use electricity from the building as a power source, then they shall be installed on the same system as the audible emergency alarms.

**515.28 (4) Auxiliary alarms.** Accessible sleeping accommodations shall have a visual alarm connected to the building emergency alarm system or shall have a standard 110 volt electrical receptacle into which such an alarm could be

connected. Instructions for use of the auxiliary alarm or connection shall be provided.

**515.28 (5) Alarm activators.** Alarm activators shall comply with Section 515.27 controls and operating mechanisms.

**515.28 (6) Special alarm systems.** Specialized alarm systems utilizing advanced technology will be considered on a case by case basis.

**515.29 Tactile warnings:**

**515.29 (1) General.** Where tactile warnings are required, they shall comply with this section.

**515.29 (2) Tactile warnings on walking surfaces.** Tactile warning textures on walking surfaces shall contrast with that of the surrounding surface.

**515.29 (3) Tactile warnings on doors to hazardous areas.** Doors that lead to areas that might prove dangerous to a blind person (for example, doors leading to platforms, mechanical rooms, stages, and the like) shall be made identifiable to the touch by a textured surface on the door handle, knob, pull or other operating hardware. This textured surface may be made by knurling or roughening or by a material applied to the contact surface. Such textured surfaces shall not be provided for emergency exit doors or any doors other than those to hazardous areas.

**515.29 (4) Tactile warnings at stairs.** All stairs (except those in dwelling units, in enclosed stair towers, or set to the side of the path of travel) shall have a tactile warning at the top of stair runs.

**515.29 (5) Tactile warnings at hazardous vehicular areas.** If a walk crosses or adjoins a frequently used vehicular way, and if there are no curbs, railings, or other elements detectable by a person who has a severe visual impairment separating the pedestrian and vehicular areas, then the boundary between the areas shall be defined by a continous 36 inch wide tactile warning texture complying with subsection (2) of this section.

**515.29 (6) Tactile warnings at reflecting pools.** The edges of reflecting pools shall be protected by railings, walls, curbs, or tactile warnings complying with subsection (2) of this section.

**515.29 (7) Standardization.** Textured surfaces for tactile warnings shall be standard within a building, facility, site or complex of buildings.

**515.30 Signage:**

**515.30 (1) General.** All signage that provides emergency information of general circulation directions or identifies rooms and spaces shall comply with this section.

**515.30 (2) Character proportion and contrast.** Letters and numbers on sign systems shall:

(a) Have a width to height ratio of between 3:5 and 1:1.
(b) Have a stroke width to height ratio of between 1:5 to 1:10.
(c) Contrast in value with their backgrounds, preferably light letters on a dark background.
(d) Have a matte finish on a matte finish background.

**515.30 (3) Raised or incised characters.** Provide numbers and letters that are:
(a) Raised or incised from the background surface 1/32 inch. Also incise or raise symbols and pictographs in this manner.
(b) Between ⅝ inch and 2 inches high.
(c) Sans serif with sharply defined edges.
(d) If incised, provided with at least ¼ inch stroke width.

**515.30 (4) Mounting location and height.** Signage shall be placed in a standardized location throughout a building or facility as follows:
(a) Interior signage shall be located on the door or alongside of the door on the latch side and shall be mounted at between 4′6″ and 5′6″ above finished floor.
(b) Exterior signage shall be installed at entrances and walks to direct individuals to accessible routes and entrances required.
(c) Symbols of accessiblity. If accessible facilities are identified, then the international sign of accessibility shall be used.

**515.31 Telephones:**

**515.31 (1) General.** If public telephones are provided, then they shall comply with this section.

**515.31 (2) Clear floor or ground space.** A clear floor or ground space at least 30 inches by 48 inches that allows either a forward or parallel approach by a person using a wheelchair shall be provided at telephones. The clear floor or ground space shall comply with Section 515.4(4). Bases, enclosures, and fixed seats shall not impede approaches to telephones by people who use wheelchairs.

**515.31 (3) Mounting height.** The highest operable part of the telephone shall be within reach ranges specified in Section 515.4(5) or (6). Telephones mounted diagonally shall have the highest operable part no higher than 54 inches above the floor.

**515.31 (4) Enclosures.** If telephone enclosures are provided, they may overhang the clear floor space required in subsection (2) of this section within the following limits:
(a) ***Side reach*** possible: The overhang shall be no greater than 19 inches; the height of the lowest overhanging part shall be equal to or greater than 27 inches.
(b) ***Full height*** enclosures: Entrances to full height enclosures shall be 30 inches clear minimum.
(c) ***Forward reach*** required: If the overhang is greater than 12 inches, then the clear width of the enclosure shall be 30 inches minimum, if the clear width of the enclosure is less than 30 inches, then the height of the

lowest overhanging part shall be equal to or greater than 27 inches.

(d) Where ***telephone enclosures*** protrude into walls, halls, corridors, or aisles, they shall also comply with Section 515.5(3).

**515.31 (5) Equipment for hearing impaired people.** Telephones shall be equipped with a receiver that generates a magnetic field in the area of the receiver cap. If banks of public telephones are provided, a minimum of 5 percent, but at least one in a building or facility shall be equipped with a volume control.

**515.31 (6) Controls.** Telephones shall have pushbutton controls where service for such equipment is available.

**515.31 (7) Telephone books.** Telephone books, if provided, shall be located so that they can be used by a person in a wheelchair.

**515.31 (8) Cord length.** The cord from the telephone to the handset shall be at least 29 inches long.

**515.32 Seating, tables, and work surfaces:** see p. following 108A-R

**515.32 (1) Minimum number.** If fixed or built-in seating, tables, or work surfaces are provided in accessible spaces, the minimum number of spaces for use by persons in wheelchairs shall be in accordance with Table 515.33.

**515.32 (2) Seating.** If seating spaces for people in wheelchairs are provided at tables, counters, or work surfaces, clear floor space complying with Section 515.4(4) shall be provided. Such clear floor space shall not overlap knee space by more than 19 inches.

**515.32 (3) Knee clearances.** If seating for people in wheelchairs is provided at tables, counters, and work surfaces, knee spaces at least 27 inches high, 30 inches wide, and 19 inches deep shall be provided.

**515.32 (4) Height of work surfaces.** The tops of tables and work surfaces shall be from 28 inches to 34 inches from the floor to ground.

**515.33 Assembly areas:** see insert next page

**515.33 (1) Minimum number.** Assembly areas shall have designated spaces for wheelchair use in each assembly area that comply with this section and the minimum number of wheelchair spaces shall be in accordance with Table 515.33. Assembly areas with audio-amplification systems shall have a listening system complying with Subsections 515.33 (6) and (7) to assist persons with severe hearing loss in the appreciation of audio presentations.

**515.33 (2) Size of wheelchair locations.** Each wheelchair location shall provide minimum clear ground or floor space of 66 inches wide by 48 inches deep for forward or rear access and 66 inches deep for side access and shall accommodate two people in wheelchairs.

**515.33 (3) Placement of wheelchair locations:**

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Section 33 to be changed to read as follows:

Section 33. Assembly Areas. (1) Minimum number. Assembly areas shall have designated spaces for wheelchair use in each assembly area that complies with this Section and the minimum number of wheelchair spaces shall be in accordance with Table II. Assembly areas with audio-amplification systems shall have a listening system complying with Subsections (6) and (7) to assist persons with severe hearing loss in the appreciation of audio presentations.

TABLE II

| Total seating capacity of the Facility | Minimum number of Wheelchair spaces |
|---|---|
| 50 to 75 | 3 |
| 76 to 100 | 4 |
| 101 to 150 | 5 |
| 151 to 200 | 6 |
| 201 to 300 | 7 |
| 301 to 400 | 8 |
| 401 to 500 | 9 |
| over 500 | 10 plus a reasonable number not to exceed 1% to be determined by Section 1 (5) |

(2) Size of wheelchair locations. Each wheelchair location shall provide minimum clear ground or floor space of sixty-six (66) inches wide by forty-eight (48) inches deep for forward or rear access and sixty-six (66) inches deep for side access and shall accommodate two (2) people in wheelchairs.

(3) Placement of wheelchair locations:

(a) Wheelchair areas shall be an integral part of any fixed seating plan and shall be dispersed throughout the seating area. They shall adjoin an accessible route that also serves as a means of egress in case of emergency and shall be located to provide lines of sight comparable to those for all viewing areas.

(b) Exception. In alteration work where it is structurally impossible to alter seating location to disperse seating throughout, seating may be located in collected areas, but must adjoin an accessible route.

(4) Surfaces. The ground or floor at wheelchair locations shall be level and shall comply with Section 5 (2).

(5) Access to performing areas. An accessible route shall be provided to performing areas, including stages, arena floors, dressing rooms, locker rooms and other spaces used by performers.

(6) Placement of listening systems. If the listening system provided serves individual fixed seats, then such seats shall be located within a fifty (50) foot viewing distance of the stage or playing area and shall have a complete view of the stage or playing area.

(7) Types of listening systems. Audio loops and radio frequency systems are two acceptable types of listening systems. The Department will rely upon the advice of the Kentucky Commission for the Deaf and Hearing Impaired in its interpretations and enforcement relative to the requirements for access for the hearing impaired.

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(8) The provisions of this Section are intended to apply to performing arts and movie theaters as well as public meeting places, auditoriums and gymnasiums, among others.

**Table 515.33**
**ACCESSIBLE LOCATIONS**

| Total seating capacity of the facility | Minimum number of wheelchair spaces |
|---|---|
| 50 to 75 | 3 |
| 76 to 100 | 4 |
| 101 to 150 | 5 |
| 151 to 200 | 6 |
| 201 to 300 | 7 |
| 301 to 400 | 8 |
| 401 to 500 | 9 |
| over 500 | 10 plus a reasonable number not to exceed 1% to be determined by Section 1 (5) |

(a) Wheelchair areas shall be an integral part of any fixed seating plan and shall be dispersed throughout the seating area. They shall adjoin an accessible route that also serves as a means of egress in case of emergency and shall be located to provide lines of sight comparable to those for all viewing areas.

(b) Exception. In alteration work where it is structurally impossible to alter seating location to disperse seating throughout, seating may be located in collected areas, but must adjoin an accessible route.

**515.33 (4) Surfaces.** The ground or floor at wheelchair locations shall be level and shall comply with Section 515.5(2).

**515.33 (5) Access to performing areas.** An accessible route shall be provided to performing areas, including stages, arena floors, dressing rooms, locker rooms, and other spaces used by performers.

**515.33 (6) Placement of listening systems.** If the listening system provided serves individual fixed seats, then such seats shall be located within a 50 foot viewing distance of the stage or playing area and shall have a complete view of the stage or playing area.

**515.33 (7) Types of listening systems.** Audio loops and radio frequency systems are two acceptable types of listening systems. The Department will rely upon the advice of the Kentucky Commission for the Deaf and Hearing Impaired in its interpretation and enforcement of the provisions relating to accessibility for the hearing impaired.

**515.33 (8) Applicability.** The provisions of this section are intended to apply to performing arts and movie theaters as well as public meeting places, auditoriums and gymnasiums, among others.

**515.34 Hotels and motels:**

***Minimum Requirements.*** In hotel and motel buildings, lodging houses, boarding houses, and dormitory buildings, providing sleeping accommoda-

tions for 20 or more individuals, a minimum of 5 percent of those accommodations shall be accessible to and shall comply with Sections 515.3(1) and 515.3(2).

**515.35 Dwelling units:** Where multi-family housing projects are required to be accessible, a minimum of one in 25 dwelling units shall meet the requirements of this section.

**515.35 (1) An accessible dwelling unit shall be on an accessible route.** An accessible dwelling unit shall have the following accessible elements and spaces as a minimum:

(a) ***Common spaces*** and facilities serving individual accessible dwelling units (for example, entry walks, trash disposal facilities, and mail boxes) shall comply with Sections 515.3 through 515.33.

(b) Accessible spaces shall have ***maneuvering space*** complying with Section 515.4(2) and (3) and surfaces complying with Section 515.5(2).

(c) At least one accessible route complying with Section 515.5(1) shall connect the ***accessible entrances*** with all accessible spaces and elements within the dwelling units.

(d) If ***parking spaces*** are assigned for use with individual dwelling units, then at least one parking space per accessible dwelling unit shall comply with Section 515.6(3).

(e) If ***windows*** intended to be operated by occupants are provided, then they shall comply with Section 515.12.

(f) ***Doors*** to and in accessible spaces that are intended for passage shall comply with Section 515.13.

(g) All ***entrances*** to accessible dwelling units shall comply with Section 515.14.

(h) ***Storage*** in accessible spaces in dwelling units, including cabinets, shelves, closets, and drawers, shall comply with Section 515.25.

(i) All ***controls*** in accessible spaces shall comply with Section 515.27. Those portions of heating, ventilating, and air conditioning equipment requiring regular, periodic maintenance and adjustment by the resident of a dwelling shall be accessible to people in wheelchairs. If air distribution registers must be placed in or close to ceilings for proper air circulation, this specification shall not apply to registers.

(j) If ***emergency alarms*** are provided, alarm connections complying with Sections 515.28(4), (5), and (6) shall be provided in the dwelling unit.

(k) If ***telephone*** connections are installed in the dwelling unit, a reasonable number, but always at least one, shall comply with Sections 515.31(2) and (3).

(l) A reasonable number, but always at least one, of ***full bathrooms*** shall comply with subsection (4) of this section. A full bathroom shall include a water closet, a lavatory, and a bathtub or shower.

(m) The ***kitchen*** shall comply with subsection (5) of this section.
(n) If ***laundry facilities*** are provided, they shall comply with subsection (6) of this section.
(o) The following ***spaces*** shall be accessible and shall be on an accessible route:
1. The living area.
2. The dining area.
3. The sleeping area, or the bedroom in one bedroom dwelling units, or at least two bedrooms or sleeping spaces in dwelling units with two or more bedrooms.
4. Patios, terraces, balconies, carports, and garages, if provided with the dwelling unit.

**515.35 (2) Adaptability.** The specifications of subsection (5) of this section are based on the concept of adaptability.

**515.35 (3) Consumer information.** To ensure that the existence of adaptable features will be known to the owner or occupant of a dwelling, consumer information shall be provided for each accessible dwelling unit for rent or sale.

**515.35 (4) Bathrooms.** Bathrooms shall be on an accessible route and shall comply with the requirements of this subsection.
(a) ***Minimum dimensions.*** Accessible bathrooms shall accommodate wheelchair turning space in accordance with Section 515.4(3). Door operation shall not interfere with maneuverability.
(b) ***Water closets:***
1. ***Clear floor space*** at the water closet shall be as shown in Appendix

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Section 32 to be changed to read as follows:

Section 32. Seating, Tables and Work Surfaces. (1) Minimum number. If fixed or built-in seating, tables, or work surfaces are provided in accessible spaces, the minimum number of spaces for use by persons in wheelchairs shall be in accordance with Table II of Section 33 of this regulation.

(2) Seating. If seating spaces for people in wheelchairs are provided at tables, counters, or work surfaces, clear floor space complying with Section 4(4) shall be provided. Such clear floor space shall not overlap knee space by more than nineteen (19) inches.

(3) Knee clearances. If seating for people in wheelchairs is provided at tables, counters, and work surfaces, knee spaces at least twenty-seven (27) inches high, thirty (30) inches wide, and nineteen (19) inches deep shall be provided.

(4) Height of work surfaces. The tops of tables and work surfaces shall be from twenty-eight (28) inches to thirty-four (34) inches from the floor to ground.

J, Figure 9. The water closet may be located with the clear area at either the right or left side of the toilet.

2. The ***height*** of the water closet shall be at least 17 to 19 inches measured to the top of the toilet seat.
3. ***Grab bars*** shall be installed as shown in Appendix J, Figure 10 and shall comply with Section 515.26.
4. The ***toilet paper dispenser*** shall be installed within reach as shown in Appendix J, Figure 10.

(c) ***Lavatory, mirrors, and medicine cabinets:***

1. The lavatory and mirrors shall comply with Section 515.19.
2. If a medicine cabinet is provided above the lavatory, then the bottom of the medicine cabinet shall be located with a usable shelf no higher than 44 inches above the floor.

(d) ***Bathtubs.*** If a bathtub is provided, then it shall have the following features:

1. ***Floor space.*** Clear floor space at bathtubs shall be as shown in Appendix J, Figure 13.
2. ***Seat.*** An in-tub seat or a seat at the head end of the tub shall be provided as shown in Appendix J, Figures 13 and 14. The structural strength of seats and their attachments shall comply with Section 515.26(3). Seats shall be mounted securely and shall not slip during use.
3. ***Grab bars.*** Grab bars shall be installed as shown in Appendix J, Figure 14 and shall comply with Section 515.26.
4. ***Controls.*** Faucets and other controls shall be located as shown in Appendix J, Figure 14 and shall comply with Section 515.27(4). Single lever and mixing devices are acceptable designs.
5. ***Shower unit.*** A shower spray unit with a hose at least 60 inches long that can be used as a fixed shower head at various heights or as a hand held shower shall be provided.

(e) ***Showers:*** If a shower is provided, it shall have the following features:

1. ***Size and clearances.*** Shower stall size and clear floor space shall comply with Appendix J, Figure 15.
2. ***Seat.*** A seat shall be provided in the transfer shower stalls as shown in Appendix J, Figure 16. The seat shall be 17 inches to 19 inches high, measured from the bathroom floor and shall extend the full depth of the stall. The seat shall be on the wall opposite the controls. The structural strength of seats and their attachments shall comply with Section 515.26(3). Seats shall be mounted securely and shall not slip during use.
3. ***Grab bars.*** Grab bars complying with Section 515.26 shall be provided as shown in Appendix J, Figure 17.
4. ***Controls.*** Faucets and other controls shall be located as shown in Appendix J, Figure 17 and shall comply with Section 515.27(4). In transfer shower stalls, all controls, faucets, and the shower unit shall be mounted on the side wall opposite the seat.

5. ***Shower unit.*** A shower spray unit with a hose at least 60 inches long that can be used as a fixed shower head at various heights or as a hand held shower shall be provided.

(f) ***Bathtub and shower enclosures.*** Enclosures for bathtubs or shower stalls shall not obstruct controls or transfer from wheelchairs onto shower or bathtub seats. Enclosures on bathtubs shall not have tracks mounted on their rims.

(g) ***Clear floor space.*** Clear floor space at fixtures may overlap.

**515.35 (5) Kitchens.** Kitchens and their components shall be on an accessible route and shall comply with the requirements of this subsection.

(a) ***Clearance.*** Clearances between all opposing base cabinets, counter tops, appliances or walls shall accommodate wheelchair turning space in accordance with Section 515.4(3).

(b) ***Clear floor space.*** A clear floor space at least 30 inches by 48 inches complying with Section 515.4(4) that allows either a forward or a parallel approach by a person in a wheelchair shall be provided at all appliances in the kitchen, including the range or cooktop, oven, refrigerator/freezer, dishwasher, and trash compactor. Laundry equipment located in the kitchen shall comply with subsection (6) of this section.

(c) ***Controls.*** All controls in kitchens shall comply with Section 515.27.

(d) ***Work surfaces.*** At least one 30 inch section of counter shall provide a work surface that complies with the following requirements:

1. The ***counter*** either shall be adjustable (or replaceable as a unit) to provide alternative heights of 28 inches to 36 inches, or shall be fixed at 30 inches measured from the floor to the top of the counter surface.
2. ***Base cabinets,*** if provided, shall be removable under the full 30 inch minimum frontage of the counter. The finished floor shall extend under the counter to the wall.
3. ***Counter thickness*** and supporting structure shall be two inches maximum over the required clear area.
4. A clear ***floor space*** 30 inches by 48 inches shall allow a forward approach to the counter. Nineteen inches maximum of the clear floor space may extend underneath the counter. The knee space shall have a minimum clear width of 30 inches and a minimum clear depth of 19 inches.
5. There shall be no sharp or abrasive ***surfaces*** under such counters.

(e) ***Sink.*** The sink and surrounding counter shall comply with the following requirements:

1. The ***sink*** and surrounding ***counter*** either shall be adjustable (or replaceable as a unit) to provide alternative heights of 28 inches to 36 inches, or shall be fixed at 30 inches measured from the floor to the top of the counter surface or sink rim. The total width of sink and counter area shall be 30 inches minimum.
2. Where the ***sink is adjustable,*** rough-in plumbing shall be located to

accept conditions of supply and drain pipes for sinks mounted at the height of 28 inches.

3. The ***depth*** of a sink bowl shall be no greater than 6½ inches.
4. ***Faucets*** shall comply with Section 515.27(4). Lever operated or push type mechanisms are two acceptable designs.
5. ***Base cabinets,*** where provided, shall be removable under the full 30 inch minimum frontage of the sink and surrounding counter. The finished flooring shall extend under the counter to the wall.
6. ***Counter thickness*** and supporting structure shall be two inches maximum over the required clear space.
7. A clear ***floor space*** 30 inches by 48 inches shall allow forward approach to the sink. Nineteen inches maximum of the clear floor space may extend underneath the sink. The knee space shall have a minimum clear width of 30 inches and a clear depth of 19 inches.
8. There shall be no sharp or abrasive ***surfaces*** under sinks. If hot water exceeds 120 degrees Fahrenheit, hot water and drain pipes under sinks shall be insulated or otherwise covered.

(f) ***Ranges and cooktops.*** Ranges and cooktops shall comply with subsection (5)(b) of this section and Section 515.27. If ovens or cooktops have knee spaces underneath, then they shall be insulated or otherwise protected on the exposed contact surfaces to prevent burns, abrasions, or electrical shock. The clear floor space may overlap the knee space, if provided, by 19 inches maximum. The location of controls for ranges and cooktops shall not require reaching across burners.

(g) ***Ovens.*** Ovens shall comply with subsection (5)(b) of this section and Section 515.27. Ovens shall be of the self cleaning type or be located adjacent to a counter with knee space below. For side opening ovens, the door latch side shall be next to the open counter space, and there shall be a pull out shelf under the oven extending the full width of the oven and pulling out not less than 10 inches when fully extended. Ovens shall have controls on front panels; they may be located on either side of the door.

(h) ***Refrigerator/freezers.*** Refrigerator/freezer type shall comply with Section 515.27. Refrigerators shall be:

1. Of the vertical side by side refrigerator/freezer type; or
2. Of the over and under type and meet the following requirements:
   a. Have at least 50 percent of the freezer space below 54 inches above the floor.
   b. Have 100 percent of the refrigerator space and controls below 54 inches. Freezers with less than 100 percent of the storage volume within the limits specified in subsections (5) or (6) of this section shall be the self defrosting type.

(i) ***Dishwashers.*** Dishwashers shall comply with subsection (5)(b) of this section and Section 515.27. Dishwashers shall have all rack space accessible from the front of the machine for loading and unloading dishes.

(j) ***Kitchen storage.*** At least 50 percent of kitchen storage areas shall

comply with Section 515.25. Door pulls or handles for wall cabinets shall be mounted as close to the bottom of cabinet doors as possible. Door pulls or handles for base cabinets shall be mounted as close to the top of cabinet doors as possible.

**515.35 (6) Laundry facilities.** If laundry equipment is provided within individual accessible dwelling units, or if separate laundry facilities serve one or more accessible dwelling units, then they shall meet the requirements of this subsection.

(a) ***Location.*** Laundry facilities and laundry equipment shall be on an accessible route.

(b) ***Washing machines and clothes dryers.*** Washing machines and clothes dryers in common use laundry rooms shall be front loading.

(c) ***Controls.*** Laundry equipment shall comply with Section 515.27.

## SECTION 516.0 SPECIAL HISTORIC BUILDINGS AND DISTRICTS

**516.1 Approval:** The provisions of this code relating to the reconstruction, restoration, stabilization, rehabilitation, and moving of buildings or structures shall not be mandatory for existing buildings or structures, identified and classified on the National Register of Historic Places or otherwise classified as historic by the Kentucky Heritage Commission or the department when such buildings or structures are judged by the department to be safe in the public interest of health, safety and welfare. The department may require submission of architectural and engineering plans and specifications prior to a determination.

# ARTICLE 6

## SPECIAL USE AND OCCUPANCY REQUIREMENTS

### SECTION 600.0 GENERAL

**600.1 Scope:** In addition to the general requirements of this code governing the location, construction and equipment of all buildings and structures, and the fireresistance ratings, height and area limitations of Tables 401 and 505, the provisions of this article shall control all buildings and structures designed for special uses and occupancies as herein provided.

Chemical plants, packing plants, grain elevators, refineries, flour mills and other similar structures may be constructed in accordance with the recognized practices and requirements of the specific industry. The building official may permit such variations from the requirements of this code as will secure reasonable and economical construction with the necessary fire, life and property safeguards. In granting such variations, due regard shall be given to the isolation of the structure, the fire hazard and the exposure to surrounding property.

**600.2 Special high hazards:** When necessary to resist a higher degree of fire severity than specified herein, for high concentrations of combustible contents and for buildings of high hazard uses which exceed five stories or 65 feet (19812 mm) in height, the building official may require higher fireresistance ratings than the requirements of Table 401 governing the fireresistance ratings of types of construction and protection of structural elements.

**600.3 Means of egress:** The means of egress for buildings of special uses and occupancies shall conform to the requirements of Article 8, except as may be modified by more restrictive provisions of this article for specific uses.

**600.4 Heating and venting:** The requirements herein prescribed for the installation of heating and venting appliances and equipment shall be construed as supplemental to the provisions of Articles 7 and 15, and the mechanical code listed in Appendix A.

**600.5 Equipment rooms:** Heating and ventilating equipment in occupancies involving fire hazards from flammable vapors, dust, combustible fibers or other highly combustible substances shall be installed and protected against fire and explosion hazards in accordance with the mechanical code listed in

Appendix A. Rooms containing such equipment shall be segregated by construction of not less than two hour fireresistance rating except as may be required for specific uses, without openings in the enclosure walls and with means of direct ingress and egress from the exterior, or such equipment shall be located in accessory structures segregated from the main building.

**600.6 Segregation of storage spaces:** All rooms and spaces used for the storage of volatile and flammable materials shall be separately enclosed and segregated with fireresistance rated construction as herein required for specific uses and occupancies.

**600.7 Restricted locations:** Except as otherwise specifically provided for herein, buildings of Use Group H shall not be located within 200 feet (60960 mm) of the nearest wall of a building classified in Use Group A or I.

## SECTION 601.0 EXPLOSION HAZARDS

**601.1 Explosion relief:** Every structure, room or space occupied for uses involving explosion hazards shall be equipped and vented with explosion relief systems and devices arranged for automatic release under predetermined increase in pressure as herein provided for specific uses.

**601.2 Venting devices:** Venting devices to relieve the pressure resulting from explosive air-vapor mixtures shall consist of windows, skylights, vent flues or releasing roof or wall panels which discharge directly to the open air or to a public place or other unoccupied space not less than 20 feet (6096 mm) in width on the same lot. Such releasing device shall be so located that the discharge end shall be not less than 10 feet (3048 mm) vertically and 20 feet (6096 mm) horizontally from window openings or means of egress facilities in the same or adjoining buildings or structures. The exhaust shall always be in the direction of least exposure and never into the interior of the building.

**601.3 Area of vents:** The aggregate clear vent relief area shall be regulated by the type of construction of the building and shall be not less than prescribed below.

1. Heavy reinforced concrete frame, 1 square foot (0.093 $m^2$) for 80 cubic feet (2.24 $m^3$) of volume.
2. Light structural steel frame and ordinary construction, 1 square foot (0.093 $m^2$) for 65 cubic feet (1.82 $m^3$) of volume.
3. Light wood frame construction, 1 square foot (0.093 $m^2$) for 50 cubic feet (1.40 $m^3$) of volume.

The combined area of open windows, pivoted sash or wall panels arranged to open under internal pressure shall not be less than 10 percent of the area of the enclosure walls, with not less than 50 percent of the opening arranged for automatic release.

**601.4 Construction of vents:** All explosion relief devices shall be of an approved type constructed of lightweight, noncombustible and corrosion resistive materials, and the discharge end shall be protected with approved

screens of not more than ¾ inch (19 mm) mesh, arranged to blow out under relatively low pressures.

## SECTION 602.0 VOLATILE FLAMMABLES

**602.1 Main storage:** Main storage systems of volatile flammable liquids shall be constructed and installed in accordance with NFiPA 30 and the fire prevention code listed in Appendix A.

**602.2 Construction of enclosures:** Process rooms shall be separated from other uses and occupancies by walls, floors and ceilings of not less than two hour fireresistance rating with one and one half hour fire doors or the approved labeled equivalent complying with Article 14. The interior door openings shall be provided with noncombustible sills not less than 6 inches (152 mm) high and the room shall be vented as required in Section 601.1. Floors shall be waterproofed and drained to comply with Section 1315.0.

**602.3 Enclosure openings:** Openings shall not be permitted in the enclosure walls within 11 feet (3353 mm) of adjoining property lines or with a fire separation of less than 11 feet (3353 mm) from any building or structure not part of the installation.

**602.4 Fire protection:** Fire protection systems shall be provided in accordance with Article 17.

## SECTION 603.0 FIRE PREVENTION CODE

**603.1 Inspections:** All buildings and structures involving the use and handling of flammable or explosive materials, buildings of Use Group A and other hazardous uses and occupancies shall be inspected in accordance with the fire prevention code listed in Appendix A.

**603.2 Coordination of inspections:** The building, fire and health officials and other administrative agencies of the jurisdiction to whom the authority is delegated to inspect buildings and structures in respect to the maintenance of safe conditions of use and occupancy shall immediately notify the respective official of any violation of the provisions of this code or the fire prevention and health rules and regulations.

**603.3 Housekeeping:** Periodic inspections of existing uses and occupancies shall be made by the appropriate fire official to insure maintenance of good housekeeping conditions.

## SECTION 604.0 SPECIAL PERMITS AND CERTIFICATES OF FITNESS

**604.1 Special permits:** A hazardous or dangerous industry, trade, occupation or use which involves the transportation, storage or handling of explosive, flammable, combustible or other substance involving fire or life hazards shall not be conducted without a permit from the fire official prescribing the conditions and requirements necessary to secure the public safety.

**604.2 Certificate of fitness:** Before any equipment involving fire or life hazard

is placed in operation, the supervisor or operator shall secure a certificate of fitness from the administrative official certifying to the qualifications of the person to whom such certificate is issued. Certificates of fitness shall be required for the operation of boilers and unfired pressure vessels as specified in the mechanical code listed in Appendix A.

## SECTION 605.0 EXISTING BUILDINGS

**605.1 Special permit for existing uses:** Any existing hazardous use which was heretofore authorized by a permit issued under the provisions of law or the regulations of the fire official may be continued by special permit provided the continuance of such use or occupancy does not endanger the public safety.

**605.2 Increase in occupant load in places of assembly:** Whenever the occupant load of an existing building of Use Group A is increased beyond the approved capacity of its exits, the building or part thereof shall be made to comply with the requirements for a new building of Use Group A hereafter erected.

**605.3 Swimming pool change of use:** An existing pool used for swimming or bathing or accessory equipment or part thereof shall not be altered or converted for any other use unless it complies with all provisions of this code applicable to the use intended.

**605.3.1 Continuation of existing pool use:** Existing swimming pools may be continued without change, provided the safety requirements of Section 627.9 are observed where required by the building official.

## SECTION 606.0 LIQUEFIED PETROLEUM GASES

**606.1 General:** The design, construction, location, installation and operation of propane, butane and other petroleum gas facilities shall conform to the applicable provisions of the fire prevention code listed in Appendix A.

## SECTION 607.0 PYROXYLIN PLASTICS

**607.1 General:** The provisions of this section shall regulate all buildings, structures and parts thereof used for the storage, handling or fabrication of pyroxylin plastic whether in raw material, process, finished product or scrap.

**607.2 Exceptions:** The provisions of this section shall not apply to the manufacture, use or storage of nitrocellulose film or the incidental storage of articles manufactured from pyroxylin plastics offered for sale in buildings of Use Group M (see Section 307.0).

**607.3 Restrictions:** A permit for the storage or manufacture of pyroxylin plastics, except as specified in Section 607.2, shall not be issued for a building or structure hereafter erected, altered or used which is occupied or located as described in the following Sections 607.3.1 through 607.3.5.

**607.3.1 Use Group A:** Within 50 feet (15240 mm) of the nearest wall of a building of Use Group A.

**607.3.2 Use Group R:** As a building of Use Group R-1, R-2 or R-3.

**607.3.3 Use Group H:** In quantities exceeding 1,000 pounds (454 kg) in buildings where paints, varnishes or lacquers are manufactured, stored or kept for sale; or where matches, resin, oils, hemp, cotton or any explosives are stored or kept for sale.

**607.3.4 Other flammable materials:** Where dry goods, garments or other materials of a highly flammable nature are manufactured in any portion of the building above that used for nitrocellulose products.

**607.3.5 Tenant factory building:** In quantities exceeding 100 pounds (45.40 kg) in any tenant factory building (Use Group F) in which more than five people are employed or likely to congregate on one floor at any one time.

**607.4 Inside storage:** All pyroxylin raw material and products intended for use in further manufacture shall be stored as herein provided in the following Sections 607.4.1 through 607.4.6.

**607.4.1 Cabinets:** Quantities of more than 25 pounds (11.35 kg) and not more than 500 pounds (227 kg) shall be stored in approved cabinets constructed of noncombustible materials, but the total quantity of storage shall not be more than 1,000 pounds (454 kg) in any workroom or space enclosed in floors, walls and ceilings of not less than two hour fireresistance rating.

**607.4.2 Vaults:** Quantities of more than 1,000 pounds (454 kg) and not more than 10,000 pounds (4540 kg) shall be stored in vaults enclosed in floors, walls and ceilings of not less than four hour fireresistance rating. The interior storage volume of the vault shall be not more than 1,500 cubic feet (42 $m^3$) and the vault shall be constructed vapor and gas tight in accordance with the approved rules, with one and one half hour vapor tight fire doors or the approved labeled fire door assembly equivalent on each side of the door opening. The vault shall be drained and provided with scuppers.

**607.4.3 Tote boxes and scrap containers:** During manufacture, pyroxylin materials and products not stored in finished stock rooms, cabinets or vaults shall be kept in approved covered noncombustible tote boxes. Scrap and other refuse material shall be collected in approved noncombustible containers in quantities not greater than 350 pounds (158.90 kg) and removed at frequent intervals as directed by the fire official.

**607.4.4 Ventilation:** Each separate compartment in storage vaults shall be vented directly to the outer air through flues complying with the requirements of the mechanical code listed in Appendix A for low temperature chimneys, or exterior metal smokestacks, or as otherwise provided in the approved rules. The vent shall discharge not less than 4 feet (1219 mm) above the roof of the building or on a street, court or other open space not less than 50 feet (15240 mm) from any other opening in adjoining walls which are not in the same plane, nor nearer than 25 feet (7620 mm) vertically or horizontally to an exterior stairway, fire escape or exit discharge. The area of the vent shall be not less than 1 square inch (6.45 $cm^2$) for each 7 pounds (3.18 kg) of pyroxylin stored.

**607.4.5 Structural strength:** The floors, walls, roof and doors of all vaults, structures or buildings used for the storage or manufacture of pyroxylin materials and products shall be designed to resist an inside pressure load of not less than 300 pounds per square foot (1464.60 kg/m$^2$).

**607.4.6 Fire protection:** Vaults located within buildings for the storage of raw pyroxylin shall be protected with an approved automatic sprinkler system capable of discharging 1.66 gallons per minute per square foot (0.0011 m$^3$/sec · m$^2$) over the area of the vault.

**607.5 Isolated storage buildings:** Pyroxylin products in quantities greater than that permitted for interior storage shall be housed in isolated storage buildings. Such buildings shall not be used for any purpose other than packing, receiving, shipping and storage of pyroxylin plastics unless otherwise approved by the building official.

**607.5.1 Capacity:** The maximum storage in any fire area enclosed in construction of four hour fireresistance rating shall be not greater than 100,000 pounds (45,400 kg). The storage capacity of the building and its separation from lot lines and other buildings on the same lot shall be limited as provided in Table 607.5. When equipped with an approved automatic sprinkler system complying with the provisions of Article 17 and as herein modified, the exposure distances may be decreased 50 percent. Such systems shall be designed in accordance with Section 2061 of NFiPA 40E as listed in Appendix A.

**Table 607.5**
**EXPOSURE DISTANCE FOR PYROXYLIN STORAGE BUILDINGS**

| Maximum quantity stored in pounds | Fire separation in feet |
|---|---|
| 1,000 | 40 |
| 2,000 | 50 |
| 3,000 | 60 |
| 4,000 | 70 |
| 5,000 | 80 |
| 10,000 | 100 |
| 20,000 | 125 |
| 30,000 | 150 |
| 40,000 | 160 |
| 50,000 | 180 |
| 75,000 | 200 |
| 100,000 | 225 |
| 150,000 | 250 |
| 300,000 | 300 |

**Note a.** 1 pound = 0.454 kg; 1 foot = 304.8 mm.

**607.6 Heating equipment:** All radiators, heating coils, piping and heating apparatus shall be protected with approved noncombustible mesh to maintain a clearance of 6 inches (152 mm) of all pyroxylin products from such equipment. All piping and risers within 6 feet (152 mm) of the floor shall be insulated with an approved noncombustible covering unless protected with wire guards.

**607.7 Electrical wiring and equipment:** All electrical wiring and equipment shall conform to the provisions of Article 20 and NFiPA 40E listed in Appendix A.

**607.8 Standpipes:** First aid standpipes shall be provided for each 5,000 square feet (465 $m^2$) of floor area equipped with 1½ inch hose complying with Article 17.

**607.9 Automatic sprinklers:** All manufacturing and storage spaces and vaults, where required, shall be protected with an approved automatic sprinkler system as herein specified and with portable fire extinguishers complying with Article 17 and the approved rules.

**607.10 Special protection:** Special chemical extinguishers and other first aid fire appliances shall be provided around motors and other electrical equipment in accordance with the approved rules.

## SECTION 608.0 USE AND STORAGE OF FLAMMABLE FILM

**608.1 Permit required:** A permit for handling, use, storage or recovery of flammable film shall not be issued for any building located as specified in Section 607.3; except that those restrictions shall not apply to the screening and projection rooms of buildings of Use Group A. It shall be unlawful to store, stock or use any nitrocellulose or other flammable film in quantities of more than 2,000 feet (610 m) in length or more than 10 pounds (4.54 kg) in weight unless approved by the fire official. All installations shall comply with NFiPA 40 listed in Appendix A.

**608.2 Storage:** Other than motion picture projection and rewind rooms, or as herein specifically exempted, all rooms in which flammable film is stored or handled shall be enclosed in not less than two hour fireresistance rated construction complying with the provisions of Article 14. All film, except when in process or use, shall be kept in approved closed containers.

**608.2.1 Cabinets:** Flammable film in amounts of 25 to 1,000 pounds (11.35 kg to 454 kg) shall be stored in approved noncombustible cabinets constructed and vented in accordance with NFiPA 40 listed in Appendix A. One cabinet shall not contain more than 375 pounds (170.25 kg). All cabinets with a capacity of more than 75 pounds (34.05 kg) shall be equipped with not less than one automatic sprinkler head.

**608.2.2 Vaults:** Flammable film in amounts greater than 1,000 pounds (454 kg) shall be kept in vaults constructed as provided in Section 607.0; except that the interior storage volume shall not exceed 750 cubic feet (21 $m^3$).

**608.2.3 Rooms:** Unexposed film may be stored in the original approved shipping cases complying with the rules of DOT in rooms equipped with an approved automatic sprinkler system complying with the provisions of Section 607.4.6.

**608.2.4 Ventilation:** Storage rooms shall be ventilated as specified in Section 607.4.4 with the vents arranged to open automatically in the event of fire, in accordance with the approved rules.

**608.2.5 Heating:** All heating equipment and installations shall conform to the requirements of Section 607.6. The duct system of warm air heating and air conditioning systems shall comply with the mechanical code listed in Appendix A and shall be protected with automatic fire dampers to cut off all rooms in which film is handled from all other rooms and spaces in the building. The heating of film vaults shall be automatically controlled to a maximum temperature of 70 degrees F. (21.11 degrees C.).

**608.2.6 Fire protection:** Approved automatic sprinkler systems shall be provided in all buildings and structures and parts thereof in which flammable film is stored or handled in amounts of more than 50 pounds (22.70 kg) and as herein specifically required, except in projection rooms and rewind rooms conforming to the requirements of Section 608.3. First aid fire extinguishing and auxiliary fire fighting equipment shall be provided in accordance with Article 17 and the approved rules adopted thereunder.

**608.3 Projection room required (scope):** The provisions of this section shall apply to rooms in which ribbon type cellulose acetate or other safety film is used in conjunction with electric arc, xenon or other light source projection equipment which develops hazardous gases, dust or radiation. Where cellulose nitrate film is used, projection rooms shall comply with NFiPA 40 listed in Appendix A.

Every motion picture machine projecting film as mentioned within the scope of this section shall be enclosed in a projection room. Appurtenant electrical equipment, such as rheostats, transformers and generators, may be within the projection room or in an adjacent room of equivalent construction. There shall be posted on the outside of each projection room door and within the projection room itself a conspicuous sign with one inch (25 mm) block letters stating: *Safety Film Only Permitted in this Room.*

**608.3.1 Construction of projection rooms:** Every projection room shall be of permanent construction consistent with the construction requirements for the type of building in which the projection room is located. Openings need not be protected.

The room shall have a floor area of not less than 80 square feet (7.44 $m^2$) for a single machine. Each motion picture projector, flood light, spotlight or similar piece of equipment shall have a clear working space of not less than 30 inches by 30 inches (762 mm by 762 mm) on each side and at the rear thereof, but only one such space shall be required between two adjacent projectors. The projection room and the rooms appurtenant thereto shall have a ceiling height of not less than 7 feet 6 inches (2286 mm). The aggregate of openings for projection equipment shall not exceed 25 percent of the area of the wall between the projection room and the auditorium. All openings shall be provided with glass or other approved material, so as to completely close the opening.

**608.3.2 Means of egress from projection rooms:** Exiting shall be provided as required in Article 8.

**608.3.3 Projection room ventilation:** Projection rooms shall be ventilated in accordance with Sections 608.3.3.1 and 608.3.3.2.

**608.3.3.1 Supply air:** Each projection room shall be provided with two or more separate fresh air inlet ducts with screened openings terminating within 12 inches (305 mm) of the floor, and located at opposite ends of the room. Such air inlets shall be of sufficient size to permit an air change every three minutes. Fresh air may be supplied from the general building air conditioning system; but when this is done, it shall be so arranged that the projection room will continue to receive one change of air every three minutes, regardless of the status of the general air conditioning system.

**608.3.3.2 Exhaust air:** Each projection room shall be provided with one or more exhaust air outlets which may be manifolded into a single duct outside the room. Such outlets shall be so located as to insure circulation throughout the room. Projection room exhaust air systems shall be independent of any other air systems in the building. Exhaust air ducts shall terminate at the exterior of the building in such a location that the exhaust air cannot be readily recirculated into the supply air system. The exhaust system shall be mechanically operated and of such a capacity as to provide a minimum of one change of air every three minutes. The blower motor shall be outside the duct system. The projection room ventilation system may also serve appurtenant rooms, such as the generator room and the rewind room.

**608.3.4 Projection equipment ventilation:** Each projection machine shall be provided with an exhaust duct which will draw air from each lamp and exhaust it directly to the outside of the building in such a fashion that it will not be picked up by supply inlets. Such a duct shall be of rigid materials, except for a continuous flexible connector for the purpose. The lamp exhaust system shall not be interconnected with any other system.

**608.3.4.1 Electric arc projection equipment:** The exhaust capacity shall be 200 cubic feet per minute (0.094 $m^3/s$) for each lamp connected to the lamp exhaust system, or as recommended by the equipment manufacturer. Auxiliary air may be introduced into the system through a screened opening to stabilize the arc.

**608.3.4.2 Xenon projection equipment:** The lamp exhaust system shall exhaust not less than 300 cubic feet per minute (0.14 $m^3/s$) per lamp, nor less than the exhaust volume required or recommended by the equipment manufacturer, whichever is the greater. The external temperature of the lamp housing shall not exceed 130 degrees F. (54.44 degrees C.) when operating.

**608.3.5 Lighting control:** Provision shall be made for control of the auditorium lighting and the emergency lighting systems of theaters from inside of the room and from at least one other convenient point in the building as required in Section 617.8.

**608.3.6 Miscellaneous equipment:** Each projection room shall be provided with rewind and film storage facilities.

**608.4 Screening rooms:** Screening rooms shall provide a seating capacity of not more than 30 persons, with not less than two approved means of egress complying with Article 8. Such rooms shall be enclosed in one hour fire separation walls with self closing fire doors or their approved labeled equivalent at the openings. All seats shall be permanently fixed in position and the arrangement shall comply with the requirements of Section 826.0.

**608.5 Temporary motion picture installations:** Permits for portable and temporary room construction for incidental amusement and educational purposes shall be secured from the fire official in accordance with the approved rules.

**608.6 Sound stage construction:** All buildings designed or used as sound stages for motion picture or television film productions shall be protected with an approved two source automatic sprinkler system complying with the provisions of Article 17; except that the building official may exempt rooms designed for housing electrical equipment from this requirement when constructed of Type 1 construction.

**608.6.1 Special rooms:** Rooms and spaces used as carpenter and repair shops, dressing rooms, costume and property stage rooms shall be enclosed in floors, walls and ceilings of not less than two hour fireresistance rated construction.

**608.6.2 Trim, finish and decorative hangings:** All permanently attached acoustic, insulating and light reflecting materials and temporary hangings on walls and ceilings of sound stages shall comply with the requirements of Article 14.

**608.6.3 Cellulose nitrate film storage:** All cellulose nitrate film shall be stored as required in Section 608.2 and surplus film shall not be kept on the studio stage, except loaded magazines in the cameras and sound recording apparatus. All extra loaded magazines shall be stored in a separate magazine room enclosed in two hour fireresistance rated construction.

**608.7 Film laboratories:** Film laboratories shall not be conducted in other than buildings or structures of Type 1A construction, equipped throughout with an approved automatic sprinkler system.

**608.8 Film exchanges:** All film exchanges and depots shall be housed in buildings and structures of Type 1A construction equipped throughout with an approved automatic sprinkler system. All flammable film other than that in process of receipt, delivery or distribution shall be stored in vaults complying with the requirements of Section 607.4.2.

## SECTION 609.0 USE AND STORAGE OF COMBUSTIBLE FIBERS

**609.1 General:** The provisions of this section shall apply to all buildings and structures involving the storage or use of combustible vegetable or animal fibers and thin sheets or flakes of such materials, including, among others, readily ignitable and free burning fibers such as cotton, sisal, henequen, jute, hemp, tow, coca fiber, oakum, baled waste, baled waste paper, kapok, hay,

straw, Spanish moss, certain synthetic fibers, excelsior (shredded paper) and cloth in the form of scraps and clippings in excess of 100 cubic feet (2.80 $m^3$). The provisions of NFiPA 91 and the fire prevention code listed in Appendix A, except as herein specifically provided, shall be deemed to conform to the provisions of this code.

**609.2 Construction requirements:** All buildings designed for the storage of combustible fibers as herein described shall be constructed within the limits of height and area specified in Table 505 for Use Group H except as described in the following Sections 609.2.1 through 609.2.6.

**609.2.1 Special limits:** A single storage room or space shall not be more than 5,000 square feet (465 $m^2$) in area or more than 50,000 cubic feet (1400 $m^3$) in volume unless of Type 1, 2A or 2B construction.

**609.2.2 Floor loads:** The floors of all buildings designed for the storage of combustible fibers shall not be loaded in excess of one half the safe load capacity of the floor, nor shall such materials be piled to more than two thirds of the clear story height.

**609.2.3 Salvage doors:** Every exterior wall shall be provided with a door to each storage compartment arranged for quick removal of the contents.

**609.2.4 Wall openings:** All openings in outside walls shall be equipped with approved fire doors and fire windows complying with Article 14.

**609.2.5 Roof openings:** All skylights, monitors and other roof openings shall be protected with galvanized wire or other approved corrosion resistive screens with not less than 36 meshes to the square inch (6 meshes/$cm^2$) or with wired glass in stationary frames.

**609.2.6 Boiler rooms:** All power and heating boilers and furnaces shall be located in detached boiler houses or in a segregated boiler room enclosed in three hour fireresistance rated construction with direct entrance from the outside, except that rooms containing gas fired heating equipment may have openings into the warehouse protected with one and one half hour fire doors or their approved labeled equivalent.

**609.3 Fire protection:** Fire protection equipment shall be provided complying with Article 17 and consisting of portable chemical extinguishers and standpipes. Where deemed necessary by the administrative authority, a system of outside hydrants and hose shall be provided.

## SECTION 610.0 COMBUSTIBLE DUSTS, GRAIN PROCESSING AND STORAGE

**610.1 General:** The provisions of this section shall apply to all buildings in which materials producing flammable dusts and particles which are readily ignitable and subject to explosion hazards are stored or handled, including, among others, grain bleachers and elevators, malt houses, flour, feed or starch mills, wood flour manufacturing and manufacture and storage of pulverized aluminum, coal, cocoa, magnesium, spices, sugar or similar material producing dust. The provisions of NFiPA 61A, 61B, 61C, 61D, 63, 65,

85F 651, 653, 654, 655, 656, 664 and the fire prevention code listed in Appendix A, except as herein specifically required, shall be deemed to conform to the requirements of this code.

**610.2 Buildings:** All such buildings and other occupied structures shall be of Type 1, Type 2 or of laminated planks or lumber sizes qualified for Type 3A construction, within the height and area limits of Table 505 for Use Group H; except that when erected of Type 1 or Type 2 construction, the height and area of grain elevators and similar structures shall be unlimited, and when of Type 3A construction, the structure may be erected to a height of 65 feet (19812 mm) and except further that, in isolated areas, the height of Type 3A structures may be increased to 85 feet (25908 mm).

**610.2.1 Grinding rooms:** Every room or space for grinding or other operations producing flammable dust shall be enclosed with floors and walls of not less than two hour fireresistance rating when the area is not more than 3,000 square feet (279 $m^2$), and of not less than four hour fireresistance rating when the area is greater than 3,000 square feet (279 $m^2$).

**610.2.2 Conveyors:** All conveyors, chutes, piping and similar equipment passing through the enclosures of such rooms or spaces shall be constructed dirt and vapor tight, and of approved noncombustible materials complying with Section 2117.0.

**610.3 Explosion relief:** Means for explosion relief shall be provided as specified in Section 601.0, or such spaces shall be equipped with the equivalent mechanical ventilation complying with the mechanical code listed in Appendix A.

**610.4 Grain elevators:** Grain elevators, malt houses and buildings for similar uses shall not be located within 30 feet (9144 mm) of interior lot lines or structures on the same lot, except when erected along a railroad right of way.

**610.5 Coal pockets:** Coal pockets located less than 30 feet (9144 mm) from interior lot lines or structures on the same lot shall be constructed of not less than Type 2A construction. When more than 30 feet (9144 mm) from interior lot lines, or erected along a railroad right of way, such structures may be built of lumber sizes qualifying for Type 3A construction, provided they are not more than 65 feet (19812 mm) in height.

## SECTION 611.0 PAINT SPRAYING AND SPRAY BOOTHS

**611.1 General:** The provisions of this section shall apply to the construction, installation and use of buildings and structures or parts thereof for the spraying of flammable paints, varnishes and lacquers or other flammable materials, mixtures or compounds used for painting, varnishing, staining or similar purpose. All such construction and equipment shall comply with NFiPA 33 and 34 in Appendix A.

**611.2 Location of spraying processes:** Such processes shall be conducted in a spraying space, spray booth, spray room or shall be isolated in a detached

building or as otherwise approved by the building official in accordance with NFiPA 70 and the fire prevention code listed in Appendix A.

**611.3 Spray spaces:** All spray spaces shall be ventilated with an approved exhaust system to prevent the accumulation of flammable mist or vapors. When such spaces are not separately enclosed, noncombustible spray curtains shall be provided to restrict the spread of fire.

**611.3.1 Spray booths:** All spray booths shall be constructed of approved noncombustible materials and equipped with mechanical ventilating systems.

**611.3.2 Spray rooms:** All spray rooms shall be enclosed in partitions of not less than one hour fireresistance rating. Floors shall be waterproofed and drained in an approved manner. Floor drains to the building drainage system and the public sewer shall be prohibited.

**611.3.3 Spray storage rooms:** Spraying materials in quantities of not more than 20 gallons (0.076 $m^3$) may be stored in approved cabinets ventilated at top and bottom. When in quantities of more than 20 gallons (0.076 $m^3$) and not more than 100 gallons (0.38 $m^3$), they may be stored in approved double walled noncombustible cabinets vented directly to the outer air. All spraying materials in quantities of more than 100 gallons (0.38 $m^3$) shall be stored in an enclosure of not less than two hour fireresistance rating or in a separate exterior storage building. Such storage shall not be in quantities of more than 250 gallons (0.95 $m^3$), except when stored in isolated storage buildings; and except further that not more than 25 gallons (0.095 $m^3$) of spraying material shall be stored in buildings in which pyroxylin products are manufactured or stored.

**611.4 Ventilation of spraying processes:** The ventilation system shall comply with the provisions of Section 601.0 and shall be adequate to exhaust all vapors, fumes and residues of spraying material directly to the outer air. Fresh air shall be admitted to the spraying spaces in an amount equal to the capacity of the fan in such manner as to avoid short circuiting the path of air in the working space and to provide air movement with a velocity of not less than 100 feet per minute (0.508 m/s) at the face of the spray booth. All ducts and vents shall be constructed and installed to comply with the mechanical code listed in Appendix A. Unless equipped with approved explosion proof motors with nonferrous fan blade fans, the mechanical exhaust equipment shall be located outside of spray spaces.

**611.5 Fire protection:** Sprinkler heads shall be provided in all spray, dip and immersing spaces and storage rooms, and shall be installed in accordance with Article 17. Where buildings containing spray areas are not equipped with an approved automatic sprinkler system, the sprinklers in booths and other spray areas and storage rooms may be supplied from the building water supply when approved by the building official, to comply with the provisions of Section 1705.0.

## SECTION 612.0 DRY CLEANING ESTABLISHMENTS

**612.1 General:** Before any dry cleaning plant is constructed or an existing

plant is remodeled or altered, complete drawings shall be filed showing to scale the relative location of the dry cleaning area, the boiler room, finishing department, solvent storage tanks, pumps, washers, drying tumblers, extractors, filter traps, stills, piping and all other equipment involving the use of flammable liquid solvents. All dry cleaning by immersion and agitation shall be carried on in closed machines, installed and operated in accordance with NFiPA 32 and the fire prevention code listed in Appendix A.

**612.2 Classification:** For the purpose of this code, all dry cleaning and dry dyeing establishments shall be classified as described in the following Sections 612.2.1 through 612.2.3.

**612.2.1 High hazard:** All such establishments shall be classified in Use Group H which employ in quantities of more than 3 gallons (0.011 $m^3$) gasoline or other solvents having a flash point below 100 degrees F. (37.78 degrees C.) as determined by ASTM D56 listed in Appendix A, or more than 60 gallons (0.23 $m^3$) of flammable solvents with a flash point between 100 and 140 degrees F. (37.78 and 60 degrees C.).

**612.2.2 Moderate hazard:** All such establishments employing less than 3 gallons (0.011 $m^3$), of volatile flammables with a flash point of less than 100 degrees F. (37.78 degrees C.), or less than 60 gallons (0.23 $m^3$) of solvent with a flash point between 100 and 140 degrees F. (37.78 and 60 degrees C.), shall be classified as moderate hazard.

**612.2.3 Low hazard:** All such establishments using solvents of other than volatile flammable liquids, or with a flash point more than 140 degrees F. (60 degrees C.), in cleaning and dyeing operations shall be classified as low hazard.

**612.3 Construction of dry cleaning plants:** Dry cleaning plants shall be constructed in accordance with Sections 612.3.1 through 612.3.7.

**612.3.1 High hazard:** High hazard dry cleaning plants as herein defined shall be located in buildings or structures of Type 1A construction, not more than one story in height with solid floors and roofs and without openings other than required for egress and ventilation purposes. Such a building shall not be used for any other purpose.

**612.3.2 Moderate hazard:** Moderate hazard dry cleaning plants as herein defined may be located in buildings or structures of any type of construction except Type 4 subject to the fire limit restrictions of Article 5 and the height and area limitations for Use Group H of Table 505. The room or space in which such operations are conducted shall be enclosed in not less than two hour fireresistance rated construction with not less than two means of egress from each dry cleaning or dry dyeing room or space.

**612.3.3 Low hazard:** Low hazard dry cleaning plants shall not be restricted as to type of construction within the height and area limitations for Use Group B of Table 505. Such uses shall not be located in basements nor in buildings of Use Groups A or I.

**612.3.4 Roof construction of dry cleaning plants:** The roof over high hazard dry cleaning plants shall be flat without attic or concealed spaces and shall be provided with a pivot type skylight or other approved vent complying with Section 601.0, arranged to release outwardly under explosion pressures.

**612.3.5 Floor construction of dry cleaning plants:** The floor finish in high hazard dry cleaning plants shall be constructed of water resistant, noncombustible materials with nonsparking surface elevated above the adjoining grade and with door sills not less than 10 inches (254 mm) in height. There shall not be openings, vaults or pits below the floor.

**612.3.6 Exterior walls of dry cleaning plants:** Exterior walls of high hazard dry cleaning plants having a fire separation of less than 30 feet (9144 mm) shall be solid masonry without openings, but not more than two sides of the building shall be enclosed in blank walls. Opening protectives of exterior doors and windows shall have not less than three quarter hour fireresistance rating or the labeled equivalent construction, and the windows shall be pressure releasing to comply with Section 601.0.

**612.3.7 Basements of dry cleaning plants:** The basements of all buildings in which high or moderate hazard dry cleaning establishments are conducted shall be completely separated from the superstructure with unpierced floor construction of not less than two hour fireresistance rating. The access to such basements shall be from the exterior only.

**612.4 Boiler room separation:** Boiler rooms and heating equipment for high hazard dry cleaning plants shall be separated from drying rooms, dry cleaning and dry dyeing rooms with unpierced walls of not less than four hour fireresistance rating, and in moderate hazard establishments with solid walls of not less than two hour fireresistance rating; or such boiler rooms shall be located in a separate building.

**612.5 Ventilation:** All rooms and spaces in high hazard dry cleaning plants shall be provided with a mechanical system of ventilation capable of 20 complete and continuous changes of air per hour. Mechanical systems of ventilation in moderate hazard establishments shall have sufficient capacity to insure ten complete and continuous changes of air per hour. Satisfactory mechanical or natural ventilation shall be provided in low hazard plants by means of fans, pipes and ducts to ventilate drying tumblers, drying cabinets and similar equipment directly to the outer air.

**612.6 Solvent storage:** All volatile flammable solvents shall be stored in accordance with the provisions of Section 602.0 and the fire prevention code listed in Appendix A.

**612.7 Fire protection:** Every dry cleaning room and dry dyeing room employing high or moderate hazard solvents shall be protected with an approved automatic fire suppression system.

## SECTION 613.0 PRIVATE GARAGES

**613.1 Dwellings:** Private garages located beneath dwellings shall have walls,

partitions, floors and ceilings separating the garage space from the dwellings constructed of not less than one hour fireresistance rating. Private garages attached to dwellings shall be completely separated from the dwellings and their attic area by means of one half inch gypsum board or equivalent applied to the garage side. The door openings shall be protected by a tight fitting door having a 20 minute fireresistance rating when tested in accordance with ASTM E152 without the hose stream and labeled and listed by an approved agency. In lieu of the required 20 minute door, an approved automatic sprinkler head located directly above the door in the garage and properly connected to the domestic water system or an approved automatic heat detector located directly above the door in the garage shall be acceptable in private garages attached to one and two family dwellings.

**613.1.1 Separation by breezeway:** A garage separated by a breezeway not less than 10 feet (3048 mm) in length from a building of Use Group R-3 outside the fire limits may be of Type 4B construction, but the junction of the garage and breezeway shall be firestopped to comply with Section 1420.0.

**613.2 Other conditions:** All private garages not falling within the purview of Sections 613.1 or 613.1.1 attached to or located beneath a building shall comply with the requirements of Section 614.2.3 for public garages.

**613.3 Heating equipment:** Boilers, furnaces, hot water heaters or any other appliances having an open flame or exposed heated surfaces shall not be located in a private garage unless precautions are taken to protect such equipment from impact by automobiles. This equipment shall have the combustion chamber, ash pit etc., raised a minimum of 18 inches (457 mm) above the floor to eliminate a possible source of ignition.

**613.4 Means of egress:** Where living quarters are located above a private garage, required means of egress facilities shall be protected from the garage area with one hour fireresistance rated construction.

## SECTION 614.0 PUBLIC GARAGES

**614.1 General:** Public garages shall comply with the applicable requirements of this section. The portions of such buildings and structures in which gasoline, oil and similar products are dispensed shall comply with the requirements of Section 615.0; the portions in which motor vehicles are repaired shall comply with Section 616.0; and the portions in which paint spraying is done shall comply with the requirements of Section 611.0.

**614.2 Construction:** All Group 1 public garages hereafter erected shall be classified as Use Group S-1 and all Group 2 public garages shall be classified as Use Group S-2 and both shall conform to the height and area limitations of Table 505 except as herein specifically provided. The areas used for dispensing gasoline in such buildings shall be located on the grade floor and shall comply with the requirements of Section 615.0.

**614.2.1 Special height limitations:** Public garage buildings shall comply with the height and area limitations of Table 505 for the classification of the use as

specified in Section 614.2. Such heights may be increased one additional story when the building is equipped with an approved automatic fire suppression system.

**614.2.2 Basements:** The first floor construction of public garages of all classifications and public hangars with basements shall be constructed of not less than two hour fireresistance rating and shall be water and vapor proof. Where openings are provided in the floor they shall be protected by a curb or ramp not less than 6 inches (152 mm) high above the floor to avoid the accumulation of explosive liquids or vapors and prevent spilling to the lower floor. There shall be not less than two means of egress from such areas, one of which shall be directly to the outside, independent of the exits serving other areas of the building.

**614.2.3 Mixed occupancy:** A public garage shall not be located within or attached to a building occupied for any other use, unless separated from such other use by walls or floors complying with Table 1402 for fireresistance rating. Such fire separation walls shall be continuous and unpierced by openings; except that door openings equipped with self closing fire doors complying with Article 14 shall be permitted. In buildings of single occupancy not exceeding the area limitations of Table 505, doors without a fireresistance rating shall be permitted between the garage area and salesroom or offices that are operated in connection with the garage.

**614.2.4 Roof storage of motor vehicles and airplanes:** When the roof of a building is used for parking or storage of motor vehicles, it shall be provided with a parapet wall or guardrail not less than 3 feet 6 inches (1067 mm) in height and a wheel guard not less than 6 inches (152 mm) in height, located so as to prevent any vehicle from striking the parapet wall or guardrail. The use of roofs for airplane storage and landing shall be subject to the approval of the Federal Aviation Administration, if required.

**614.2.5 Floor construction and drainage:** Floors of public garages and airplane hangars shall be graded to drain through oil separators or traps to avoid accumulation of explosive vapors in building drains or sewers as provided in the plumbing code listed in Appendix A. The floor finish shall be of concrete or other approved nonabsorbent, noncombustible material.

**614.3 Ventilation:** All public garages and airplane hangars shall be provided with mechanical or natural ventilation adequate to prevent the accumulation of carbon monoxide or exhaust fumes in excess of one part in 10,000 or .01 percent or the concentration of gasoline vapors in excess of 20 percent of the lower explosive limit. The building official may require a test by an approved testing agency to determine ventilation adequacy. The cost of testing shall be borne by the owner.

**614.3.1 Below grade:** Enclosed and below grade public garages shall be equipped with mechanical ventilation adequate to provide six air changes per hour. The ventilation system shall be operated at all times the garage areas are occupied.

**614.3.2 Repair shops or rooms:** When motor vehicles are to be operated or engines are run for test purposes or minor adjustments, provisions shall be made to collect the exhaust fumes from each vehicle individually and to discharge such fumes to the outer air by means of a positive induced draft. The discharge from such system shall be located so as not to create a hazard to adjoining properties, but not less than 8 feet (2438 mm) above the adjacent ground level on the exterior of the building and shall discharge into a yard or court. When necessary to discharge across a walkway or private thoroughfare, the discharge opening shall be carried to a height of not less than 25 feet (7620 mm) above the ground level or to a distance 4 inches (102 mm) above the highest point of the wall of the building or structure on which it is located.

**614.3.3 Pits:** Pits shall not be installed in floors below the first; and pits in first and upper stories shall be provided with mechanical ventilation adequate to provide the ventilation required under Section 614.3. The ventilation system shall be operated at all times the pits are occupied.

**614.4 Special hazards:** Any process conducted in conjunction with public garages involving volatile flammable solvents shall be segregated or located in a detached building or structure, except as provided in Section 602.0 for the storage and handling of gasoline and other volatile flammables. The quantity of flammable liquids stored or handled in public garages other than in underground storage and in the tanks of motor vehicles shall be not more than five gallons (0.019 $m^3$) in approved safety cans.

**614.5 Heating and protection of equipment:** Radiation and heating coils and pipes located within 6 inches (152 mm) of the floor shall be protected with wire mesh or other approved noncombustible shields of adequate strength; and with other insulation on top of the equipment when located in partitions or near combustible racks or woodwork.

**614.6 Boiler rooms of public garages:** All heat generating plants other than approved direct fired heaters shall be located in separate buildings or shall be separately enclosed within the structure with solid, water and vapor tight masonry. All rooms housing boilers, stoves or other heating apparatus shall be cut off from all other parts of the building with four hour fireresistance rated construction with entrance from outside only, and there shall not be openings through the fire separation wall other than those necessary for heating pipes or ducts.

## SECTION 615.0 MOTOR FUEL SERVICE STATION

**615.1 Construction:** Buildings and structures used for the storage and sale of motor fuel oils shall conform to Table 505 for Use Group B and the types of construction as modified by Section 502.0. The canopies and supports over pumps and service equipment when located less than 20 feet (6096 mm) from interior lot lines shall be constructed of approved noncombustible materials, Type 3A construction or one hour fireresistance rated construction.

**615.1.1 Exceptions:** Approved plastics conforming to the requirements of

Article 24 may be used in canopies over pumps when conforming to the requirements of Sections 615.1.1 through 615.1.1.3.

**615.1.1.1 Location of canopy:** The canopies shall be located at least 10 feet (3048 mm) from any building on the same property and face yards or streets not less than 40 feet (12192 mm) wide on the other sides.

**615.1.1.2 Area of plastic:** The aggregate area of plastic in each canopy shall not exceed 200 square feet (18.60 $m^2$) inside the fire limits or 1,000 square feet (93 $m^2$) outside the fire limits.

**615.1.1.3 Area of panel:** The maximum area of each panel shall not exceed 100 square feet (9.30 $m^2$).

**615.1.2 Opening protectives:** All permissible openings in walls with a fire separation of less than 20 feet (6096 mm) shall be protected with approved fire windows or fire doors complying with Article 14, except doors in such walls to rest rooms.

**615.1.3 Basements:** Motor fuel service stations shall not have cellars or basements; and when pits are provided they shall be vented as required in Section 614.3.

**615.2 Gasoline storage:** All volatile flammable liquid storage tanks shall be installed as specified in Section 602.0. A pump or other mechanical equipment for dispensing Class I flammable liquids shall not be installed inside or within 10 feet (3048 mm) of a building unless otherwise specifically approved.

**615.3 Location of pumps:** Gasoline pumps or other mechanical equipment shall be located at least 15 feet (4572 mm) from property lines and shall not be installed so as to permit servicing of motor vehicles standing on a public street or highway. When necessitated by the widening of streets or highways, the use of the outer driveway of existing service stations may be continued for servicing of vehicles when approved by the authority having jurisdiction and in accordance with the fire prevention code listed in Appendix A.

## SECTION 616.0 MOTOR VEHICLE REPAIR SHOPS

**616.1 General:** All buildings and structures designed and used for repair and servicing of motor vehicles, motor boats, airplanes or other motor driven means of transportation shall be subject to the limitations of Tables 401 and 505 for Use Group S-1. Such buildings shall be used solely for that purpose.

**616.2 Enclosure walls:** Exterior walls, when located within 6 feet (1829 mm) of interior lot lines or other buildings, shall not have openings therein.

**616.3 Handling of volatile flammables:** All volatile flammables shall be stored and handled in accordance with Section 602.0 and the fire prevention code listed in Appendix A.

**616.4 Ventilation:** All rooms and spaces used for motor vehicle repair shop purposes shall be provided with an approved system of mechanical ventilation meeting the requirements of Section 614.3 and the mechanical code listed in Appendix A.

## SECTION 617.0 PLACES OF PUBLIC ASSEMBLY

**617.1 Applicability:** The provisions of this section shall apply to all places of public assembly and all parts of buildings and structures classified in Use Group A.

**617.2 Restrictions:** All buildings and structures of Use Group A shall be subject to the restrictions of Sections 617.2.1 through 617.2.8.

**617.2.1 High hazard uses:** A place of public assembly shall not be permitted in a building classified in Use Group H.

**617.2.2 Superimposed theaters:** An addition or extension shall not be erected over the stage section of a theater, nor shall a second theater be erected above another. The building official may waive the prohibition against superimposed theaters and construction above the stage when adequate access is provided for fire fighting with direct means of ventilation to the outer air from the stage portion.

**617.2.3 Frame construction:** A theater with stage, fly gallery and rigging loft shall not be permitted in a building of Type 4B construction.

**617.2.4 Location:** All buildings used for assembly purposes shall front on at least one street on which the main entrance and exit discharge shall be located.

**617.2.5 Trim, finish and decorative hangings:** All permanent acoustic, insulating and similar materials and temporary hangings shall comply with the flameresistance requirements of Article 14. Moldings and decorations around the proscenium openings shall be constructed entirely of noncombustible material.

**617.2.6 Existing buildings:** Nothing herein contained shall prohibit the alteration of a building heretofore occupied as a place of public assembly for such continued use provided the occupant load is not increased and seats, aisles, passageways, balconies, stages, appurtenant rooms and all special permanent equipment comply with the requirements of this code.

**617.2.7 New buildings:** A building not heretofore occupied as a place of public assembly shall not hereafter be altered to be so occupied unless it is made to comply with all the provisions of this code.

**617.2.8 Skating rinks:** Places of assembly used for the purposes of skating rinks shall not be located below the floor nearest grade.

**617.3 Theater means of egress requirements:** The number, type, location and construction of all means of egress facilities shall comply with the requirements of Article 8 except as herein specifically provided.

**617.3.1 Main exit:** The main exit shall be located on a street front and shall be of sufficient width to accommodate not less than one half of the total occupant load.

**617.3.2 Other exits:** Each level of an assembly occupancy shall have access to

the main exit and shall be provided with other exits of sufficient width to accommodate not less than two thirds of the total occupant load served by that level. Such exits shall discharge directly to a street or into an enclosed stairway, exterior stairway or exit passageway leading to a street. Such exits shall be located as far apart and as far from the main exit as practicable. Such exits shall be accessible from a cross or side aisle. There shall be not less than two such exits in addition to the required access to the main exit when the occupant load of the level being served exceeds 50.

**617.3.3 Width of exit doors:** The maximum width of single exit doors shall be 42 inches (1067 mm) and the minimum width of double doorways shall be 60 inches (1524 mm).

**617.3.4 *Exit* lights:** All exit doors shall be marked with illuminated *Exit* signs complying with Section 823.0 which shall be kept lighted at all times during occupancy of the building.

**617.4 Railings:** Metal or other approved noncombustible railings shall be provided on balconies and galleries as prescribed in Sections 617.4.1 through 617.4.3.

**617.4.1 At fascia:** At the fascia of boxes, balconies and galleries not less than 26 inches (660 mm) in height; not less than 36 inches (914 mm) in height at the end of aisles extending to the fascia for the full width of the aisle; and not less than 42 inches (1067 mm) in height at the foot of steps for the full width of the steps.

**617.4.2 At cross aisles:** Along cross aisles, not less than 26 inches (660 mm) in height except where the backs of the seats along the front of the aisles project 24 inches (610 mm) or more above the floor of the aisle.

**617.4.3 Successive tiers:** Where seatings are arranged in successive tiers, and the height of rise between platforms exceeds 18 inches (457 mm) not less than 26 inches (660 mm) in height along the entire row of seats at the edge of the platform.

**617.5 Foyer:** In every theater or similar place of public assembly, not including churches, for theatrical use with stage and scenery loft, a foyer or lobby shall be provided with a net floor area, exclusive of stairs or landings, of not less than 1½ square feet (0.14 $m^2$) for each occupant having access thereto. The use of foyers and lobbies and other available spaces for harboring occupants until seats become available shall not encroach upon the clear floor area herein prescribed or upon the required clear width of front exits.

**617.5.1 Egress:** When the foyer is not directly connected to the public street through the main lobby, an unobstructed corridor or passage shall be provided which leads to, and equals the required minimum width of, main entrances and exits. A mirror shall not be placed so as to give the appearance of a doorway, exit or passageway.

**617.5.2 Gradient:** The rear foyer shall be at the same level as the back of the auditorium and the means of egress leading therefrom shall not have a steeper gradient than one unit vertical for eight units horizontal (1:8).

**617.5.3 Construction:** The partitions separating the foyer from the auditorium and other adjoining rooms and spaces of theaters shall be constructed of not less than two hour fireresistance rating. Opening protectives may be constructed of noncombustible materials without fireresistance rating.

**617.5.4 Waiting spaces:** Waiting spaces for harboring occupants shall be located only on the first or auditorium floor. Separate exits in addition to the required theater exits shall be provided from the waiting space based on an occupancy of one person for each 3 square feet (0.28 $m^2$) of waiting space area.

**617.6 Stage enclosure walls:** Every stage hereafter erected or altered for theatrical performances which is equipped with portable or fixed scenery, lights and mechanical appliances, shall be enclosed on all sides with solid walls of not less than four hour fireresistance rating extending continuously from foundation to at least 4 feet (1219 mm) above the roof. There shall not be window openings in such walls within 6 feet (1829 mm) of an interior lot line. All permissible window openings shall be protected with three quarter hour fire windows complying with Article 14.

**617.6.1 Stage floor construction:** The entire stage, except that portion used for the working of scenery, traps, and other mechanical apparatus for the presentation of a scene, and the roof over the stage shall be not less than three hour fireresistance rated construction. All openings through the stage floor shall be equipped with tight fitting, solid wood trap doors not less than 3 inches (76 mm) in thickness or other materials of equal physical and fireresistance rated properties.

**617.6.2 Stage rigging loft:** The rigging loft, fly galleries and pin rails shall be constructed of approved noncombustible materials.

**617.6.3 Footlights and stage electrical equipment:** Footlights and border lights shall be installed in troughs constructed of noncombustible materials. The switchboard shall be so located as to be readily accessible at all times and the storage or placing of stage equipment against it shall be prohibited.

**617.6.4 Exterior stage doors:** All required exit discharge door openings to the outer air shall be protected with approved self closing fire doors, complying with Article 14. All exterior openings which are located on the stage for means of egress or loading and unloading purposes which are likely to be open during occupancy of the theater, shall be constructed with vestibules to prevent air draughts into the auditorium.

**617.6.5 Proscenium wall:** There shall be no other openings in the wall separating the stage from the auditorium except the main proscenium opening; two doorways at the stage level, one on each side thereof; and, where necessary, not more than two doorways to the musician's pit from the space below the stage floor. Each such doorway shall not exceed 21 square feet (1.95 $m^2$) in area and shall be protected with approved automatic or self closing fire door assemblies complying with Article 14 with a combined fireresistance rating of three hours, or the approved labeled equivalent. The distance between the top of the proscenium opening and the ceiling of the stage shall be not less than 5 feet (1524 mm).

**617.6.6 Proscenium curtain:** The proscenium opening shall be provided with an approved curtain of noncombustible or fire-retardant material so designed and installed that it will protect against passage of flame and smoke for five minutes. The curtain shall be operated by an automatic heat activated device to descend instantly and safely and to completely close the proscenium opening at a rate of temperature rise of 15 to 20 degrees F. per minute (0.14 degrees C. to 0.19 degrees C. per second); and by an auxiliary operating device to permit prompt and immediate manual closing of the proscenium opening.

**617.6.7 Scenery:** All combustible materials used in sets and scenery shall be rendered flameresistant to comply with Article 14.

**617.6.8 Stage ventilation:** Metal or other approved noncombustible ventilators, equipped with movable shutters or sash shall be provided over the stage, constructed to open automatically and instantly by approved heat activated devices, with an aggregate clear area of opening not less than one eighth the area of the stage, except as otherwise provided in Section 617.2.2. Supplemental means shall be provided for manual operation of the ventilator.

**617.7 Dressing and appurtenant rooms:** Dressing and appurtenant rooms shall comply with Sections 617.7.1 through 617.7.3.

**617.7.1 Construction:** Dressing rooms, scene docks, property rooms, work shops and store rooms and all compartments appurtenant to the stage shall be of Type 1 construction and shall be separated from the stage and all other parts of the building by walls of not less than three hour fireresistance rating. Such rooms shall not be placed immediately over or under the operating stage area.

**617.7.2 Opening protectives:** Openings other than to trunk rooms and the necessary doorways at stage level shall not connect such rooms with the stage, and such openings shall be protected with one and one half hour self closing fire doors or the approved labeled equivalent complying with Article 14.

**617.7.3 Dressing room and stage exits:** Each tier of dressing rooms shall be provided with at least two means of egress, one of which shall lead directly to an exit corridor, outer court or street. Exit stairways from dressing and storage rooms may be unenclosed in the stage area behind the proscenium wall. At least one approved exit shall be provided from each side of the stage and from each side of the space under the stage, and from each fly gallery and from the gridiron to a street, outer court or passageway to a street. A steel ladder shall be provided from the gridiron to a scuttle in the stage roof.

**617.8 Lighting:** Assembly lighting shall comply with Sections 617.8.1 through 617.8.4.

**617.8.1 Exits:** During occupancy all exits in places of assembly shall be lighted to comply with the requirements of Section 824.0.

**617.8.2 Auditoriums:** Aisles in auditoriums shall be provided with general illumination of not less than 0.1 foot candles (1.08 lux) at the front row of seats and not less than 0.2 foot candles (2.15 lux) at the last row of seats and

the illumination shall be maintained throughout the showing of motion pictures or other projections.

**617.8.3 Other places of public assembly:** All areas and portions of buildings used as places of public assembly other than theaters shall be lighted by electric light to provide a general illumination of not less than 1 foot candle (10.76 lux).

**617.8.4 Control:** The lighting of exits, aisles and auditoriums shall be controlled from a location inaccessible to unauthorized persons. Supplementary control shall be provided as specified in Section 608.3.5 in the motion picture projection room.

**617.9 Fire protection and fire fighting equipment:** Every theater classified in Use Group A-1 shall be equipped with a fire protection system complying with the requirements of Article 17 and as herein specified.

**617.9.1 Fire suppression system:** Approved automatic fire suppression systems complying with the provisions of Section 1702.0 shall be provided.

**617.9.2 Standpipes:** Standpipe fire lines complying with the provisions of Section 1711.0 shall be provided with outlets and hose attachments; one on each side of the auditorium in each tier; one in each mezzanine; one in each tier of dressing rooms; and protecting each property, store and work room.

**617.9.3 First aid standpipes:** First aid standpipes complying with the provisions of Section 1711.0 shall be provided on each side of the stage. Such standpipes shall be not less than 2½ inches in diameter, equipped with 1½ inch hose and ⅜ inch nozzles.

**617.9.4 Hose outlets:** A sufficient quantity of hose shall be provided, equipped with approved fire department couplings, nozzle and hose spanner, to reach all areas as specified in Article 17.

**617.9.5 First aid hand equipment:** Approved portable 2½ gallon (0.0095 $m^3$) fire extinguishers shall be provided and located as follows: two on each tier or floor of the stage; one immediately outside of the motion picture projection room; one in each dressing room; and one in each work, utility and storage room. Fire axes and fire hooks shall also be provided as directed by the fire official; and all fire extinguishers and fire tools shall be securely mounted on walls in plain view and readily accessible.

## SECTION 618.0 AMUSEMENT PARKS

**618.1 Construction:** All accessory buildings and enclosed structures shall be constructed to conform to the requirements of this code governing use and occupancy as regulated by Tables 401 and 505 and in compliance with the fire limit restrictions of Article 5, except as may be specifically required in the following Sections 618.1.1 through 618.1.3.

**618.1.1 Amusement devices:** The maximum height of any amusement device in which passengers are transported shall not exceed 40 feet (12192 mm) in

Type 4 construction; 100 feet (30480 mm) in Type 2C and 3A construction; and shall not be limited in Type 1 construction.

**618.1.2 Amusement park buildings:** All enclosed amusement park buildings over one story in height shall be constructed or protected to furnish not less than one hour fireresistance rating, except where roof framing and decking are specifically permitted to be of Type 2 or 3A construction under the provisions of this code.

**618.1.3 Proximity to lot lines:** All structures located within 20 feet (6096 mm) of lot lines or other structures on the same lot shall be of Types 1, 2A, 2B, 3A, or 3B construction.

**618.2 Walkways and ramps:** Walkways and ramps shall be erected with a slope not greater than one unit vertical in ten units horizontal (1:10), except that when approved slip resistant surfaces are provided, the grade may be increased to a maximum of one unit vertical in eight units horizontal (1:8).

**618.3 Elevating and conveying equipment:** The equipment and operation of all devices and mechanisms for transporting persons shall comply with the requirements of Article 21.

**618.4 Tests:** All amusement devices used by the public which involve hazardous features shall be installed and operated as directed by the building official, and shall not be placed in service until acceptance tests have been made and the installation has been approved by the building official.

**618.5 Fire protection:** In addition to the fire extinguisher and fire fighting equipment required by the use and occupancy of each building and structure under the provisions of this code, every amusement and exhibition park, when required by the building official, shall be provided with a system of fire hydrants and fire lines with the required water supply complying with Article 17.

## SECTION 619.0 STADIUMS AND GRANDSTANDS

**619.1 General:** Stadiums and grandstands shall be constructed as required by this code and in accordance with the approved rules and NFiPA 102 listed in Appendix A.

**619.2 Handrails:** Means of egress stairways shall be provided with a handrail on at least one side. The handrail shall be broken as necessary to provide for entrance to the seating platforms.

**619.3 Spaces underneath seats:** Spaces underneath grandstand seats shall be kept free of all combustible and flammable materials and shall not be occupied or used for other than exits; except that when enclosed in not less than one hour fireresistance rated construction, the building official may approve the use of such spaces for other purposes that do not endanger the safety of the public.

## SECTION 620.0 DRIVE-IN MOTION PICTURE THEATERS

**620.1 Location:** The location of drive-in motion picture theaters shall be approved by the local or state authority having jurisdiction over highways and streets.

**620.2 Arrangement of lanes:** Separate entrance and exit lanes shall be provided not less than 12 feet (3657 mm) in width, with not less than 40 foot (12192 mm) intervals between access lanes. The parking space for each car shall not be less than 9 feet (2743 mm) by 20 feet (6096 mm) in area, and so arranged to provide continuous lanes of travel.

**620.3 Projection booth:** The projection booth shall comply with Section 608.3 and shall be supported on a structure of Type 2C or other approved noncombustible construction. A motor vehicle shall not be permitted to park within 20 feet (6096 mm) of the projection booth or room.

**620.4 Toilet facilites:** Separate toilet facilities shall be provided for each sex as required in the plumbing code (Article 22) for places of public assembly.

**620.5 Fire protection:** Sufficient approved portable fire extinguishers shall be provided in readily accessible locations, plainly and visibly identified by signs, at distances of not more than 150 feet (45720 mm) so as to be available to every motor vehicle as directed by the fire official. The fire extinguishers shall be mounted on posts or platforms protected from mechanical injury with substantial guards as approved by the building official.

## SECTION 621.0 TENTS, AIR SUPPORTED STRUCTURES AND OTHER TEMPORARY STRUCTURES

**621.1 Construction:** Tents and air supported structures shall be constructed as required by this code, the approved rules and NFiPA 102 listed in Appendix A.

**621.2 Permits:** A special temporary permit shall be secured from the building official for all such installations. Tents, air supported structures and other temporary structures may be erected for a period not exceeding 90 days for religious, educational, recreational, or similar purposes.

**621.3 Location:** Tents and air supported structures shall be located outside the fire limits unless an accessible unoccupied open space is provided around the perimeter with a minimum width of 50 feet (15240 mm).

**621.4 Approved type:** Tents, air supported structures and other temporary structures shall be of an approved type. The applicant for a special temporary permit hereunder shall submit evidence of the adequacy of the temporary structure in accordance with the requirements of Section 110.0 of this code.

**621.5 Combustible material:** Combustible materials shall not be permitted under stands or seats at any time.

**621.6 Combustible trash:** The area within and adjacent to tents, air supported structures or other temporary structures shall be maintained clear of all grass or underbrush creating a fire hazard within a radius of 50 feet (15240 mm). All combustible trash shall be removed from the structure after each performance.

## SECTION 622.0 PARKING LOTS

**622.1 Curb cuts:** Parking lots shall be arranged to afford ready means of entrance and exit at sidewalk level; and special permits shall be secured for curb cuts from the administrative authorities.

**622.2 Lanes and parking spaces:** Access lanes not less than 12 feet (3658 mm) in width shall be provided for each row of cars; and the parking space shall be not less than 8 feet (2438 mm) by 18 feet (5486 mm) in area for each motor vehicle.

**622.3 Parking lot offices:** The construction of parking lot offices shall comply with the fire limit restrictions of Section 502.0.

**622.4 Protection of adjoining property:** A substantial bumper of masonry, steel or heavy timber shall be placed near all interior lot lines to protect structures and property abutting the parking lot.

**622.5 Surface and drainage:** Parking lots shall be graded with rolled or compacted cinders, gravel or other approved nonabsorbent materials to prevent raising of dust and shall be maintained to prevent drainage onto adjoining property or the sidewalk.

**622.6 Electric illumination:** Electric light wiring shall be provided to furnish adequate illumination of driveways and lanes as required by the administrative authorities for street lighting, but such illumination shall not be less than 0.25 lumen per square foot (2.69 lumens/ $m^2$) of parking area.

## SECTION 623.0 MOBILE UNITS

**623.1 General:** Mobile units, as defined in Section 201.0 shall be designed, constructed and maintained to be transported from one location to another and not mounted on a permanent foundation. A mobile unit placed on a permanent foundation or on foundation piers shall be designed and constructed to comply with all of the requirements of this code for on-site and prefabricated construction.

**623.2 Construction:** Residential mobile units shall be of an approved design and constructed in accordance with the applicable ordinances and statutes. All other mobile units shall be designed and constructed in accordance with the requirements of this code. All mobile units on a permanent foundation shall be evaluated, inspected and labeled in-plant in accordance with Section 2303.0.

**623.3 Location:** Mobile units shall be located in spaces approved for such use. The provisions of this code shall not be construed to repeal, modify or constitute an alternative to any lawful zoning regulations. In case of conflict

between this code or any other ordinance or statute, the most rigid requirements shall apply.

**623.3.1 Anchorage and tie down:** Every parking space for mobile units shall be provided with devices for anchoring the unit to prevent overturning or uplift. The owner of the parking space shall anchor or cause to be anchored all mobile units located on the parking space. Where concrete platforms are provided for the parking of the units, anchorage may be by eyelets embedded in the concrete with adequate anchor plates or hooks, or other suitable means. The anchorage shall be adequate to withstand wind forces and uplift as required in Article 9 for buildings and structures, based upon the size and weight of the units.

## SECTION 624.0 MOTELS

**624.1 General:** All buildings and accessory structures used as motels shall comply with the requirements and limitations of this code for the occupancy and use for which they are designed, and as herein specifically required.

**624.2 Garages:** Garages, when attached to buildings of Use Group R-1, shall have the interior faces of all walls, when not of approved masonry construction, and the ceilings protected to afford one hour fireresistance rating. All connecting openings shall be protected with approved three quarter hour fire doors or their equivalent complying with Article 14, or with 1¾ inch solid core wood doors. Roofed over passageways may be used to connect garages to dwellings if protected with one hour fireresistance rated construction.

**624.3 Required exits:** All exits in buildings more than one story in height shall be constructed of one hour fireresistance rating and all stories above the first shall have at least two means of egress complying with Article 8. All exits from residential quarters shall lead to open spaces not less than 20 feet (6096 mm) in width which provide direct access to public streets or highways.

**624.4 Driveways and parking spaces:** The arrangement and capacity of driveways, lanes and parking spaces shall comply with the requirements specified for parking lots in Section 622.0.

**624.5 Water supply and sanitary facilities:** Fresh water supply for drinking and domestic purposes and all sanitary facilities shall comply with the provisions of the plumbing code listed in Appendix A.

## SECTION 625.0 RADIO AND TELEVISION TOWERS

**625.1 General:** Subject to the structural provisions of Section 915.0 for wind loads and the requirements of Section 1426.0 governing the fireresistance ratings of buildings for the support of roof structures, all radio and television towers shall be designed and constructed as herein provided.

**625.2 Location and access:** The towers shall be so located and equipped with step bolts and ladders to be readily accessible for inspection purposes. Guy wires or other accessories shall not cross or encroach upon any street or other

public space, or over any electric power lines, or encroach upon any other privately owned property without written consent of the owner.

**625.3 Construction:** All towers shall be constructed of approved corrosion resistive noncombustible material. Within the limitations of Section 502.0 for fire limits, isolated radio towers may be constructed of lumber sizes qualifying for Type 3A construction when not more than 100 feet (30480 mm) in height.

**625.4 Loads:** The structure shall be designed to resist the wind loads in accordance with ANSI A58.1 listed in Appendix A. Consideration shall be given to conditions involving wind load on ice covered sections in localities subject to sustained freezing temperatures.

**625.4.1 Dead load:** Antennae and towers shall be designed for the dead load plus ice load in regions where ice formation is likely to occur.

**625.4.2 Uplift:** Adequate foundations and anchorage shall be provided to resist two times the calculated wind uplift.

**625.5 Grounding:** All towers shall be permanently and effectively grounded.

## SECTION 626.0 RADIO AND TELEVSION ANTENNAE

**626.1 Permits not required:** Antennae structures for private radio or television reception not more than 12 feet (3658 mm) in height may be erected and maintained on the roof of any building without a building permit. Such a structure, however, shall not be erected so as to injure the roof covering, and when removed from the roof, the roof covering shall be repaired to maintain weather and water tightness. The installation of any antennae structure mounted on the roof of a building shall not be erected nearer to the lot line than the total height of the antennae structure above the roof, nor shall such structure be erected near electric power lines or encroach upon any street or other public space.

**626.2 Permits required:** The approval of the building official shall be secured for all roof mounted antennae structures more than 12 feet (3658 mm) in height above the roof. The application shall be accompanied by detailed drawings of the structure and methods of anchorage. All connections to the roof structure must be properly flashed to maintain water tightness. The design and materials of construction shall comply with the requirements of Section 625.3 for character, quality and minimum dimension.

## SECTION 627.0 SWIMMING POOLS

**627.1 General:** Pools used for swimming or bathing shall be in conformity with the requirements of this section, provided, however, these regulations shall not be applicable to any such pool less than 24 inches (610 mm) deep or having a surface area less than 250 square feet (23.25 $m^2$), except when such pools are permanently equipped with a water recirculating system or involve structural materials. For purposes of this code, pools are classified as private swimming pools or public and semi-public swimming pools, as defined in

Section 627.2. Materials and constructions used in swimming pools shall comply with the applicable requirements of this code.

**627.2 Classification of pools:** Any constructed pool which is used, or intended to be used, as a swimming pool in connection with a building of Use Group R-3 and available only to the family of the householder and his private guests shall be classified as a private swimming pool. Any swimming pool other than a private swimming pool shall be classified as a public or semi-public swimming pool.

**627.3 Plans and permits:** A swimming pool or appurtenances thereto shall not be constructed, installed, enlarged or altered until plans have been submitted and a permit has been obtained from the building official. The approval of all city, county and state authorities having jurisdiction over swimming pools shall be obtained before applying to the building official for a permit. Certified copies of these approvals shall be filed as part of the supporting data for the application for the permit.

**627.3.1 Plans:** Plans shall accurately show dimensions and construction of the pool and appurtenances and properly established distances to lot lines, buildings, walks and fences, as well as details of water supply system, drainage and water disposal systems, and all appurtenances pertaining to the swimming pool. Detail plans of structures, vertical elevations, and sections through the pool showing depth shall be included.

**627.4 Locations:** Private swimming pools shall not encroach on any front or side yard required by this code, or the governing zoning law, except by specific rules of the jurisdiction in which it may be located. A wall of a swimming pool shall not be located less than 6 feet (1829 mm) from any rear or side property line or 10 feet (3048 mm) from any street property line, except by specific rules of the jurisdiction in which it may be located.

**627.5 Structural design:** The pool structure shall be engineered and designed to withstand the expected forces to which it will be subjected.

**627.5.1 Wall slopes:** To a depth up to 5 feet (1524 mm) from the top, the wall slope shall not be more than 2 feet (610 mm) horizontal in 5 feet (1524 mm) vertical.

**627.5.2 Floor slopes:** The slope of the floor on the shallow side of transition point shall not exceed one unit vertical to seven units horizontal (1:7). The transition point between shallow and deep water shall not be more than 5 feet (1524 mm) deep.

**627.5.3 Surface cleaning:** All swimming pools shall be provided with a recirculating skimming device or overflow gutters to remove scum and foreign matter from the surface of the water. Where skimmers are used there shall be at least one skimming device for each 1,000 square feet (93 $m^2$) of surface area or fraction thereof. Where overflow gutters are used they shall be not less than 3 inches (76 mm) deep, pitched to a slope of one unit vertical to 48 units horizontal (1:48) toward drains, and constructed so they are safe, cleanable

and that matter entering the gutters will not be washed out by a sudden surge of entering water.

**627.5.4 Walkways:** All public or semi-public swimming pools shall have walkways not less than 4 feet (1219 mm) in width extending entirely around the pool. Where curbs or sidewalks are used around any swimming pool they shall have a slip resistant surface for a width of not less than 1 foot (305 mm) at the edge of the pool and shall be so arranged to prevent return of surface water to the pool.

**627.5.5 Steps and ladders:** One or more means of egress shall be provided from the pool. Treads of steps or ladders shall have slip resistant surfaces and handrails on both sides, except that handrails may be omitted when there are not more than four steps or when they extend the full width of the side or end of the pool.

**627.6 Water supply:** All swimming pools shall be provided with a potable water supply, free of cross connections with the pool or its equipment.

**627.6.1 Water treatment:** Public and semi-public swimming pools shall be designed and installed so that there is a pool water turnover at least once every eight hours. Filters shall not filter water at a rate in excess of 3 gallons per minute per square foot (0.0020 $m^3/s/m^2$) of surface area. The treatment system shall be so designed and installed to provide in the water, at all times when the pool is in use, excess chlorine of not less than 0.4 parts per million (ppm) or more than 0.6 ppm, or excess chloramine between 0.7 and 1.0 ppm, or disinfection may be provided by other approved means. Acidity/alkalinity of the pool water shall not be below 7.0 or more than 7.5. All recirculation systems shall be provided with an approved hair and lint strainer installed in the system ahead of the pump.

Private swimming pools shall be designed and installed so that there is a pool water turnover at least once every 18 hours. Filters shall not filter water at a rate in excess of 5 gallons per minute per square foot (0.0034 $m^3/s/m^2$) of surface area. The pool owner shall be instructed in proper care and maintenance of the pool by the supplier or builder, including the use of high test calcium hypochlorite (dry chlorine) or sodium hypochlorite (liquid chlorine) or equally effective germicide and algaecide and the importance of proper pH (alkalinity and acidity) control.

**627.6.2 Drainage systems:** The swimming pool and equipment shall be equipped to be completely emptied of water and the discharged water shall be disposed of in an approved manner that will not create a nuisance to adjoining property.

**627.7 Appurtenant structures:** All appurtenant structures, installations, and equipment, such as showers, dressing rooms, equipment houses or other buildings and structures, including plumbing, heating, and air conditioning, amongst others appurtenant to a swimming pool, shall comply with all applicable requirements of this code and the zoning law.

**627.7.1 Accessories:** All swimming pool accessories shall be designed, con-

structed, and installed so as not to be a safety hazard. Installations or structures for diving purposes shall be properly anchored to insure stability, and properly designed and located for maximum safety.

**627.8 Equipment installations:** Pumps, filters, and other mechanical and electrical equipment for public and semi-public swimming pools shall be enclosed in such a manner as to be accessible only to authorized persons and not to bathers. Construction and drainage shall be such as to avoid the entrance and accumulation of water in the vicinity of electrical equipment.

**627.9 Swimming pool safety devices:** Every person owning land on which there is situated a swimming pool, which contains 24 inches (610 mm) or more of water in depth at any point, shall erect and maintain thereon an adequate enclosure either surrounding the property or pool area, sufficient to make such body of water inaccessible to small children. Such enclosure, including gates therein, must be not less than 4 feet (1219 mm) above the underlying ground. All gates must be self latching with latches placed 4 feet (1219 mm) above the underlying ground and otherwise made inaccessible from the outside to small children.

A natural barrier, hedge, pool cover or other protective device approved by the governing body may be used so long as the degree of protection afforded by the substituted devices or structures is not less than the protection afforded by the enclosure, gate and latch described herein.

## SECTION 628.0 OPEN PARKING STRUCTURES

**628.1 General:** Open passenger vehicle parking structures are those structures used for the parking or storage of passenger motor vehicles designed to carry not more than nine persons, and include the two general types indicated in Sections 628.1.1 and 628.1.2.

**628.1.1 Ramp type parking structures:** Ramp type parking structures are those employing a series of continuously rising floors or a series of interconnecting ramps between floors permitting the movement of passenger automobiles under their own power to and from the street level.

**628.1.2 Mechanical type parking structures:** Mechanical type parking structures are those employing specially designed parking machines, elevators, lifts, conveyors, moving cranes, dollies or other devices for moving passenger automobiles to and from the street level.

**628.2 General construction requirements:** Passenger vehicle structures shall be constructed of noncombustible materials throughout, including structural framing, floors, roofs and walls. Any enclosed rooms or spaces on the premises shall comply with the applicable requirements of this code.

**628.3 Separations:** Parking structures may be erected without exterior walls except that an enclosure wall with not less than two hour fireresistance rating and without openings therein shall be provided when located within 6 feet (1829 mm) of interior lot lines.

**628.4 Basements:** Basements, if used for parking of vehicles, shall be sprinklered in accordance with the provision of Section 1702.0 and shall be ventilated in accordance with the provisions of Section 614.3.1.

**628.5 Gasoline dispensing:** Areas used for dispensing of gasoline in parking structures shall be located on the grade floor and shall comply with the requirements of Section 615.0.

**628.6 Heights and areas:** Heights and areas of open parking structures shall not exceed the limits specified in the following Table 628 except that open parking structures of Types 2B and 2C construction may be six stories in height and unlimited in area when at least 50 percent open on all sides and when the horizontal distance from any point on any level to an exterior wall opening on a street, alley, courtyard or any other permanent open space does not exceed 200 feet (60960 mm).

**Table 628**
**HEIGHT AND AREA LIMITATION FOR OPEN PARKING STRUCTURES**

| Type of construction | Height | Area in square feet |
|---|---|---|
| 1A and 1B | Unlimited | Unlimited |
| 2A | 12 Stories—120 feet | Unlimited |
| 2B | 10 Stories—100 feet | 50,000 |
| 2C | 8 Stories— 85 feet | 30,000 |
| 2B and 2C | 2 Stories— 25 feet[a] | Unlimited |

**Note a.** Types 2B and 2C construction may be six stories in height and unlimited in area when at least 50 percent open on all sides and when the horizontal distance from any point on any level to an exterior wall opening on a street, alley, courtyard or any other permanent open space does not exceed 200 feet (see Section 628.6).

**Note b. 1 foot** = 304.8 mm; 1 square foot = 0.093 $m^2$.

The areas of structures wherein more than 25 percent of the perimeter has frontage on street or other open space leading to a street, each of which is not less than 30 feet (9144 mm) wide, may be increased as provided in Section 506.2. When an automatic sprinkler system is installed in accordance with Section 1704.0 in Types 2B and 2C construction, the area may be unlimited. The above limits of height permit parking on the roof.

**628.7 Protective guardrails:** All wells, shafts and other open, exposed spaces throughout, except first floor, shall be enclosed and protected with continuous walls or protective guardrails at least 3 feet 6 inches (1067 mm) in height, except that in those structures wherein vehicles are hoisted to the desired level and placed in the parking space entirely by approved mechanical means, the 3 foot 6 inch (1067 mm) high continuous wall or protective guardrail may be omitted on the side of the parking levels adjacent to the space occupied by the hoisting and placing equipment.

**628.8 Wheel guards:** Wheel guards made of noncombustible material shall be placed wherever required.

**628.9 Means of egress:** For means of egress requirements, see Section 809.5.

## SECTION 629.0 HIGH RISE BUILDINGS

**629.1 Applicability:** The provisions of this section shall apply to all buildings of Use Groups B, R-1 and R-2 when such buildings have floors used for human occupancy located more than 75 feet (22860 mm) above the lowest level of fire department vehicle access.

**629.2 Maintenance and inspection:** All fire protection systems shall be maintained in an operative condition at all times and shall be periodically inspected and tested in accordance with the fire prevention code listed in Appendix A. Maintenance inspections shall be made quarterly and logged in a journal kept available for inspection.

**629.3 Options:** All buildings and structures shall be provided with either an approved automatic fire suppression system according to Section 629.3.1 or safe areas of refuge (compartmentation) according to Section 629.3.2.

**629.3.1 Automatic fire suppression system:** When provided as required herein, the automatic fire suppression system shall be installed throughout the building. The system shall be designed using the parameters set forth in Article 17 and the requirements of Sections 629.3.1.1 through 629.3.1.3.

**629.3.1.1 Shutoff valves and water flow devices:** Shutoff valves and a water flow device shall be provided for each floor.

**629.3.1.2 Valve supervision:** Valves shall be supervised by a continuously manned control station or central station.

**629.3.1.3 Secondary water supply:** In addition to the main water supply, in Seismic Zones 2 and 3, a secondary on-site supply of water equal to the hydraulically calculated sprinkler design demand plus 100 gallons per minute (0.0063 $m^3/s$) additional for the total standpipe system shall be provided. This supply shall have a duration of 30 minutes, but need not exceed 10,000 gallons (37.90 $m^3$).

**629.3.1.4 Automatic fire suppression system alternatives:** When a fire suppression system is installed, modifications to this code are permitted as described in Sections 629.3.1.4.1 through 629.3.1.4.10.

**629.3.1.4.1 Type of construction:** The type of construction required by this code may be modified as indicated in Table 629.

**Table 629**
**TYPE OF CONSTRUCTION MODIFICATIONS PERMITTED FOR HIGH-RISE BUILDINGS**

| Type of construction set forth in Table 401 | Modified type of construction permitted hereunder |
|---|---|
| 1A | 1B |
| 1B | 2A |
| 2A | 2B |

**629.3.1.4.2 Fireresistance ratings:** The fireresistance rating of exit access corridors and vertical separation of tenant spaces shall not be required in Use

Group B buildings and may be reduced to one half hour in Use Groups R-1 and R-2 buildings; and the wall or partitions may be terminated at the lowest portion of the fireresistance rated assembly above.

**629.3.1.4.3 Shaft enclosures:** Vertical shafts other than stairway enclosures and elevator hoistway enclosures may be reduced to one hour fireresistance rating when sprinklers are installed within the shafts at alternate floors.

**629.3.1.4.4 Doors:** The exit access and corridor doors need not meet the requirements of Section 810.4, except they shall be self closing and tight fitting.

**629.3.1.4.5 Standpipe system:** The 1½ inch hose line, nozzle, rack and cabinet may be omitted as set forth in Section 1711.5.1.

**629.3.1.4.6 Travel distance:** The exit access travel distance set forth in Table 807 may be increased to 300 feet (91440 mm).

**629.3.1.4.7 Smokeproof enclosures:** Smokeproof enclosures as set forth in Section 818.0 may be omitted, but required stairways shall be pressurized to a minimum of 0.15 inches of water column (37.33 Pa) and a maximum of 0.35 inch of water column (87.10 Pa) in the manner described in Section 818.7.5.

**629.3.1.4.8 Spandrel walls, eyebrows and compartmentation:** Spandrel walls, eyebrows and compartmentation are not required: however, the fireresistance rating of the floors and junctures of exterior walls with each floor must be maintained.

**629.3.1.4.9 Fire dampers:** Fire dampers, other than those needed to maintain the fireresistance rating of the floor/ ceiling assembly, are not required. Where fire dampers will interfere with the operation of the smoke control system, approved alternate protective devices shall be utilized.

**629.3.1.4.10 Windows:** Operable windows required by Section 809.4 for emergency egress or rescue may be omitted.

**629.3.2 Areas of refuge (compartmentation):** Areas of refuge conforming to Sections 629.3.2.1 through 629.3.2.6 may be provided as an alternate to the automatic fire suppression systems.

**629.3.2.1 Division of floor areas:** Every story shall be divided into two or more areas of approximately the same size with no single area exceeding 15,000 square feet (1395 $m^2$). The wall and doors between the areas of refuge shall be constructed as required for a horizontal exit in Section 814.0.

**629.3.2.2 Stairways and elevators:** Each area of refuge (compartment) shall contain a minimum of one enclosed exit stairway and each compartment shall have access to an elevator which may serve additional compartments. When elevators are directly accessible to more than one compartment, the elevator lobby shall be separated from the compartments by not less than two hour fireresistance rated construction with tight fitting opening protectives having fireresistance ratings of not less than one and one half hour.

**629.3.2.3 Exterior openings:** Openings in exterior walls, where such openings

are within 5 feet (1524 mm) of each other horizontally on adjacent floors or located vertically above one another, shall be protected by approved flame barriers either extending 30 inches (762 mm) beyond the exterior wall in the plane of the floor or by approved vertical panels complying with Section 1406.2.1.

**629.3.2.4 Wall construction:** Walls used for compartmenting a building shall have a fireresistance rating of not less than two hours. Duct penetrations of this wall shall not be permitted. Ferrous or copper piping and conduit may penetrate or pass through the wall only if the openings around such piping and conduit are sealed with impervious noncombustible materials sufficiently tight to prevent the transfer of smoke or combustion gases from one side of the wall to the other and are so maintained. The fire door serving as the horizontal exit between compartments shall be so installed, fitted and gasketed that it will provide a substantial barrier to the passage of smoke and shall comply with Section 814.2.1.

**629.3.2.5 Floor/ceiling construction:** The fireresistive floor or the floor/ceiling construction shall extend to and be tight against the exterior wall so that the fireresistive integrity between stories is maintained. Penetrations or other installations which will impair the fireresistive integrity of the floor or floor/ceiling assembly shall not be permitted (see Section 1403.1).

**629.3.2.6 Manual fire alarm system:** A manual fire alarm system (pull boxes) shall be provided.

**629.4 Smoke detection systems:** A smoke detector suitable for the intended use shall be installed in accordance with Sections 629.4.1 through 629.4.3.

**629.4.1 Room locations:** A smoke detector shall be installed in every mechanical equipment, electrical, transformer, telephone equipment, elevator machine or similar room unless such rooms are protected with an automatic fire suppression system.

**629.4.2 Duct locations:** A smoke detector shall be installed in each connection to a vertical duct or riser serving two or more stories from return air ducts or plenums of heating, ventilating and air conditioning systems, except that in Use Group R occupancies, an approved smoke detector may be used in each return air riser carrying not more than 5,000 cfm (2.36 $m^3/s$) and serving not more than ten air inlet openings.

**629.4.3 Operation:** The actuation of any detector required by this section shall operate the voice alarm system and shall place into operation all equipment necessary to prevent the recirculation of smoke.

**629.5 Alarm and communication systems:** Alarm and communication systems shall be provided. The alarm and communication systems shall be so designed and installed that damage to any terminal unit or speaker will not render more than one zone of the system inoperative.

A single communication system may be designed to serve the voice alarm, public address and fire department communication system as indicated in Sections 629.5.1 through 629.5.3.

**629.5.1 Voice alarm system:** The operation of any smoke detector, sprinkler, waterflow device or manual fire alarm station shall automatically activate a voice alarm system. Activation of the system shall automatically sound an alert signal to the desired areas. The voice alarm system shall provide a predetermined message on a selective basis to the area where the alarm originated and shall provide information and give direction to the occupants. The alarm shall be designed to be heard clearly by all occupants within the building or designated portions thereof as is required for the public address system.

The central control station shall contain controls for the voice alarm system so that a selective or general voice alarm may be manually initiated.

The system shall be continuously electrically supervised against component failure of the audiopath including amplifiers, speaker wiring, switches and electrical contacts and shall detect opens, shorts and grounds which might impair the function of the system.

**629.5.2 Public address system:** A public address communication system designed to be clearly heard by all occupants of the building shall operate from the central control station. It shall be established on a selective or general basis to the following terminal areas; elevators, elevator lobbies, corridors, exit stairways, rooms and tenant spaces exceeding 1,000 square feet (93 $m^2$) in area, dwelling units in Use Group R-2 and guest rooms or suites in Use Group R-1.

**629.5.3 Fire department communication system:** A two way fire department communication system shall be provided for fire department use. It shall operate between the central control station and every elevator, elevator lobby and entry to an enclosed exit stairway.

**629.6 Central control station:** A central control station for fire department operations shall be provided in a location approved by the fire department. It shall contain the voice alarm and public address system panels; the fire department communications panel; fire detection and alarm system annunciator panels; status indicator for elevators and annunciator indicating which elevators are operational; status indicators and controls for air handling systems; controls for unlocking all stairway doors simultaneously; sprinkler valve and waterflow detector display panels; emergency power, light and system controls; and status indicators and a telephone for fire department use with controlled access to the public telephone system.

**629.7 Smoke control:** Natural or mechanical ventilation for the removal of products of combustion shall be provided in every story and shall consist of one of the following methods described in Sections 629.7.1 through 629.7.3.

**629.7.1 Panels or windows:** Panels or windows shall be provided in the exterior walls which can be opened remotely from an approved location other than the fire floor. Such venting facilities shall be provided at the rate of 20 square feet per 50 lineal feet (1.86 $m^2$ per 15240 mm) of exterior wall in each story and shall be distributed around the perimeter at not more than 50 foot

(15240 mm) intervals. Such windows or panels and their controls shall be clearly identified.

**Exception:** When a complete automatic fire suppression system is installed, windows or panels manually openable from within the fire floor or approved fixed tempered glass may be used in lieu of the remotely operated openable panels and windows. Such windows shall be clearly identified and shall be of the size and spacing indicated above.

**629.7.2 Mechanical system:** When a complete and approved automatic fire suppression system is installed, the mechanical air handling equipment may be designed to accomplish smoke removal. Under fire conditions, the return and exhaust air shall be moved directly to the outside without recirculation to other sections of the building. The air handling system shall provide a minimum of one exhaust air change each ten minutes for the area involved.

**629.7.3 Other designs:** Any other approved design may be provided which will adequately remove smoke from each compartment served in an unsprinklered building, provided the system is tested and approved by the building official before the building is certified for occupancy.

**629.8 Elevators:** Elevator operation and installation shall be in accordance with Article 21. Elevator service shall be provided for fire department emergency access to all floors. Said elevator cab shall be of such size to accommodate an ambulance cot 24 inches (610 mm) by 76 inches (1930 mm) in its horizontal open position. Except for the main entrance level, all elevators shall open into a lobby (which may serve additional elevators) separated from the remainder of the building by one hour fireresistance rated construction. Exit stairways, chutes, janitor closets, guest or tenant rooms and service rooms shall not open into the elevator lobby.

**629.9 Standby power, light and emergency systems:** Standby power, light and emergency systems shall comply with the requirements of Sections 629.9.1 through 629.9.3.

**629.9.1 Standby power:** A standby power generating system conforming to Section 700 of NFiPA 70 listed in Appendix A shall be provided. The system shall be equipped with suitable means for automatically starting the generator upon failure of the normal electrical supply systems, and for automatic transfer of all functions required by this section at full power within 60 seconds of such normal service failure. System supervisions with manual start and transfer features shall be provided at the central control station. The generator, if inside a building, shall be located in a separate room of two hour fireresistance rated construction.

**629.9.1.1 Fuel supply:** An on-premises fuel supply sufficient for not less than two hours full demand operation of the system shall be provided.

**Exception:** Where the system is supplied with pipeline natural gas and is approved by the building official.

**629.9.1.2 Capacity:** The standby system shall have a capacity and rating that

would supply all equipment required to be operational at the same time. The generating capacity need not be sized to operate all the connected electrical equipment simultaneously.

**629.9.1.3 Connected facilities:** All power, lighting, signal and communication facilities specified in Sections 629.4, 629.5, 629.6, 629.7, 629.8 and 629.9 as applicable and electrically powered fire pumps required to maintain pressure, shall be transferable to the standby source.

**629.9.2 Separate circuits and fixtures:** Separate lighting circuits and fixtures shall be required sufficient to provide light with an intensity of not less than one footcandle (10.76 lux) measured at floor level in all egress corridors, stairways, smokeproof enclosures, elevator cars and lobbies and other areas which are clearly a part of the escape route.

**629.9.2.1 Other circuits:** All circuits supplying lighting for the central control station and mechanical equipment rooms shall be transferable to the standby source.

**629.9.3 Emergency systems:** *Exit* signs, exit illumination as required by Section 824.0, and elevator car lighting, are classified as emergency systems and shall operate within ten seconds of failure of the normal power supply and may also be connected to the standby source.

**629.10 Exits:** Exits shall comply with other requirements of this code and Sections 629.10.1 through 629.10.2.

**629.10.1 Door operation:** All stairway doors which are to be locked from the stairway side shall have the capability of being unlocked simultaneously without unlatching upon a signal from the central control station.

**629.10.2 Stairway communication system:** A telephone or other two way communications system connected to an approved emergency service which operates continuously shall be provided at not less than every fifth floor in each required stairway where other provisions of this code permit the doors to be locked.

**629.11 Seismic consideration:** In Seismic Zones 2 and 3, the anchorage of elevator drive and suspension systems, emergency power and lighting facilities, fire pumps and all other fire protection equipment and systems shall be designed in accordance with Section 916.3 for a lateral force based on *Cp* values of 0.5 unless data approved by the building official substantiating a lesser value is furnished.

## SECTION 630.0 COVERED MALL BUILDINGS

**630.1 Scope:** The provisions of this section shall apply to buildings or structures defined herein as covered mall buildings not exceeding three floor levels in height at any one point.

**Exceptions:** When approved by the building official, the following uses need not comply with the provisions of this section.

1. Terminals for transportation facilities.

2. Foyers and lobbies in buildings of Use Groups R-1, R-2 or B.
3. Buildings need not comply with the provisions of this section when they comply totally with all other applicable provisions of this code.

**630.2 Lease plan:** The permit holder shall provide both the building and fire departments with a lease plan showing the locations of each occupancy and its means of egress after the certificate of occupancy has been issued. Such plans shall be kept current. Modifications or changes in occupancy or use shall not be made from that shown on the lease plan without prior approval of the building official.

**630.3 Tenant separations:** Each tenant space shall be separated from other tenant spaces by a wall having a fireresistance rating of not less than one hour. The separation wall shall extend from the floor to the underside of the ceiling. Except as required by other provisions of this code, the ceiling need not be a fireresistive assembly. A separation is not required in attic spaces above tenant separation walls nor is a tenant separation wall required between any tenant space and a mall, except for occupancy separations required elsewhere in this code.

**630.4 Egress:** Each individual occupancy within the covered mall building shall be provided with a means of egress in accordance with other provisions of this code. Measurements may be made to the entrance to the mall.

**630.4.1 Travel distance:** The maximum length of exit access travel from any point within the mall to an approved exit along the natural and unobstructed path of travel shall not exceed 200 feet (60960 mm).

**630.4.2 Secondary exits:** When the length of travel from the most remote point within a tenant space to the mall exceeds 100 feet (30480 mm), a second means of egress shall be provided. When two or more means of egress are required, the secondary exits may open into the mall, an exit corridor, an exit enclosure, or to the exterior. When a corridor provides the second means of egress, it shall be of one hour fireresistance rated construction and doors to the corridor shall be one hour opening protectives. Such doors shall be self closing and be so maintained, or shall be automatic closing when actuated by smoke detectors.

**Table 630**
**FLOOR AREA ALLOWANCE PER OCCUPANT FOR COVERED MALLS**

| Square feet per person | Gross leasable area (sq. ft.) |
|---|---|
| 30 | under 150,000 |
| 40 | 150,001-350,000 |
| 50 | over 350,000 |

**Note a.** 1 square foot = 0.093 square meter.

**630.4.3 Anchor store exits:** Anchor stores shall provide the required number of exits and units of exit width directly to the exterior. The occupant load of anchor stores opening into the mall shall not be included in determining exit requirements for the mall.

**630.4.4 Dead ends:** The dead end of a mall shall not exceed twice its width.

**630.4.5 Design occupant load:** In determining required exit facilities of the mall, the number of occupants for whom exit facilities are to be provided shall be based on gross leasable area of the covered mall building (excluding anchor stores) and shall be based on Table 630.

**630.4.6 Exit access width:** The minimum width of exit access passageways and corridors from a mall shall be 66 inches (1676 mm).

**630.4.7 Exit distribution:** The required units of exit width and exits shall be distributed equally throughout the mall.

**630.4.8 Storage prohibited:** Storage is prohibited in exit corridors which are also used for service to the tenants. Such corridors shall be posted with conspicuous signs so stating.

**630.5 Mall width:** The minimum width of the mall shall be 20 feet (6096 mm). There shall be a minimum of 10 feet (3048 mm) clear exit width to a height of 8 feet (2438 mm) between any projection of a tenant space bordering the mall and the nearest kiosk, vending machine, bench, display opening, or other obstruction to egress travel.

The mall width shall be sufficient to accommodate the occupant load emptying into the immediately adjacent mall as determined by Section 630.4.5 for all occupancies except Use Group A which shall be determined by Section 806.0.

**630.6 Structural elements:** The structural elements of the covered mall building shall be of Type 1, 2 or 3A construction.

**630.6.1 Floor/ceiling assemblies:** Floor/ceiling assemblies and their supporting columns and beams within multi-level covered malls shall be of one hour fireresistance rated noncombustible construction.

**630.7 Roof coverings:** Roof coverings for covered mall buildings shall be Class A, B or C as required by Section 1427.0.

**630.8 Use Group A-1 and A-2 occupancies:** Use Group A-1 and A-2 occupancies shall be located in the covered mall building so that their main entrance is immediately adjacent to a principal entrance to the mall and shall have not less than one half of their required exits opening directly to the exterior of the covered mall building.

**630.9 Fire suppression:** The covered mall and all buildings connected thereto shall be provided throughout with an approved automatic fire suppression system. The suppression system in the covered mall shall be independent of the suppression system in the buildings connected to the covered mall.

**630.9.1 Supervision:** All sprinkler control valves shall be electrically supervised and connected to either the fire department or to an approved supervisory service.

**630.10 Standpipes:** There shall be a fire department standpipe outlet connected to a supply capable of delivering 250 gallons per minute (0.022 $m^3/s$)

located within the mall at each entrance to an exit passageway, corridor or enclosed stairway and at exterior exits.

**630.11 Fire extinguishers:** First aid fire extinguishers shall be provided as required by the fire prevention code listed in Appendix A.

**630.12 Fire emergency ventilating system:** The covered mall and exit corridors serving the mall shall be equipped with an approved automatic exhaust system capable of producing six air changes per hour computed on volume measured to a height of 12 feet (3658 mm) above each pedestrian area. Necessary outside air to accomplish the six air changes per hour shall be provided.

**630.12.1 Activation:** The exhaust system shall be activated by smoke detectors complying with NFiPA 72E listed in Appendix A, by operation of the sprinkler system, and manually. The activation system shall be installed in an approved manner. Exhaust shall be taken uniformly from the entire mall area and exits serving the mall through an approved duct system with vents spaced not more than 50 feet (15240 mm) or through a ceiling plenum with uniformly distributed openings. Where tenant spaces are open to the mall area exhaust may be taken through the tenant spaces.

**630.12.2 Operation:** The approved automatic exhaust system may be a separate system or may be integrated with an approved air conditioning system. Where a separate system is provided, operation of the fire emergency ventilating system shall automatically shut down the air conditioning system or any other devices which interfere with the effective operation of the fire emergency ventilating system.

**630.13 Fire department access to equipment:** Controls for air conditioning systems, sprinkler risers and valves, or other fire detection, suppression or control elements shall be accessible to and properly identified for use by the fire department.

**630.14 Plastic panels and plastic signs:** Within every story or level and from side wall to side wall of each tenant space, approved plastic panels and signs shall be limited as specified in Sections 630.14.1 through 630.14.4.

**630.14.1 Area:** The panels and signs shall not exceed 20 percent of the wall area facing the mall.

**630.14.2 Height and width:** The panels and signs shall not exceed a height of 36 inches (914 mm); except if the panel or sign is vertical, the height shall not exceed 96 inches (2438 mm) and the width shall not exceed 36 inches (914 mm).

**630.14.3 Location:** The panels and signs shall be located a minimum distance of 18 inches (457 mm) from adjacent tenants.

**630.14.4 Encasement:** All edges and the backs shall be fully encased in metal.

**630.15 Kiosks:** Kiosks and similar structures (temporary or permanent) shall meet the requirements of Sections 630.15.1 through 630.15.4.

**630.15.1 Construction:** Combustible kiosks or other structures shall not be located within the covered mall unless constructed of fire-retardant treated wood throughout, conforming to Section 1403.5.

**630.15.2 Fire suppression:** Kiosks or similar structures that are covered or have roofs and are located within the covered mall shall be protected by an approved automatic fire suppression system.

**630.15.3 Horizontal separation:** The minimum horizontal separation between kiosks and other structures within the covered mall shall be 20 feet (6096 mm).

**630.15.4 Maximum area:** Kiosks or similar structures shall have a maximum area of 300 square feet (27.90 $m^2$).

**630.16 Security grilles and doors:** Horizontal sliding or vertical security grilles or doors which are a part of a required means of egress shall conform to Sections 630.16.1 through 630.16.4.

**630.16.1 Open position:** They must remain secured in the full open position during the period of occupancy by the general public.

**630.16.2 Closed position:** Doors or grilles shall not be brought to the closed position when there are more than ten persons occupying spaces served by a single exit or 50 persons occupying spaces served by more than one exit.

**630.16.3 Operation:** The doors or grilles shall be openable from within without the use of any special knowledge or effort when the space is occupied.

**630.16.4 Limitation:** When two or more exits are required, not more than one half of the exits may be equipped with horizontal sliding or vertical rolling grilles or doors.

**630.17 Parking structures:** An attached garage for the storage of passenger vehicles having a capacity of not more than nine persons or an open parking structures may be considered as a separate building when it is separated from the covered mall building by an fire separation wall having a fireresistance rating of not less than two hours.

## SECTION 631.0 OPEN WELLS

**631.1 General:** Open wells are to be classified as either atriums (Section 631.2) or floor openings (Section 631.3) and shall be permitted in all buildings in other than Use Group H when provided with the protection herein required.

**631.1.1 Fire suppression:** An approved electrically supervised automatic fire suppression system shall be installed throughout all floor areas connected by the open well in accordance with the provisions of Article 17, except those floor areas separated from the open well by fire separation assemblies conforming to Table 401.

**631.1.2 Use:** The floor of the open well shall not be used for other than low fire hazard uses and only approved materials and decorations may be used in the open well space.

**Exception:** The open well floor area may be used for any approved use when the individual space is provided with an automatic fire suppression system.

**631.1.3 Exits:** An open well connecting not more than three floor levels may contain an exit as permitted by Section 816.10.

**631.1.4 Emergency power:** All equipment required to provide smoke control shall be provided with an emergency source of power in compliance with Article 700 of NFiPA 70 listed in Appendix A.

**631.1.5 Acceptance of the smoke control system:** Before the certificate of occupancy is issued, the smoke control system shall be tested in an approved manner to show compliance with the requirements of this section.

**631.1.6 Inspections of the smoke control systems:** All operating parts of the smoke control system (including dampers) shall be tested by the owner every three months and a log of the tests shall be kept for examination by the fire department. At six month intervals the system shall be inspected and operated in accordance with the fire prevention code listed in Appendix A.

**631.2 Atriums:** Atriums shall be constructed as herein required except atriums in buildings two stories in height shall not be required to be equipped with a smoke control system as indicated in Section 631.2.1. For purposes of this section, the volume of the atrium shall include all spaces not separated from the atrium in accordance with Section 631.2.2.

**631.2.1 Smoke control:** A smoke control system shall be designed to control the migration of products of combustion in the atrium spaces. Upon detection of a fire or smoke, the system shall shut down the air supply to the fire floor and the return air from all non-fire floors.

**631.2.1.1 Atriums 55 feet or less in height:** In atriums 55 feet (16764 mm) or less in height with a volume of 600,000 cubic feet (16800 $m^3$)or less, a smoke exhaust system shall be located at the ceiling of the atrium. Such system shall exhaust 40,000 cfm (18.88 $m^3/s$) or six air changes per hour, whichever is greater. When the volume of the atrium exceeds 600,000 cubic feet (16,800 $m^3$), the exhaust system shall be sized to provide a minimum of four air changes per hour.

Supply air inlets may be provided at the lowest level of the atrium. These inlets shall be sized for 75 percent of the exhaust.

**631.2.1.2 Atriums in excess of 55 feet in height:** When the height of the atrium exceeds 55 feet (16764 mm) an exhaust system shall be provided as required by Section 631.2.1.1. However, supply air shall be introduced mechanically from the floor of the atrium and shall be directed vertically at the exhaust outlet above. The capacity of the supply shall be 75 percent of the exhaust.

**631.2.1.3 Smoke detectors:** Smoke detectors shall be provided at the ceiling of the atrium and on the underside of each floor area projecting into the atrium space. Detectors shall be located in accordance with their listing.

**631.2.1.4 Smoke control activation:** The smoke control system required for

the atrium spaces shall be activated by the fire suppression system, by smoke detectors required by Section 631.2.1.3 and by manual controls provided for the fire department use. The system shall not be activated by a manual fire alarm system required by Section 1717.0. Manual controls shall be located in the central control station or other location approved by the fire department.

**631.2.1.5 Other approved methods:** Any other approved design which will achieve the same level of smoke control as described in this section may be used in lieu of these requirements.

**631.2.2 Enclosure of atriums:** Atrium spaces shall be separated from adjacent spaces by a one hour fire separation wall. A glass wall forming a smoke partition may be used in lieu of the required fire separation wall where automatic sprinklers are spaced 6 feet (1829 mm) or less along both sides of the separation wall, or on the room side only if there is not a walkway on the atrium side, and not more than 1 foot (305 mm) away from the glass and so designed that the entire surface of the glass will be wet upon activation of the sprinkler system.

**Exception:** The adjacent spaces of any three floors of the atrium shall not be required to be separated from the atrium; however, these spaces shall be included in the atrium volume according to Section 631.2.

**631.2.3 Voice alarm:** In Use Groups R-1, R-2 and I, a voice alarm system complying with the requirements of Section 629.5.1 shall be required on the floors communicating with the atrium. The alarm shall be initiated by either the fire suppression system or the activation of two or more smoke detectors in the atrium.

**631.2.4 Travel distance:** In other than the lowest level of the atrium, when the required means of egress is through the atrium space, the exit access travel distance shall not exceed 150 feet (45720 mm).

**631.3 Floor openings:** Floor openings for unenclosed supplemental stairways, or escalators conforming to Section 2118.3 shall be permitted when protected on every floor pierced by the opening with an approved automatic exhaust system or by other approved smoke control method as herein required to prevent the passage of products of combustion to the story above.

**Exception:** Supplemental stairways conforming to Section 816.8.

**631.3.1 Smoke control:** The approved automatic exhaust system may be a separate unit or integrated with an approved air handling system and shall be thermostatically controlled to operate simultaneously with the detection of fire.

**631.3.1.1 Capacity of exhaust system:** The exhaust system shall be of adequate capacity to create a controlled draft in the floor opening with sufficient velocity of flow over the entire area of the floor opening under normal conditions of window and door openings in the building.

**631.3.1.2 Operation of mechanical system:** The exhaust system herein required shall be so arranged as to automatically stop the operation of the

normal mechanical air handling and ventilating systems, and close the dampers of the return air duct connections, in the event of fire.

**631.3.2 Draftstop:** An approved draftstop shall be installed at each story of the floor opening. The draftstop shall enclose the perimeter of the opening and shall extend from the ceiling downward at least 18 inches (457 mm) on all sides. Automatic sprinklers shall be provided around the perimeter of the opening and within 2 feet (610 mm) of the draftstop. The distance between the sprinklers shall not exceed 6 feet (1829 mm) center to center.

# ARTICLE 7

## LIGHT, VENTILATION AND SOUND TRANSMISSION CONTROL

### SECTION 700.0 GENERAL

**700.1 Scope:** The provisions of this article shall govern the means of light, ventilation and sound transmission control required in all habitable and occupiable spaces and rooms. Every building and structure hereafter erected and every building room or space which is changed in use shall be constructed, arranged and equipped to conform to the requirements of this article.

**700.2 Conflicting laws:** The provisions in this article shall not be construed to nullify the provisions of any other law or ordinance regulating sound transmission control, yards, courts, or other spaces required for light or ventilation; but the provisions specifying the greater requirements shall control the construction.

**700.3 Buildings on same lot:** If more than one building is hereafter placed on a lot, or if a building is placed on the same lot with existing buildings, the several buildings may be treated as a single structure for the purpose of this article, provided equivalent uncovered lot area or other adequate sources of light and ventilation are furnished for all habitable and occupiable spaces and rooms.

### SECTION 701.0 PLANS AND SPECIFICATIONS

**701.1 General:** Plans for all buildings and structures other than buildings of Use Groups R-2 and R-3 which are designed for human occupancy shall designate the number of occupants to be accommodated in the various rooms and spaces, and when means of artificial lighting and ventilation are required, the application shall include sufficient details and description of the mechanical system to be installed as herein required or as specified in the mechanical code listed in Appendix A.

### SECTION 702.0 STANDARDS OF NATURAL LIGHT

**702.1 General:** In the application of the provisions of this article, the standard

of natural light for all habitable and occupiable rooms, unless otherwise specifically required by the provisions of Article 6 for special uses and occupancies, shall be based on 250 foot candles (2691 lux) of illumination on the vertical plane adjacent to the exterior of the light transmitting device in the enclosure wall and shall be adequate to provide an average illumination of 6 foot candles (64.58 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.

## SECTION 703.0 STANDARDS OF NATURAL VENTILATION

**703.1 General:** In the application of the provisions of this article, the standard of natural ventilation for all habitable and occupiable rooms shall be based on a volume of 400 cubic feet (11.20 $m^3$) of air per occupant with ventilating skylights, monitors, louvres, windows, transoms, doors or other alternate ventilating devices located in the exterior walls or on the roof of the building as provided in Sections 706.0 to 712.0 inclusive.

## SECTION 704.0 ARTIFICIAL LIGHT AND VENTILATION

**704.1 When required:** When natural light and ventilation do not meet the minimum requirements of this code, or when rooms, which by use or occupancy, involve the presence of dust, fumes, gases, vapors or other noxious or deleterious impurities that create a fire or health hazard, or when required by the provisions of Article 6 for special uses, the building shall be equipped with artificial light and mechanical means of ventilation under the conditions and of the minimum capacity prescribed herein and in the mechanical code listed in Appendix A.

**704.2 Operation of ventilating systems:** Where mechanical ventilation is accepted as an alternate for natural means of ventilation, or is required under the conditions herein prescribed, the system, equipment and distributing ducts shall be installed in accordance with the provisions of Article 15 and the mechanical code listed in Appendix A. Ventilating systems shall be kept in operation at all times during normal occupancy of the building or space so used.

**704.3 Habitable rooms:** The glazed areas of windows and exterior doors in habitable rooms and spaces need not be openable where a mechanical ventilation system is provided complying with the requirements of the mechanical code listed in Appendix A.

## SECTION 705.0 EXISTING BUILDINGS

**705.1 Unsafe conditions:** In all existing rooms or spaces in which the provisions for light and ventilation do not meet the requirements of this article and which, in the opinion of the building official, are dangerous to the health and safety of the occupants, the building official shall order the required repairs or installations to render the building or structure livable for the posted use and occupant load.

**705.2 Alterations:** A building shall not hereafter be altered or reararranged so as to reduce either the size of a room, or the fresh air supply, or the amount of available natural light to less than that required for buildings hereafter erected; or to create an additional room unless made to conform to the requirements of Section 706.0. The building official may permit new rooms to be of the same height as existing rooms in the same story unless in the building official's opinion greater provision of artificial light and ventilation is deemed necessary to insure healthful living conditions.

**705.3 Uncovered yard and court area:** A building shall not be hereafter enlarged nor shall the lot on which it is located be diminished so as to decrease the required courts or yards to less than that prescribed in this article for the lighting and ventilation of new buildings.

## SECTION 706.0 NATURAL LIGHTING AND VENTILATION OF ROOMS

**706.1 Window and skylights:** All habitable and occupiable rooms or spaces shall contain windows, skylights, monitors, glazed doors, transoms, glass block panels or other light transmitting media opening to the sky or on a public street, yard or court complying with the provisions of this article. The light transmitting properties and the area of the devices used shall be adequate to meet the minimum daylighting and ventilating requirements specified herein and in the approved rules.

**706.2 Window size:** Windows and exterior doors may be used as a natural means of light and ventilation, and when so used their aggregate glass area shall amount to not less than 8 percent of the floor area served, and with not less than one half of this required area available for unobstructed ventilation.

**706.3 Openings on yards and courts:** In order to be credited as a source of natural light or ventilation under the provisions of this article, a window or any other approved device shall open directly on a public street, alley or other open public space, or on a yard or court located on the same lot or plot complying with the requirements of Sections 713.0, 714.0 and 715.0.

**706.4 Alternate devices:** In place of the means for natural light and ventilation herein prescribed an alternate arrangement of windows, louvres or other methods and devices that will provide the equivalent minimum performance requirements shall be permitted when complying with the approved rules.

**706.5 Ceiling heights:** Habitable (spaces) rooms, other than kitchens, storage rooms and laundry rooms, shall have a ceiling height of not less than 7 feet 6 inches (2286 mm). Hallways, corridors, bathrooms, water closet rooms and kitchens shall have a ceiling height of not less than 7 feet (2134 mm) measured to the lowest projection from the ceiling.

A clear height from finished floor to ceiling or lowest projection of not less than 7 feet 6 inches (2286 mm) shall be provided in all exit access and occupiable rooms of structures of Use Group A, B or M.

If any room in a building has a sloping ceiling, the prescribed ceiling height for the room is required in only one half the area thereof. Any portion of the

room measuring less than 5 feet (1524 mm) from the finished floor to the finished ceiling shall not be included in any computation of the minimum area thereof.

If any room has a furred ceiling, the prescribed ceiling height is required in two thirds of the area thereof, but the height of the furred ceiling shall not be less than 7 feet (2134 mm).

**706.6 Floor area:** Every dwelling unit shall have at least one room which shall have not less than 150 square feet (13.95 $m^2$) of floor area. Other habitable rooms except kitchens shall have an area of not less than 70 square feet (6.51 $m^2$).

**706.7 Width:** A habitable room other than a kitchen shall not be less than 7 feet (2134 mm) in any dimension.

## SECTION 707.0 LIGHTING AND VENTING OF SPECIAL SPACES

**707.1 Alcove rooms:** When alcove rooms open without obstruction into adjoining rooms, the required window openings to the outer air shall be based on the combined floor area of the room and alcove. For the purpose of determining light and ventilation requirements, any room may be considered as a portion of an adjoining room when one half of the area of the common wall is open and unobstructed and provides an opening of at least 8 percent of the floor area of the interior room but not less than 25 square feet (2.33 $m^2$).

**707.2 Roof spaces:** Enclosed attics and enclosed rafter spaces formed where ceilings are applied direct to the underside of roof rafters, shall have cross ventilation for each separate space by ventilating openings protected against the entrance of rain and snow. The openings shall be covered with corrosion resistant mesh not less than ¼ inch (6 mm) nor more than ½ inch (13 mm) in any direction.

**707.2.1 Ventilating area:** The net free ventilating area shall be not less than $^1/_{150}$ of the area of the space ventilated, except that the area may be $^1/_{300}$ provided at least 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the space to be ventilated at least 3 feet (914 mm) above eave or cornice vents with the balance of the required ventilation provided by eave or cornice vents.

**707.3 Crawl spaces:** Crawl space areas in which the first floor construction does not bear directly on the ground shall be provided with a space under the first floor not less than 18 inches (457 mm) in depth. Crawl space areas, other than those used as an underfloor plenum, shall be ventilated by an approved mechanical means or by openings in exterior foundation walls. Openings shall be located as close to corners as practicable and shall provide cross ventilation on at least two approximately opposite sides. The openings shall be covered with corrosion resistant mesh not less than ¼ inch (6 mm) nor more than ½ inch (13 mm) in any direction.

**707.3.1 Opening size:** Openings shall have a net area of not less than 1 square foot (0.093 $m^2$) for each 150 square feet (13.95 $m^2$) of foundation space. Where

an approved vapor barrier is installed over the ground surface, the required net area of openings may be reduced to 10 percent of the above and vents may have manually operable louvers.

## SECTION 708.0 BUSINESS AND WORK ROOMS

**708.1 General:** Offices, stores, mercantile and salesrooms, restaurants, markets, bakeries, hotel and restaurant kitchens, factories, workshops, machinery and boiler rooms shall be provided with the required windows specified in Section 706.0 for habitable and occupiable rooms, opening directly on a street or required yard or court; or such rooms shall be equipped with an approved system of mechanical ventilation complying with Section 704.0 and the mechanical code listed in Appendix A.

## SECTION 709.0 ASSEMBLY ROOMS

**709.1 General:** In addition to the requirements of Article 6 for special uses, the required windows or other approved devices for natural ventilation shall be distributed as equally as practicable on at least two sides of the room; and artificial lighting shall comply with the requirements of this article and Article 20.

## SECTION 710.0 ROOMS OF INSTITUTIONAL BUILDINGS

**710.1 General:** In buildings of Use Group I, every habitable and occupiable room shall be provided with light and ventilation as herein provided, except that in buildings of Use Group I-1 indirect openings to the street or court may be permitted through intermediate corridors or by other approved means of light and ventilation.

## SECTION 711.0 BATH AND TOILET ROOMS

**711.1 General:** Every bath, toilet and laundry room shall be lighted and ventilated by one of the methods prescribed in this section.

**711.2 Exterior windows:** Windows opening to the outer air as provided in Section 706.2, but not less than 3 square feet (0.28 $m^2$) in area with one half of that area available for unobstructed ventilation.

**711.3 Vent shaft windows:** Windows as provided in Section 706.0 but not less than 3 square feet (0.28 $m^2$) in area, opening on a vent shaft with a cross sectional area of 1 square foot (0.093 $m^2$) for every foot (305 mm) in height, but not less than 9 square feet (0.84 $m^2$) in area, open to the outer air at top or constructed with equivalent side louvre openings.

**711.4 Vents and ducts:** Individual vents or ducts constructed of approved noncombustible materials complying with Section 1509.0 with a minimum cross sectional area of ½ square foot (0.05 $m^2$) and ⅓ additional square foot (0.03 $m^2$) for each additional water closet or urinal above two in number. Such ducts shall be of adequate height and so located as to insure a minimum

supply of 2 cubic feet of fresh air per square foot (0.60 $m^3/m^2$) of room area.

**711.5 Skylights:** A skylight of approved noncombustible construction complying with Section 1426.3, and not less than 3 square feet (0.28 $m^2$) in area of ventilating opening.

**711.6 Mechanical ventilating systems:** Any system of mechanical or gravity ventilation capable of producing a change of air every 12 minutes in private bath, laundry and toilet rooms. Public bath, laundry and toilet room mechanical ventilation systems shall comply with the mechanical code listed in Appendix A.

**711.6.1 Recirculation:** Recirculation of air supplied to bath, toilet and laundry rooms shall not be permitted.

**711.7 Artificial lighting:** Illumination shall be provided in all bath and toilet rooms to afford an average intensity of 3 foot candles (32.29 lux) measured at a level 30 inches (762 mm) above the floor.

## SECTION 712.0 STAIRWAYS AND EXITS

**712.1 Use Groups R and I:** Stairways and exits in buildings of Use Groups R and I shall comply with Sections 712.1.1 through 712.1.4.

**712.1.1 Windows:** In all buildings of Use Groups R-2 and I-2, required interior stairways shall be provided with windows to the outer air having a glass area of not less than 10 square feet (0.93 $m^2$) which open on a required street, alley, yard or court, or with the equivalent source of light for each story through which the stairway passes; and such additional artificial lighting to provide the equivalent illumination at all times that the building is occupied as specified in Section 824.0 and Article 20.

**712.1.2 Skylights:** When the building is not more than three stories in height, a ventilating skylight of the required area may be used in lieu of windows.

**712.1.3 Hallways:** Hallways shall have at least one window opening directly on a street or on a required yard or court in each story, located so that light penetrates the full length of the hallway, with additional windows for each change of direction of the hallway; or the equivalent artificial lighting shall be provided. Every recess or return with a depth or length which exceeds twice the width of the hall, and every corridor separately shut off by a door, shall be treated as a separate hall in applying the provisions of this section.

**712.1.4 Mechanical ventilating systems:** All exits and corridors in buildings of Use Groups R-2 and I shall be provided with mechanical ventilation as required by the mechanical code listed in Appendix A.

**712.2 Business and assembly buildings:** All stairway enclosures shall conform to the requirements of Articles 8 and 14 for construction and shall have the means of artificial illumination to meet the requirements of this article and Article 20.

**712.3 Intensity of illumination:** In all required exits, except in buildings of Use

Group R-3, and wherever natural lighting is not available, artificial lighting shall be provided to furnish not less than 3 foot candles (32.29 lux) at the floor level of all required exits.

## SECTION 713.0 COURTS

**713.1 General:** All courts required to serve rooms for light and ventilation purposes shall comply with the requirements of this section.

**713.2 Minimum width:** Every such court shall have a minimum width of 3 inches (76 mm) for each foot of height or fraction thereof, but not less than 5 feet (1524 mm) for outer courts and twice these values for inner courts.

**713.2.1 Irregular court width:** In the case of irregular or gore shaped courts, the required minimum width of a court may be deemed to be the average width, provided that such a court shall not be less than 5 feet (1524 mm) at any point.

**713.3 Area of court:** The cross sectional area of a required court shall be not less than one and one half times the square of its width; nor shall the length of any court be more than twice its width.

**713.4 Access to court:** A door or other means of access shall be provided at the bottom of every court that is not otherwise conveniently accessible for purposes of cleaning.

**713.5 Air intakes:** Every court serving one or more habitable rooms that does not open for its full height on one or more sides to a street or legal yard shall be connected at or near the bottom with a street or yard by a horizontal intake or passage of fireresistive construction. Such intake or passage shall have a cross sectional area of not less than 21 square feet (1.95 $m^2$) and shall remain fully open at both ends and unobstructed for its full size and length, except that grilles of noncombustible construction complying with the approved rules may be permitted at the ends of the intake.

**713.5.1 Fireresistance rating:** The walls, floors and ceilings of such intakes or passages shall have a fireresistance rating of not less than two hours in buildings of Types 1, 2 or 3 construction and not less than one hour in Type 4 construction.

**713.6 Court walls:** When, in the opinion of the building official, windows facing on courts do not receive adequate direct light by reason of peculiar arrangement or orientation, the building official may require the walls to be constructed of light colored masonry, or to be painted and maintained a light color to furnish additional reflected light.

**713.7 Court drainage:** The bottom of every court shall be properly graded and drained to a public sewer or other approved disposal system complying with the plumbing code listed in Appendix A; and shall be paved with concrete or other nonabsorbent material when required by the building official.

## SECTION 714.0 REAR YARDS

**714.1 Use Groups R and I:** At the rear of every building hereafter erected to be occupied as Use Group R-2, R-3 or I, there shall be maintained a yard of the minimum dimensions herein prescribed. When such yard serves as a required light and ventilation court, its minimum dimensions shall be those required for a court in this article.

**714.1.1 Depth of yards:** The depth of a required yard between the extreme rear of the building and the rear lot line shall be not less than 15 feet (4572 mm) at any point for a height of 35 feet (10668 mm), and shall increase 4 inches (102 mm) in depth for each additional foot (305 mm) of height above that limit. For a corner lot, the minimum depth shall be not less than 10 feet (3048 mm). When the lot is less than 65 feet (19812 mm) in depth, the required yard may be diminished 6 inches (152 mm) in depth for each foot (305 mm) less than 65 feet (19812 mm).

**714.2 Other use groups:** In buildings of other than Use Groups R-2, R-3 or I, rear yards shall be provided to serve all habitable and occupiable rooms requiring light and ventilation from such source. The lowest level of such yards shall begin at the sill level of the second story windows, with a depth of not less than 10 feet (3048 mm) for a height of 35 feet (10668 mm) and shall increase 3 inches (76 mm) for each additional foot (305 mm) of height above that level.

## SECTION 715.0 OBSTRUCTION OF COURTS AND YARDS

**715.1 Permissible projections:** Every required court and yard shall remain unobstructed for its required area and full height, except for the projections permitted in Section 511.0. In Use Groups R and I, clothes poles, arbors, garden trellises and other such accessories shall not be prohibited in the open spaces at ground level.

**715.2 Motor vehicle parking:** When approved by the building official, required court and yard areas may be used for automobile parking spaces or private garages not exceeding one story in height when accessory to and only for the use of the occupants of a Use Group R building provided required windows for light and ventilation are not obstructed thereby.

## SECTION 716.0 FIRE EMERGENCY VENTILATING SYSTEM

**716.1 Where required:** Fire emergency ventilating systems shall be provided in buildings of the use groups described in Sections 716.1.1 and 716.1.2.

**716.1.1 Use Groups I, R-1 and R-2:** In the corridors of buildings of Use Groups I, R-1 and R-2 which exceed 3 stories or 40 feet (12192 mm) in height, and exceed 10,000 square feet (930 $m^2$) in floor area, and are occupied by more than 50 persons above the first floor or have more than 25 sleeping rooms above the first floor.

**716.1.2 Use Group F:** In the corridors of all fully enclosed buildings of Use

Group F without provision of exterior openings for ventilation purposes.

**716.2 Systems:** In all buildings and structures herein required to have fire emergency ventilating systems, the corridors shall be constructed with vertical fire vent stacks and lateral fire vent ducts as herein provided, or windows to the outer air, or mechanical ventilating or exhaust systems, or other equivalent approved means for dissipating smoke, heated air and toxic gases directly to the outer air in the event of fire.

**716.3 Vent stacks and vent ducts:** Where vertical fire vent stacks and lateral fire vent ducts are used, they shall be constructed in accordance with Sections 716.3.1 through 716.3.3.

**716.3.1 Fire vent ducts:** When the corridors and exits are not ventilated by windows opening directly to the outer air as required in Section 712.0, a system of collecting fire ducts shall be provided in each story of aggregate size to remove the smoke, hot air and noxious fumes or gases in event of fire. Each duct shall be not less than 1 square foot (0.093 $m^2$) in area located in the corridors, with screened openings complying with the approved rules, constructed as provided for hot air ducts in Section 1509.0.

**716.3.1.1 Thermostatic operation:** When not connected to a vent stack, the inlet openings on each story shall be controlled by automatic heat operated devices as required in Section 1410.3 and in accordance with the approved rules.

**716.3.2 Fire vent stacks:** When the fire ducts do not discharge directly to the outer air in each story, one or more fire vent stacks of adequate capacity shall be installed to accommodate the discharge from the fire duct system in any one floor or enclosed fire area, but an individual stack shall not be less than 4 square feet (0.37 $m^2$) in area, and all stacks shall terminate in an approved automatic cowl or ventilator outlet above the roof.

**716.3.2.1 Location of stacks:** The vent stack shall be located in as central a position as practicable with respect to the floor area vented thereby, preferably in the vicinity of vertical shafts, and shall extend continuously to the roof.

**716.3.2.2 Vent control of stacks:** The vent control of the vertical stacks shall consist of approved noncombustible dampers, shutters, or glazed metal sash designed to open outwardly, located not less than 20 feet (6096 mm) distant from window openings or exit doors in adjoining walls, and shall be equipped with a thermostatic unit arranged to open at a predetermined rate of temperature rise in accordance with the approved rules. Auxiliary mechanical means for manual operation of all vent controls shall be provided in an accessible location designated by the building official.

**716.3.2.3 Stack construction:** The enclosure shall be constructed to be vapor and smoke tight with walls of not less than two hour fireresistance rating, and without openings other than the fire duct inlets and the top automatic ventilator outlet.

**716.3.3 Mechanical exhaust systems:** When mechanical exhaust is required to operate the emergency ventilating system either in horizontal ducts or vertical vent stacks, the installation shall be thermostatically controlled and installed in accordance with the provisions of the mechanical code listed in Appendix A and the approved rules.

## SECTION 717.0 WINDOW CLEANING SAFEGUARDS

**717.1 General:** All buildings and structures over 50 feet (15240 mm) or four stories in height, in which the windows are cleaned from the outside, shall be provided with anchors or other approved safety devices for all window openings. Such anchors, belt terminals or other devices shall be of approved design, and constructed of corrosion resistive materials securely attached to the window frames or anchored in the enclosure walls of the building. Cast iron or cast bronze anchors shall be prohibited.

## SECTION 718.0 SOUND TRANSMISSION CONTROL IN RESIDENTIAL BUILDINGS

**718.1 Scope:** This section shall apply to all common interior walls, partitions and floor/ceiling assemblies between adjacent dwelling units or between a dwelling unit and adjacent public areas such as halls, corridors, stairs or service areas in all buildings of Use Group R.

**718.2 Airborne noise:** Walls, partitions and floor/ceiling assemblies separating dwelling units from each other or from public or service areas shall have a sound transmission class (STC) of not less than 45 for airborne noise when tested in accordance with ASTM E90 listed in Appendix A. This requirement shall not apply to dwelling unit entrance doors, but such doors shall be tight fitting to the frame and sill.

**718.3 Structure borne sound:** Floor/ceiling assemblies between dwelling units and between a dwelling unit and a public or service area within the structure shall have an impact insulation class (IIC) rating of not less than 45 when tested in accordance with ASTM E492 listed in Appendix A.

**718.4 Tested assemblies:** Assemblies of building construction listed in GA 600, NCMA TEK 69A and BIA TN 5A listed in Appendix A may be accepted as having the STC and IIC ratings specified therein for determining compliance with the requirements of this section.

# ARTICLE 8

## MEANS OF EGRESS

### SECTION 800.0 GENERAL

**800.1 Scope:** The provisions of this article shall control the design, construction and arrangement of building elements required to provide a reasonably safe means of egress from all buildings and structures hereafter erected, and from all buildings hereafter altered to a new occupant load, or manner of use, or inherent fire hazard. Existing buildings and uses shall be controlled by the provisions of Section 804.0.

**800.2 Modification of egress requirements:** When strict compliance with the provisions of this code is not practical, the building official may accept alternate means of egress which will accomplish the same purpose, by the procedure established in Article 1 for modification of this code, or by adoption of approved rules. Existing buildings shall not be occupied during repairs or alterations unless all existing means of egress and any existing fire protection are continuously maintained, or in lieu thereof, other measures are taken which provide equivalent safety.

**800.3 Minimum requirements:** It shall be unlawful to alter any building or structure in any manner that will reduce the number of exits or the capacity of exits below the requirements of this code for new buildings of the proposed use and occupancy.

### SECTION 801.0 PLANS AND SPECIFICATIONS

**801.1 Arrangement of egress:** The plans shall show in sufficient detail the location, construction, size and character of all exits together with the arrangement of aisles, corridors, passageways and hallways leading thereto in compliance with the provisions of this code.

**801.2 Number of occupants:** In other than buildings of Use Groups R-2 and R-3, the plans and the application for a permit shall designate the number of occupants to be accommodated on every floor, and in all rooms and spaces when required by the building official. When not otherwise specified, the minimum number of occupants to be accommodated by the exits shall be determined by the occupant load prescribed in Section 806.0. The posted occupant load of the building shall be limited to that number.

## SECTION 802.0 USE AND OCCUPANCY REQUIREMENTS

**802.1 New buildings:** Every building and structure and part thereof hereafter erected shall have the prescribed number of exits of one or more of the approved types defined in this article. Exits, in combination with the exit access and exit discharge, shall provide safe and continuous means of egress to a street or to an open space with direct access to a street.

**802.2 Mixed use groups:** In buildings classified in more than one use group, each fire area shall be considered separately in determining the required number, capacity, size and construction of all exits.

**802.3 Multiple tenants:** When more than one tenant occupies any one floor of a building or structure, each tenant shall be provided with direct access to approved exits.

## SECTION 803.0 AIR CONDITIONED BUILDINGS

**803.1 Location of stairways:** In all buildings, without exterior window openings in all stories, that are artifically ventilated and air conditioned as provided in Section 704.0, the stairway element of required exits shall be located as to be accessible to the fire department either through the access openings specified in Section 1406.4 or as otherwise approved in at least alternate stories of the building.

**803.2 Exhaust ducts:** Exhaust ducts or vents of air conditioning systems shall not discharge into stairway or elevator enclosures. Nor shall corridors serving as exit access be used as the return exhaust from air conditioned spaces through louvres or other devices in the doors or partitions enclosing such air conditioned spaces, unless such passageways are equipped with approved smoke detectors to automatically stop the supply and exhaust fans and close the louvres, and such use is approved by the building official.

## SECTION 804.0 EXISTING BUILDINGS

**804.1 Owner responsibility:** The owner or lessee of every existing building and structure shall be responsible for the safety of all persons in, or occupying, such premises with respect to the adequacy of means of egress therefrom.

**804.2 Unsafe means of egress:** In any existing building or structure, not provided with exit facilities as herein prescribed for new buildings and in which the exits are deemed inadequate for safety by the building official, such additional provision shall be made for safe means of egress as the building official shall order.

**804.2.1 Appeal from exit order:** Within seven days after the service of the exit order of the building official, the owner may file a written appeal therefrom, and the building official shall appoint a board of survey as required in Section 123.0 to make a final determination.

## SECTION 805.0 MAINTENANCE OF EXITS

**805.1 Obstructions:** It shall be unlawful to obstruct, or reduce in any manner, the clear width of any doorway, hallway, passageway or other means of egress required by the provisions of this code.

**805.2 Maintenance:** All exterior stairways and fire escapes shall be kept free of snow and ice. They shall be properly painted before and after erection; and shall be scraped and painted as often as necessary to maintain them in safe condition.

## SECTION 806.0 OCCUPANT LOAD

**806.1 Design occupant load:** In determining required facilities, the number of occupants for whom exit facilities shall be provided shall be established by the largest number computed in accordance with each of Sections 806.1.1 through 806.1.3.

**806.1.1 Actual number:** The actual number of occupants for whom each occupied space, floor, or building, as the case may be, is designed for.

**806.1.2 Number by Table 806:** The number of occupants computed at the rate of one occupant per unit of area as prescribed in Table 806.

**806.1.3 Number by combination:** The number of occupants of any space as computed in Sections 806.1.1 or 806.1.2 plus the number of occupants similarly computed for all spaces that discharge through the space in order to gain access to an exit.

**806.1.4 Increased occupant load:** The occupant load permitted in any building or portion thereof may be increased from that number established for the given use by Table 806 when all other requirements of the code are also met based on such modified number. The building official may require an approved aisle, seating, or fixed equipment diagram to substantiate any increase in occupant load and may require that such diagram be posted.

**806.1.5 Fixed seats:** The occupant load for an assembly area having fixed seats shall be determined by the number of fixed seats installed.

**806.2 Mezzanine levels:** The occupant load of a mezzanine level discharging through a floor below shall be added to that floor's occupant load, and the capacity of the exits shall be designed for the total occupant load thus established.

**806.3 Roofs:** Roof areas occupied as roof gardens or for assembly, storage or other purposes shall be provided with exit facilities to accommodate the required occupant load, but there shall not be less than two approved means of egress from roof areas of Use Group A.

**806.4 Special or unlisted occupancies:** Where data regarding the square feet per person for an occupancy is not listed in Table 806, the occupant load shall be established by the architect or engineer, subject to the approval of the building official.

**806.5 Conflicts:** When there are special requirements for specific occupancies and uses which differ from general requirements herein prescribed, such special provisions shall take precedence.

**806.6 Nonsimultaneous occupancy:** The occupant load of toilets, locker rooms, meeting rooms, storage rooms, employee cafeterias, and similar rooms or spaces that are not occupied at the same time as other rooms or spaces on the same floor of a building, may be omitted from the occupant load calculation of the floor on which they are located, to the extent that such spaces only serve occupied rooms on the same floor.

**806.7 Modifications:** The modifications indicated in Sections 806.7.1 and 806.7.2 may be used in determining the occupant load.

**806.7.1 Approved alternative basis:** When the actual occupant load of any space will be significantly different than that determined by Table 806, the building official may establish an alternative basis for the determination of the occupant load. The space occupied by permanent fixtures or displays may serve to reduce the occupant load.

**Table 806**
**MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT**

| Use | Floor area in square feet per occupant |
|---|---|
| Assembly without fixed seats | |
| Concentrated (chairs only—not fixed) | 7 net |
| Unconcentrated (tables and chairs) | 15 net |
| Standing space | 3 net |
| Assembly with fixed seats | See Section 806.1.5 |
| Business areas | 100 gross |
| Court rooms—other than fixed seating areas | 40 net |
| Educational | |
| Classroom area | 20 net |
| Shops and other vocational room areas | 50 net |
| Industrial areas | 200 gross |
| Institutional areas | |
| Sleeping areas | 80 gross |
| Inpatient treatment areas | 240 gross |
| Outpatient areas | 100 gross |
| Library | |
| Reading rooms | 50 net |
| Stack area | 100 gross |
| Mercantile, basement and grade floor areas | 30 gross |
| Areas on other floors | 60 gross |
| Storage, shipping areas | 100 gross |
| Parking garages | 200 gross |
| Residential | 200 gross |
| Storage areas, mechanical equipment room | 300 gross |
| Bowling alleys, allow 5 persons for each alley including 15 feet of runway, and for additional areas | 7 net |

**Note a.** 1 foot = 304.8 mm; 1 square foot = 0.093 $m^2$.

**806.7.2 Change in use or occupancy:** When a building is altered or changed in occupancy or use so as to require enlarged exit facilities, the building official may authorize the alteration or change in occupancy or use without an enlargement of exit facilities, provided the occupant load is limited to that accommodated by the existing exit facilities as determined by the provisions of this code, and the building or space is posted as required in Section 122.0.

## SECTION 807.0 TYPES AND LOCATION OF MEANS OF EGRESS

**807.1 General:** All approved exits, including doorways, passageways, corridors, interior stairways, exterior stairways, escalators, smokeproof enclosures, ramps, horizontal exits, bridges, balconies, fire escapes and combinations thereof shall be arranged and constructed as provided in this code.

**807.2 Arrangement:** All required exits shall be so located as to be discernable and accessible with unobstructed access thereto and so arranged as to lead directly to the street or to an area of refuge with supplemental means of egress that will not be obstructed or impaired by fire, smoke or other cause.

**807.2.1 Exit discharge:** All exits shall discharge directly at a public way or at a yard, court or open space of the required width and size to provide all occupants with a safe access to a public way.

**807.2.2 Egress through adjoining spaces:** Egress from a room or space may open into an adjoining or intervening room or area, provided such adjoining room is accessory to the area served, is not of a higher hazard than the room or space from which egress is made and provides a direct means of egress to an exit. An exit access shall not pass through a kitchen, storeroom, restroom, closet or similar space as the only means of egress. An exit access shall not pass through a room subject to locking.

**Table 807**
**LENGTH OF EXIT ACCESS TRAVEL [In feet[b]] [a]**

| Use group | Without fire suppression system | With fire suppression system |
|---|---|---|
| A | 150 | 200 |
| B | 200 | 300 |
| F | 200 | 300 |
| H | — | 75 |
| I | 100 | 200 |
| M | 100 | 150 |
| R | 100 | 150 |
| S-1 | 200 | 300 |
| S-2 | 300 | 400 |

**Note a.** See the following sections for travel distance requirements for special uses.
Section 507.1.3 The maximum length of exit access travel in unlimited area buildings shall be 400 feet.
Section 629.3.1.4.6 The exit access travel distance set forth in Table 807 may be increased to 300 feet in high rise buildings under the automatic fire suppression system alternatives.
Section 630.4.1 The maximum length of exit access travel from any point within a covered mall to an approved exit shall not exceed 200 feet.
Section 809.5 The maximum distance from any point on a parking tier to an exit in open parking structures shall be 300 feet.
**Note b.** 1 foot = 304.8 mm.

**807.3 Remote location:** Whenever more than one exit is required from any room, space or floor of a building, they shall be placed as remote from each other as practicable, and shall be arranged and constructed to provide direct access in separate directions from any point in the area served so as to minimize the possibility that both may be blocked by any one fire or other emergency condition.

**807.4 Length of travel:** Except as modified by provisions of Section 809.3 for buildings with one exit, all exits shall be so located that the maximum length of exit access travel, measured from the most remote point to an approved exit along the natural and unobstructed line of travel, shall not exceed the distances given in Table 807; except where the area is subdivided into rooms or compartments, and the egress travel in the room or compartment is not greater than 50 feet (15240 mm) or 100 feet (30480 mm) in use groups equipped with an automatic fire suppression system, the distance shall be measured from the exit access entrance to the nearest exit.

## SECTION 808.0 CAPACITY OF EXITS

**808.1 General:** The capacity of means of egress for a floor, balcony, tier or other occupied space shall be sufficient for the occupant load thereof.

**808.2 Unit of egress width:** The unit of egress width for all approved types of means of egress parts and facilities shall be 22 inches (559 mm) with a credit of one half unit for each 12 inches (305 mm) width in addition to one or more 22 inch (559 mm) units. Fractions of a unit of width less than 12 inches (305 mm) shall not be credited.

**Table 808**
**CAPACITY PER UNIT EGRESS WIDTH**

| | Without fire suppression system Number of occupants | | With fire suppression system Number of occupants | |
|---|---|---|---|---|
| Use group | Stairways | Doors, ramps and corridors | Stairways | Doors, ramps and corridors |
| A[a] | 75 | 100 | 113 | 150 |
| B | 60 | 100 | 90 | 150 |
| F | 60 | 100 | 90 | 150 |
| H | — | — | 60 | 100 |
| I-1 | 60 | 100 | 90 | 150 |
| I-2 | 22 | 30 | 33 | 45 |
| M | 60 | 100 | 90 | 150 |
| R | 75 | 100 | 113 | 150 |
| S | 60 | 100 | 90 | 150 |

**Note a.** The main exit of a bowling alley shall be of sufficient capacity to accommodate 50 percent of the total occupant load, without regard to the number of aisles which it serves (see Section 808.3.1).

**808.3 Design allowance for use groups:** Except as may be specifically modified in Article 6, the design capacity per unit of egress width shall be computed in accordance with Table 808 for the specified use groups.

**808.3.1 Main exit of bowling alleys:** The main exit of a bowling alley shall be of sufficient capacity to accommodate 50 percent of the total occupant load without regard to the number of aisles which it serves.

**808.4 Exit design per floor:** Where exits serve more than one floor, only the occupant load of each floor considered individually need be used in computing the capacity of the exits at that floor, provided that the exit capacity shall not decrease in the direction of egress travel.

**808.5 Egress convergence:** When means of egress from floors above and below converge at an intermediate floor, the capacity of the means of egress from the point of convergence shall not be less than the sum of the two.

## SECTION 809.0 NUMBER OF EXITS

**809.1 General:** The following general requirements apply to buildings of all use groups. More restrictive requirements that may be provided in Article 6 for special uses and occupancies shall take precedence over the general provisions of this section.

**809.2 Minimum number:** Every floor area shall be provided the minimum number of approved independent exits as required by Table 809.2 based on the occupant load, except as modified in Section 809.3.

**Table 809.2**
**MINIMUM NUMBER OF EXITS FOR OCCUPANT LOAD**

| Occupant load | Minimum number of exits |
|---|---|
| 500 or less | 2 |
| 501 - 1000 | 3 |
| over 1000 | 4 |

**809.3 Buildings with one exit:** Only one exit shall be required in buildings of Use Group R-3 and in buildings of the use groups and characteristics specified in Table 809.3; and in the first story of buildings with an occupant load not exceeding 50 persons and an exit access travel distance not exceeding 50 feet

**Table 809.3**
**BUILDINGS WITH ONE EXIT[b]**

| Use group | Max. height above grade[a] | Size | Max. exit access travel distance | Min. fire-resistance rating of exit enclosure | Min. fire-resistance rating of opening protection |
|---|---|---|---|---|---|
| R-2 | 2 stories | 4 dwelling units per floor | 50 ft. | 1 hour | 1 hour |
| B and S-2 | 2 stories | 3500 sq. ft. per floor | 75 ft. | 1 hour | 1 hour |

**Note a.** Areas complying with definition for basements shall not be counted as a story (see Section 809.3).
**Note b.** Open parking structures shall have the number of exits prescribed in Section 809.5.
**Note c.** 1 foot = 304.8 mm; 1 square foot = 0.093 $m^2$.

(15240 mm) on the first story. Areas complying with the definition for basements shall not be counted as a story for the purpose of this section.

**809.4 Emergency escape:** Every sleeping room below the fourth story in buildings of Use Group R shall have at least one operable window or exterior door approved for emergency egress or rescue. The units must be operable from the inside opening without the use of separate tools. Where windows are provided as a means of egress or rescue, they shall have a sill height not more than 44 inches (1118 mm) above the floor. All egress or rescue windows from sleeping rooms must have a minimum net clear opening of 5.7 square feet (0.53 $m^2$). The minimum net clear opening height dimension shall be 24 inches (610 mm). The minimum net clear opening width dimension shall be 20 inches (508 mm).

Bars, grilles or screens placed over emergency escape windows shall be releasable or removable from the inside without the use of a key, tool or excessive force.

**Exceptions**

1. Grade floor windows may have a minimum net clear opening of 5 square feet (0.47 $m^2$).
2. In buildings of Use Group R-3, where the sleeping room is provided with a door to a corridor having access to two remote exits in opposite directions, then an outside window or an exterior door for emergency escape from each such sleeping room is not required.

**809.5 Open parking structures:** Parking structures shall have not less than two exits from each parking tier, except that where vehicles are mechanically parked, only one exit need be provided. The maximum distance from any point on a parking tier to an exit at that tier shall not exceed 300 feet (91440 mm). Unenclosed vehicle ramps may be considered as required exits if pedestrian facilities are provided. Interior exit stairways need not be enclosed.

## SECTION 810.0 EXIT ACCESS PASSAGEWAYS AND CORRIDORS

**810.1 Access passageway:** Direct exit access shall be provided to required exits through continuous passageways, aisles or corridors, conveniently accessible to all occupants and maintained free of obstruction.

**810.1.1 Turnstiles and gates:** Access through turnstiles, gates, rails or similar devices shall not be permitted unless such a device is equipped to readily swing in the direction of exit travel under a total pressure of not more than 15 pounds (73.23 N).

**810.1.2 Restrictions:** The required width of passageways, aisles or corridors shall be maintained free of projections and restrictions; except doors opening into such spaces may reduce the clear width to not less than one half the required width. When fully open the door shall not project more than 7 inches (178 mm) into the required width.

**810.2 Dead ends:** Exit access passageways and corridors in all stories which serve more than one exit shall provide direct connection to such exits in

opposite directions from any point in the passageway or corridor, insofar as practicable. The length of a dead end corridor shall not be more than 20 feet (6096 mm).

**810.3 Width:** The width of passageways, aisles and corridors shall be that width required for the capacity as determined by Section 808.0 but not less than 44 inches (1118 mm).

**Exceptions**

1. In buildings of Use Group I used for the movement of beds, the minimum width shall be 96 inches (2438 mm).
2. In Use Group A-4 with more than 100 occupants, the minimum width shall be 72 inches (1829 mm).
3. The minimum width may be reduced to 36 inches (914 mm) when servicing an occupant load of 50 or less.
4. Aisles conforming to Section 826.0.

**810.4 Enclosures:** All corridors serving as exit access shall be enclosed in fire separation walls having a fireresistance rating of at least one hour when serving an occupant load greater than 30.

***810.4.1 Automatic fire suppression system alternatives:** When an approved automatic fire suppression system is installed and is supervised in accordance with Section 1718.1, Parts 1, 2 or 3, and has its water flow alarm device connected to an approved central station system, proprietary system or remote station system of the jurisdiction, a fireresistance rating is not required in Use Groups A-4, B, F, M, and S. In Use Groups R-1 and R-2, the corridor enclosure walls shall have a fireresistance rating of not less than one half hour. Corridor walls in Use Groups R-1 and R-2 shall be constructed tight to the underside of the ceiling directly above.

**810.4.2 Opening protectives:** All door assemblies from rooms opening onto a corridor required to be of fireresistance rated construction shall be self closing or automatic closing by smoke detection, with a 20 minute fireresistance rating when tested in accordance with ASTM E152 listed in Appendix A without the hose stream and labeled and listed by an approved agency. All door assemblies from rooms opening onto a corridor, required by Table 401 to be of two hour fireresistance rated construction, shall be one and one half hour fire doors.

## SECTION 811.0 GRADE PASSAGEWAYS USED AS AN EXIT ELEMENT

**811.1 Passageways:** Every required interior and exterior exit element which does not adjoin a public way shall be directly connected to the public way or to an open court leading to the public way by an enclosed grade passageway or other unobstructed exit element constructed as provided in this section.

**811.2 Vestibule:** An exit may discharge into an interior vestibule which is used

*KY. BLDG. CODE INTERP. NO. 3 Door closures are required on classroom doors opening into rated corridors in newly constructed and remodeled educational facilities. This is a reversal of our policy used prior to the adoption of the *Kentucky Building Code* but is definitely the intent of the newly adopted code.

for ingress and egress only and complies with Sections 811.2.1 and 811.2.2.

**811.2.1 Depth and width:** The vestibule depth from the exterior of the building is not greater than 10 feet (3048 mm) and the width is not greater than 20 feet (6096 mm).

**811.2.2 Separation:** The vestibule is separated from the remainder of the level of discharge by self closing doors and the equivalent of one quarter inch thick wired glass in steel frames.

**811.3 Lobby:** An exit may discharge into an interior lobby which shall be provided with an automatic fire suppression system, and any other portion of the floor with access to the lobby shall be provided with an automatic fire suppression system or shall be separated therefrom in accordance with the requirements for the enclosure of exits.

**811.4 Width and height:** The effective width of the passageway shall be not less than three quarters of the aggregate width of all required exit stairways leading thereto and all required exit doorways opening into the passageway. Such passageway shall have a minimum width of 44 inches (1118 mm) and a minimum clear ceiling height of 8 feet (2438 mm).

**811.5 Maximum stairway limitations:** Not more than 50 percent of the required stairways shall discharge through the same passageway.

## SECTION 812.0 MEANS OF EGRESS DOORWAYS

**812.1 General:** The requirements of this section shall apply to all doorways serving as a component or element of a means of egress; except as provided in Sections 816.6, 818.6.1, 818.6.2, 818.7.1 and 819.3.

**812.2 Number of doorways:** Every room or tenant space with an occupant load of more than 50 or which exceeds 2,000 square feet (186 $m^2$) in area shall have at least two egress doorways leading from the room or tenant space to an exit or corridor. All doors shall swing in the direction of egress travel when serving an occupant load of 50 or more or a high hazard occupancy.

**Exceptions**

1. Use Group R-3.
2. Boiler, incinerator and furnace rooms shall be provided two egress doorways when the area exceeds 500 square feet (46.50 $m^2$) and individual fuel fired equipment exceeds 400,000 Btuh (117.240 W) input capacity. Doorways must be separated by horizontal distance equal to one half of the diagonal dimension of the room. When two doorways are required by this exception, a fixed ladder access out of the room may be provided for one doorway.
3. Institutional use areas with more than six beds shall be provided two egress doorways.

**812.2.1 Entrance and egress doorways:** Where separate doors are provided for entrance and egress use, the entrance door shall be clearly marked *Entrance Only* in letters not less than 6 inches (152 mm) in height and legible from both inside and outside.

**812.3 Size of doors:** The minimum width of single door openings shall provide a clear width of not less than 32 inches (813 mm) except that for door openings within a dwelling unit the clear width shall be not less than 28 inches (711 mm). The maximum width shall be 48 inches nominal. Means of egress doors in Use Group I used for the movement of beds shall be at least 44 inches (1118 mm) wide. When the doorway is subdivided into two or more separate openings, the minimum clear width of one opening shall be not less than 32 inches (813 mm) and each opening shall be computed separately in determining the number of required units of egress width. A door 40 inches (1016 mm) in width shall be deemed the equivalent of two full units of egress width. The height of doors shall not be less than 6⅔ feet (2032 mm), except that within a dwelling unit the height of the doors shall be not less than 6½ feet (1981 mm).

**812.4 Location of doors:** The required doorways opening from a room or space within a building and leading to an exit access shall be located as remote as practicable from each other. The distance of exit access travel from any point in a room or space to a required exit door shall not exceed the limitations of Section 807.4.

**812.5 Door hardware:** Every egress door serving an area having an occupant load of more than ten or serving a high hazard occupancy shall be of the side hinged swinging type.

**812.5.1 Locks and latches:** All egress doors shall be readily openable from the side from which egress is to be made without the use of a key or special knowledge or effort, except for special institutional uses as indicated in Section 812.5.5. Except for dwelling units, draw bolts, hooks and other similar devices shall be prohibited on all egress doors.

**812.5.2 Flush and surface bolts:** Manually operated or surface mounted flush bolts and surface bolts are prohibited. When egress doors are used in pairs and approved automatic flush bolts are used, the door leafs having the automatic flush bolts shall not have a door knob or surface mounted hardware. The unlatching of any leaf shall not require more than one operation.

**812.5.3 Double cylinder dead bolts:** Double cylinder dead bolts requiring a key operation on both sides are prohibited on required means of egress in Use Group R occupancies.

**812.5.4 Panic hardware:** All doors equipped with latching devices in buildings of Use Group A and serving rooms or spaces with an occupant load greater than 100 shall be equipped with approved panic hardware. Acceptable panic hardware will be a door latching assembly incorporating a device which causes the door latch to release and the leaf to open when a force of 15 pounds (73.23 N) is applied in the direction of egress to a bar or panel, the activating portion of which extends not less than one half the width of the door leaf, and applied at a height greater than 30 inches (762 mm) but less than 44 inches (1118 mm) above the floor. The force shall be applied at the lock side of the door or 30 inches (762 mm) from the hinged side, whichever is farther from the hinge.

**812.5.5 Remote control:** In rooms of Use Group I-1 occupied as places of detention, approved releasing devices with remote control shall be provided for emergency use unless otherwise specifically approved.

**812.5.6 Mechanical operation:** All doors which open into enclosed exit stairs, exit passageways or those which are installed to provide fire or smoke barriers across corridors shall be self closing and be so maintained, or shall be automatic doors which will close upon activation of an approved smoke detector. Where egress doors are arranged to be opened by nonpower operated mechanical devices of any kind, they shall be so constructed that the door may be opened manually and will release under a total pressure of not more than 15 pounds (73.23 N) applied in the direction of egress travel. Power operated exit doors shall be capable of being opened with not more than 50 pounds (244.10 N) pressure applied at the normal door knob location when power is lost.

**812.6 Door construction:** All required egress doors that serve as an element of an exit shall be self closing or automatic closing, except for grade floor exit discharge doors.

**812.6.1 Grade exit discharge doors:** When glazed, doors at grade shall be glazed with approved safety glazing. Approved doors having one or more unframed edges may be used, provided they are constructed of safety glazing not less than ½ inch thick.

**812.7 Door arrangement:** Doors in series shall have a space between them of not less than 7 feet (2134 mm) when measured in their closed positions.

**Exception:** Power operated doors, and buildings of Use Groups R-3 and T.

## SECTION 813.0 REVOLVING DOORS

**813.1 Limitations of use:** Revolving doors shall not be used as exit doors.

**813.2 Speed control:** All approved automatic collapsible revolving doors shall be equipped with an approved speed control governor adjustable to safe traffic speed as required by the approved rules, but not more than 15 nor less than ten revolutions per minute.

**813.3 Construction:** All approved automatic collapsible revolving doors shall be constructed as indicated in the following Sections 813.3.1 through 813.3.4.

**813.3.1 Operating mechanism:** The collapsing mechanism shall be constructed of stainless steel or other approved corrosion resistive materials.

**813.3.2 Use of wood:** The doors may be constructed of wood or other approved materials of similar combustible characteristics with a minimum thickness of 1¼ inches (32 mm).

**813.3.3 Floor covering:** Approved mats or other floor coverings, not more than ½ inch (13 mm) thick, may be installed within the enclosure when permanently secured to the structural flooring and finished flush with the adjacent floor area.

**813.3.4 Glazing:** The doors shall be glazed with approved safety glazing as specified in Section 1301.5.6.

## SECTION 814.0 HORIZONTAL EXITS

**814.1 General:** Horizontal exits as herein defined shall be accepted as an approved element of a required means of egress when complying with the requirements of this article. The connection between the areas of refuge as herein specified may be accomplished by protected openings in a fireresistance rated wall, by a vestibule, or by an open air balcony or bridge.

**814.2 Separation:** The separation between fire areas shall be provided by at least a two hour fireresistance rated fire wall or fire separation wall complying with Article 14 and Table 401.

**814.2.1 Opening protectives:** All fire doors in horizontal exits are to be self closing or automatically closing when activated by an approved smoke detector. All doors shall swing in the direction of egress travel. When serving as a dual element of a means of egress, there shall be adjacent openings with swinging fire doors opening in opposite directions.

**814.3 Size of doors:** Size of openings in fire walls and fire separation walls shall comply with the provisions of Section 1408.0 and 1409.0, but the width of one opening used as a required exit shall not be greater than 88 inches (2235 mm) nor shall the area exceed 80 square feet (7.44 $m^2$).

**814.4 Area of refuge:** The discharge area of a horizontal exit shall be either public areas or spaces occupied by the same tenant and each such area of refuge shall be adequate to house the total occupant load of both connected areas. The capacity of areas of refuge shall be computed on a net floor area allowance of 3 square feet (0.28 $m^2$) for each occupant to be accommodated therein except for nonambulatory institutional areas which shall be 30 square feet (2.79 $m^2$) per occupant, not including areas of stairs, elevators and other shafts or courts.

**814.5 Unlocked doors:** Horizontal exit doors shall be kept unlocked and unobstructed whenever the area on either side of the horizontal exit is occupied.

**814.6 Stairway exit:** In multi-story buildings, there shall be at least one interior enclosed stairway or smokeproof enclosure on each side of the horizontal exit, and any fire area not having a stairway accessible thereto shall be considered as part of an adjoining section with such stairway; but the length of exit access travel distance to the horizontal exit or the required exit shall not exceed the requirements of Section 807.4.

**814.7 Auxiliary elevator:** When horizontal exits are provided in floors located 12 or more stories above grade, the required stairway shall be supplemented by at least one passenger elevator maintained ready for use during normal occupancy of the building.

## SECTION 815.0 EGRESS RAMPS

**815.1 Capacity:** The capacity of a ramp used as an egress component shall be computed in accordance with Section 808.0.

**815.2 Minimum dimensions:** The minimum dimensions of egress ramps shall comply with Sections 815.2.1 through 815.2.3.

**815.2.1 Width:** The minimum width of an egress ramp shall be not less than that required for corridors by Section 810.3.

**815.2.2 Headroom:** The minimum headroom in all parts of the egress ramp shall be not less than 6 feet 8 inches (2032 mm).

**815.2.3 Restrictions:** Egress ramps shall not reduce in width in the direction of egress travel. Projections into the required ramp and landing width are prohibited except for handrails and stringers. Doors opening onto a landing shall not reduce the clear width to less than 42 inches (1067 mm).

**815.3 Maximum slope:** The slope of ramps shall be as indicated in the following Table 815.

**Table 815**
**MAXIMUM LENGTHS AND SLOPES ALLOWED FOR RAMPS**

| Maximum horizontal projection for rampways[a] | Maximum horizontal projection of each run | Allowable slopes as percent of slope and ratio (in parentheses)[b] |
|---|---|---|
| 2 ft. | 2 ft. | If slope - 12.5% (1:8) or less steep |
| 8 ft. | 8 ft. | If slope - 10.0% (1:10) or less steep |
| 60 ft. | 30 ft. | If slope - 8.3% (1:12) or less steep |
| 160 ft. | 40 ft. | If slope - 6.25% (1:16) or less steep |

**Note a.** A rampway may have more than one ramp run, and landings are not counted as part of total maximum horizontal projection.
**Note b.** All slopes taken from a horizontal (level) plane.
**Note c.** 1 foot = 304.8 mm.

**815.4 Landings:** Landings shall be provided at all points of turning, entrance, exit and doors. Landings shall also be provided between each maximum vertical rise of ramp length indicated in Table 815. Each landing shall have a minimum length of 60 inches (1524 mm) except the bottom landing shall have a length of 72 inches (1829 mm).

**815.5 Guards and handrails:** Handrails shall be continuous and on both sides of every ramp having a slope greater than one unit vertical in 12 units horizontal (1:12) and shall conform to Section 816.5.1. Guards shall be provided as required by Sections 816.5.2.1 and 816.5.2.3.

**Exception:** Handrail extension for ramps shall extend at least 12 inches (305 mm) beyond the top and bottom.

**815.6 Ramp construction:** Ramps used as an exit shall conform to the applicable requirements of Section 816.9 as to materials of construction and enclosure.

**815.6.1 Cross slope and surface:** The cross slope off a ramp surface shall be no greater than 1:50. Ramp surfaces shall be stable, firm and relatively nonslip under all weather conditions.

**815.6.2 Changes in level:** Changes in level up to ¼ inch (6 mm) may be vertical and without edge treatment. Changes between ¼ inch (6 mm) and ½ inch (13 mm) shall be beveled with a slope no greater than 1:2. Changes in level greater than ½ inch (13 mm) shall be accomplished by means of a ramp that complies with Section 515.7 or 515.8.

**815.6.3 Carpet:** If carpet or carpet tile is used on a ground or floor surface, then it shall be securely attached; have a firm cushion, pad, or backing or no cushion or pad; and have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. The maximum pile height shall be ½ inch (13 mm). Exposed edges of carpet shall be fastened to floor surfaces and have trim along the entire length of the exposed edge. Carpet edge trim shall comply with Section 515.5.2.

**815.6.4 Gratings:** If gratings are located in walking surfaces, then they shall have spaces no greater than ½ inch (13 mm) wide in one direction. If gratings have elongated openings, then they shall be placed so that the long dimension is perpendicular to the dominant direction of travel.

**815.6.5 Edge protection:** Ramps and landings with dropoffs shall have curbs, walls, railings, or projecting surfaces that aid in preventing people from slipping off the ramp. Curbs shall be a minimum of 2 inches (51 mm) high.

**815.6.6 Outdoor conditions:** Outdoor ramps and their approaches shall be designed so that water will not accumulate on walking surfaces.

## SECTION 816.0 INTERIOR EXIT STAIRWAYS

**816.1 Capacity:** The capacity of stairways and doors per unit of exit width shall be computed in accordance with Section 808.0.

**816.2 Minimum dimensions:** The minimum dimensions of interior exit stairways shall comply with Sections 816.2.1 through 816.2.3.

**816.2.1 Width:** All interior exit stairways shall be not less than 44 inches (1118 mm) in width, except that such width may be reduced to 36 inches (914 mm) when serving an occupant load of 50 or less.

**816.2.2 Headroom:** The minimum headroom in all parts of the stair enclosure shall be not less than 6 feet 8 inches (2032 mm) measured vertically from the tread nosing or from the floor surface of the landing or platform.

**816.2.3 Restrictions:** Stairways shall not reduce in width in the direction of exit travel. Projections into a stairway are prohibited except for handrails as indicated in Section 816.5.1 and for stairway stringers which may project not more than 1½ inches (38 mm).

**816.3 Landings and platforms:** Landings and platforms of interior exit stairways shall comply with Sections 816.3.1 and 816.3.2.

**816.3.1 Width:** The least dimension of landings and platforms shall be not less than the required width of stairway.

**816.3.2 Vertical rise:** In all buildings a stairway shall not have a height of vertical rise of more than 12 feet (3658 mm) between landings and intermediate platforms.

**816.4 Treads and risers:** On any given flight of stairs, all steps shall have uniform riser heights and tread widths and shall comply with Sections 816.4.1 and 816.4.2.

**816.4.1 Limiting dimensions:** The height of risers and width of treads, in inches, shall be as indicated in the following Table 816.

**Table 816**
**TREAD AND RISER SIZE[a, c]**

| Use group | Max. riser | Min. riser | Max. tread | Min. tread |
|---|---|---|---|---|
| R-3 and within dwelling units in Use Group R-2 | 8¼ in. | — | — | 9 in. |
| All others[b] | 7 in. | 4 in. | — | 11 in. |

**Note a.** There shall be no variation exceeding 3/16" in the depth of adjacent treads or in the height of adjacent risers, and the tolerance between the largest and smallest riser shall not exceed ⅜" in any flight.
**Note b.** In balconies and galleries risers and treads shall be as shown in above table, but one tread in each seat platform width may have a greater width to accommodate access to seats. Seating platforms shall be of a uniform width.
**Note c.** 1 inch = 25.4 mm.

**816.4.2 Winders:** Winders shall not be permitted in required exit stairways except in Use Group R-3 and stairways serving a single dwelling unit and in ornamental stairways not required as an element of an exit. Such winders shall have a tread width of not less than 9 inches (229 mm) at a point not more than 12 inches (305 mm) from the side where the tread is narrower and the minimum tread width shall not be less than 6 inches (152 mm).

**816.5 Stairway guards and handrails:** Stairways shall have continuous guards and handrails on both sides, and in addition thereto, stairways more than 88 inches (2235 mm) in required width shall have intermediate handrails dividing the stairway into portions not more than 88 inches (2235 mm) wide. Stairways having a width of less than 44 inches (1118 mm) may have one handrail.

**816.5.1 Handrail details:** Handrails shall be provided according to the requirements of Sections 816.5.1.1 through 816.5.1.4.

**816.5.1.1 Projection:** Handrails may project not more than 3½ inches (89 mm) into the required stair width. The clear space between handrails and the walk shall be 1½ inches (38 mm).

**816.5.1.2 Height above treads:** Handrails shall be not less than 30 inches (762 mm) nor more than 34 inches (864 mm) measured vertically, above the nosing of the treads.

**816.5.1.3 Handrail ends:** Handrails shall comply with Section 515. 26 and

shall have the following features:

1. Handrails shall be continuous along both sides of stairs. The inside handrail on switchback or dogleg stairs shall always be continuous.
2. If handrails are not continuous, they shall extend at least 12 inches plus the width of one tread beyond the bottom riser. At the top, the extension shall be parallel with the floor or ground surface. At the bottom, the handrail shall continue to slope for a distance of the width of one tread from the bottom riser, and the remainder of the extension shall be horizontal.

**816.5.1.4 Design load:** Handrails shall be designed to withstand an applied load of 200 pounds (976.40 N) in any direction at any point (see Section 909.4).

**816.5.2 Guard details:** Guards shall be provided according to the requirements of Sections 816.5.2.1 through 816.5.2.3.

**816.5.2.1 Height above tread:** Guards shall be not less than 42 inches (1067 mm) in height measured vertically above the nosing of the tread.

**Exception:** Guards shall be not less than 30 inches (762 mm) in height measured vertically above the nosing of the tread along stairs which do not exceed 20 feet (6096 mm) in height or reverse direction at intermediate landings with 12 inches (305 mm) or less measured horizontally between successive flights.

**816.5.2.2 Guard construction:** Guards shall be constructed so that the area in the plane of the guard, from the top of the tread to the top of the guard, is subdivided or filled in one of the methods indicated in Sections 816.5.2.2.1 through 816.5.2.2.3 or a combination of such methods.

**816.5.2.2.1 Longitudinal rails:** A sufficient number of intermediate longitudinal rails constructed so that the clear distance between rails measured at right angles to the rail does not exceed 6 inches (152 mm). The bottom rail shall not be more than 6 inches (152 mm) measured vertically from the tread nosing.

**816.5.2.2.2 Balusters:** Balusters spaced not more than 6 inches (152 mm) apart.

**816.5.2.2.3 Walls or panels:** Wall construction or panels of wire mesh, or expanded metal, or ornamental grilles which provide protection equivalent to that provided by the intermediate rails or balusters specified in Sections 816.5.2.2.1 and 816.5.2.2.2.

**816.5.2.3 Location:** Guards at least 42 inches (1067 mm) in height shall be located along open sided floor areas, mezzanines and landings.

**Exception:** In buildings of Use Group R-3 guards shall be at least 36 inches (914 mm) in height.

**816.6 Stair exit doors:** Stairway exit doors shall comply with Sections 816.6.1 through 816.6.3.

**816.6.1 Width:** The width of every exit door to or from a stairway shall be not

less than the number of units of exit width required for the capacity of the stairway which services the floor or area from which the exit door leads; but such a door shall not be less than 28 inches (711 mm) in clear width in buildings of Use Group R-3 nor less than 32 inches (813 mm) in clear width in all other use groups.

**816.6.2 Direction of swing:** All doors shall swing on a landing in the direction of egress travel. When opening, stair exit doors shall not reduce the width of landings to less than one half the required width. When fully open, the exit door may project 7 inches (178 mm) onto the landing.

**816.6.3 Door construction:** All doorway opening protectives, including the frames and hardware, shall be approved self closing, swinging fire doors, except in buildings of Use Group R-3 where 1¾ inch solid core wood doors are permitted. Labeled fire doors shall have a maximum transmitted temperature end point of not more than 450 degrees F. (232 degrees C.) above ambient at the end of 30 minutes of standard fire test exposure.

**816.7 Spiral stairways:** Spiral stairways of noncombustible construction may be used as an element of a means of egress in buildings of Use Group R-3 and within a single dwelling unit and from a mezzanine area not more than 250 square feet (23.25 $m^2$) in area and serving not more than five occupants. The minimum width shall be 26 inches (660 mm) with each tread having a 7½ inch (191 mm) minimum tread width at 12 inches (305 mm) from the narrow edge. All treads shall be identical and the rise shall be not more than 9½ inches (241 mm). A minimum headroom of 6 feet 6 inches (1981 mm) shall be provided.

**816.7.1 Circular stairways:** Circular stairways may be used as an element of egress when a minimum tread width of 10 inches (254 mm) is provided and the smaller radius is not less than twice the width of the stairway.

**816.8 Supplemental stairways:** Stairways which are not a required means of egress element, serving one adjacent floor and not connected with a corridor or stairway serving other floors, may be used in all use groups except Use Group I.

**816.9 Stairway construction:** All required interior stairways shall be built of materials consistent with the types of materials permitted in Table 401 for the type of construction of the building; except that wood handrails shall be permitted for all types of construction. Such stairways shall have solid treads and landing platforms and all finish floor surfaces of slip resistant materials.

**816.9.1 Strength:** All stairways, platforms, landings and exits in other than buildings of Use Group R-3 shall be adequate to support a live load of 100 pounds per square foot (488.20 kg/ $m^2$) and a concentrated load of 300 pounds (136.20 kg).

**816.9.2 Enclosures:** Required interior exit stairways shall be enclosed in fire separation assemblies of the fireresistance rating specified in Table 401. An exit enclosure shall not be used for any purpose other than means of egress. A space below a stairway shall be enclosed as required or kept open. Doors shall not open into the stairway enclosure except exit doors.

**Exceptions**
1. Exits in buildings of Use Group R-3.
2. Exits serving and contained within a single residential dwelling unit.
3. Exits in communicating floor levels as provided in Section 816.10.
4. Supplemental stairways as provided in Section 816.8.
5. Exits in open parking structures as provided in Section 809.5.

**816.10 Communicating floors:** In any building, other than Use Group H, provided with an automatic fire suppression system, not more than three communicating floor levels may be permitted without enclosure or protection between such areas, provided all the conditions described in Sections 816.10.1 through 816.10.4 are met.

**816.10.1 Location of floors:** The lowest, or next to the lowest, level is a street floor.

**816.10.2 Open communication:** The entire area, including all communicating floor levels, is sufficiently open and unobstructed to be assumed that a fire or other dangerous condition in any part will be immediately obvious to the occupants of all communicating levels and areas.

**816.10.3 Egress capacity:** Egress capacity is simultaneously sufficient for all the occupants of all communicating levels and areas, all communicating levels in the same fire area being considered as a single floor area for purposes of determination of required egress capacity.

**816.10.4 Other exits:** Each floor level, considered separately, has at least one half of its individual required egress capacity provided by an exit or exits leading directly out of that area without traversing another communicating floor level or being exposed to the spread of fire or smoke therefrom.

**816.11 Discharge identification:** Stairways which continue beyond the floor of discharge shall be interrupted at the floor of discharge by partitions, doors or other effective means of preventing persons from continuing past the floor of discharge while egressing. A sign shall be provided at each floor landing in all interior stairways more than three stories in height, designating the floor level above the floor of discharge.

## SECTION 817.0 ACCESS TO ROOF

**817.1 By stairway or ladder:** In buildings more than three stories in height except those with a roof slope greater than 4 units vertical in 12 units horizontal (4:12), access to the roof shall be provided by means of a stairway or a ladder and trap door. The ladder shall not be on the exterior of the building. Where the roof is used as a roof garden or for other habitable purposes, sufficient stairways shall extend to it to provide the necessary exit facilities from the roof as required for such occupancy. Roof trap doors shall be constructed to comply with Section 1426.2.

**817.1.1 Optional stairway or ladder:** Buildings not required to have a stairway or ladder to the roof, as described above, may include such a stairway or

ladder at the discretion of the designer of the building. The stairway or ladder shall conform to the provisions of this section, except that ladders may be placed on the exterior of the building. The siderails of exterior ladders shall be carried over the coping or parapet to afford hand hold. The ladder shall be metal, and if it exceeds 20 feet (6096 mm) in height, shall have a protective cage or other safety device. Other design details of such exterior ladders are subject to the approval of the building official.

**817.2 Roof enclosures:** Stairways extending through roofs shall be enclosed in roof structures of fireresistance rated construction meeting the requirements of Section 1426.0.

## SECTION 818.0 SMOKEPROOF ENCLOSURES

**818.1 General:** A smokeproof enclosure shall consist of an interior exit stairway conforming to Section 816.0, enclosed from the highest point to the lowest point, and meeting the requirements of this section. When access is required to the roof by Section 817.0, such access shall be from the smokeproof enclosure where such is required.

**818.2 Where required:** At least one of the required exits shall be a smokeproof enclosure in buildings having floors used for human occupancy located more than 75 feet (22860 mm) above the lowest level of fire department vehicle access.

> **Exception:** Buildings of Use Groups B, R-1 and R-2 complying with the area of refuge (compartmentation) option of Section 629.0.

**818.2.1 Fire suppression system alternative:** When the building is provided with an automatic fire suppression system throughout, the smokeproof enclosure may be eliminated provided all interior exit stairways are pressurized to 0.15 inches of water column (37.33 Pa) as described in Section 818.7.5.

**818.3 Access:** Access to the smokeproof enclosure shall be from every story and shall be by way of a vestibule or by way of an open exterior balcony.

**818.4 Outlet:** The smokeproof enclosure shall discharge onto a street, yard or open court with direct access to a public way, or into a grade passageway leading to a public way. The grade passageway shall be without other openings and shall be separated from the remainder of the building by two hour fireresistance rated construction.

**818.5 Construction:** The walls of the smokeproof enclosure and the vestibule shall provide a two hour fireresistance rating without openings other than the required doorways. The open exterior balcony shall be constructed in accordance with the fireresistance rating requirements for floor construction.

**818.6 Smokeproof enclosure by natural ventilation:** The provisions of Sections 818.6.1 through 818.6.4 shall apply to ventilation of smokeproof enclosures by natural means.

**818.6.1 Balcony doors:** Where access to the smokeproof enclosure is by way

of an open exterior balcony, the door assembly into the enclosure shall have a one and one half hour fireresistance rating; and shall be maintained self closing, or shall be automatic closing by actuation of a smoke detector.

**818.6.2 Vestibule doors:** Where access to the smokeproof enclosure is by way of a vestibule, the door assembly into the vestibule shall have a one and one half hour fireresistance rating and the door assembly from the vestibule to the stairs shall have not less than a 20 minute fireresistance rating. Doors shall be maintained self closing or shall be automatic closing by actuation of a smoke detector.

**818.6.3 Vestibule ventilation:** Each vestibule shall have a minimum net area of 16 square feet (1.49 $m^2$) of opening in a wall facing an outer court, yard, or public way at least 20 feet (6096 mm) in width.

**818.6.4 Vestibule size:** The minimum dimension of the vestibule shall be not less than the required width of the corridor leading to it.

**818.7 Smokeproof enclosure by mechanical ventilation:** The provisions of Sections 818.7.1 through 818.7.8 shall apply to ventilation of smokeproof enclosures by mechanical means.

**818.7.1 Vestibule doors:** The door assembly from the building into the vestibule shall have a one and one half hour fireresistance rating and the door assembly from the vestibule to the stairway shall have not less than a 20 minute fireresistance rating. The door to the stairway shall be provided with a drop sill or other provisions to minimize air leakage. The doors shall be self closing or automatic closing by smoke detection or in the event of a power failure.

**818.7.2 Vestibule size:** The vestibule shall have a minimum width of 44 inches (1118 mm) and a minimum length of 72 inches (1829 mm) in the direction of exit travel.

**818.7.3 Vestibule ventilation:** The vestibule shall be supplied with not less than one air change per minute, and exhausted at a rate sufficient to maintain an underpressure relative to the atmosphere of 0.05 inch of water column (12.44 Pa), and of 0.10 inch of water column (24.88 Pa) relative to the stair shaft. Supply air shall enter and exhaust air shall discharge from the vestibule through separate, tightly constructed ducts used only for that purpose. Supply air shall enter the vestibule within 6 inches (152 mm) of the floor level. The top of the exhaust register shall be located at the top of the smoke trap but not more than 7 inches (152 mm) down from the top of the trap and shall be entirely within the smoke trap area. Doors, when in the open position, shall not obstruct duct openings. Duct openings may be provided with controlling dampers, if needed, to meet the design requirements, but such are not otherwise required.

**818.7.3.1 Engineered ventilation system:** A specially engineered system may be used. Such an engineered system shall provide 2,500 cubic feet per minute (1.18 $m^3/s$) exhaust from a vestibule when in emergency operation and shall

be sized to handle three vestibules simultaneously. The smoke detectors located outside each vestibule shall, upon release, open the supply and exhaust duct dampers in that affected vestibule.

**818.7.4 Smoke trap:** The vestibule ceiling shall be at least 20 inches (508 mm) higher than the door opening into the vestibule to serve as a smoke and heat trap and to provide an upward moving air column. The height may be decreased when justified by design and test.

**818.7.5 Stair shaft air movement system:** The stair shaft shall be provided with a dampered relief opening at the top and supplied with sufficient air to discharge a minimum of 2,500 cubic feet per minute (1.18 $m^3/s$) through the relief opening while maintaining a minimum positive pressure of 0.05 inch of water column (12.44 Pa) in the shaft relative to atmosphere with all doors closed.

**818.7.6 Ventilating equipment:** The activation of ventilating equipment shall be by a smoke detector installed outside the vestibule door in an approved location. When the closing device for the stair shaft and vestibule doors is activated by smoke detection or power failure, the mechanical equipment shall operate at the levels specified in Sections 818.7.3 and 818.7.5.

**818.7.7 Standby power:** Mechanical vestibule and stair shaft ventilation systems and detector systems shall be powered by an approved self contained generator designed to operate whenever there is a loss of normal current. The generator, if inside a building, shall be located in a separate room of two hour fireresistance rated construction and shall have a minimum fuel supply to operate the equipment for two hours.

**818.7.8 Acceptance and testing:** Before the mechanical equipment is approved by the building official, it shall be tested in the building official's presence to confirm that the mechanical equipment is operating in compliance with these requirements.

## SECTION 819.0 EXTERIOR EXIT STAIRWAYS

**819.1 As required exit:** Exterior stairways conforming to the requirements for interior exit stairways as required in Section 816.0, except as to enclosures and fire doors and except as herein specifically modified, may be accepted as an element of a required means of egress in buildings not exceeding five stories or 65 feet (19812 mm) in height for other than buildings of Use Group I. Exterior stairways and exit access balconies in climates subject to snow or ice shall be protected to prevent accumulation of same.

**819.1.1 Location and arrangement:** Exterior stairways may be utilized where at least one door from each tenant space opens onto a roofed over open balcony served by at least two stairways, except that one stairway may be provided as permitted in Section 809.3, so located as to provide a choice of independent, unobstructed means of egress directly to the grade. The stairways shall be located remotely from each other. Balconies shall conform to

the same width requirements as corridors as required by Section 810.0. The maximum travel distance from any tenant space to the nearest stairway shall be as specified in Table 807. Balconies and stairways shall be located at least 10 feet (3048 mm) from adjacent property lot lines and from other buildings on the same lot unless openings in such buildings are protected by three quarter hour fireresistance rated doors or windows.

**819.2 Guards and handrails:** Guards and handrails shall be as specified in Section 816.0.

**819.3 Opening protectives:** Openings below and within 10 feet (3048 mm) horizontally of the stairway shall be protected with approved three quarter hour fireresistance rated automatic opening protectives.

**Exceptions**

1. Buildings two stories or less in height.
2. Openings may be unprotected when two independent exterior stairways serve an exterior balcony.

**819.4 Location:** All required exterior stairways shall be located so as to lead directly to a street or open space with direct access to a street; or when located on the rear of the building may lead through a passageway at grade complying with Section 811.0. Exterior stairways shall not project beyond the street lot line.

**819.5 Construction:** Exterior stairs, porches and balconies shall be constructed of materials consistent with the types of materials permitted in Table 401 for the type of construction of the building to which the stairway is attached.

## SECTION 820.0 ESCALATORS AS EXITS

**820.1 When acceptable:** Escalators of the horizontal slip resistant tread type moving in the direction of egress may be accepted as an approved exit element in all buildings except buildings of Use Groups A and I when constructed and approved in accordance with the requirements of this article and the provisions of Section 2118.0. When accepted as an element of a required means of egress, they shall be enclosed with fireresistance rated partitions as specified in Section 816.0.

**820.2 Width:** The width shall be not less than 40 inches (1016 mm) between guards and the moving tread shall be not less than 36 inches (914 mm) in width and 15¾ inches (400 mm) in depth.

**820.3 Capacity:** The occupant capacity shall be computed as provided in Section 808.0 for exit stairways.

**820.4 Landings and platforms:** Landings and platforms shall be provided at the top and bottom of each unit as required for interior exit stairways.

**820.5 Railings:** Guards shall be surmounted with moving handrails traveling at the same speed as the stairway.

**820.6 Egress:** Means of egress to the street shall be provided as specified for interior exit stairways.

**820.7 Construction:** Only noncombustible materials shall be used in the construction of escalators accepted as a required means of egress except for step wheels, handrails, electrical equipment and wood veneers not more than 1/28 inch (1 mm) thick directly attached to metal or other noncombustible backing with a nonvolatile and nonflammable cement.

**820.7.1 Enclosure:** The enclosure shall afford the fireresistance rating required for approved interior exit stairways as specified in Section 816.9.

**820.8 Height of travel per unit:** A single escalator unit shall not have a vertical travel of more than two stories nor more than 35 feet (10668 mm).

## SECTION 821.0 FIRE ESCAPES

**821.1 Where permitted:** Fire escapes shall not be permitted as an element of a required means of egress except on existing buildings or structures when constructed in accordance with the approved rules and when more adequate exit facilities cannot be provided. Fire escapes shall not provide more than 50 percent of the required exit capacity.

**821.2 Location:** When located on the front of the building and projecting beyond the building line, the lowest landing shall be not less than 7 feet (2134 mm) or more than 12 feet (3658 mm) above grade, equipped with a counter-balanced stairway to the street. In alleyways and thoroughfares less than 30 feet (9144 mm) wide, the clearance under the lowest landing shall be not less than 12 feet (3658 mm).

**821.3 Construction:** The fire escape shall be designed to support a live load of 100 pounds per square foot (488.20 kg/ $m^2$) and shall be constructed of steel or other approved noncombustible materials. Fire escapes may be constructed of wood not less than 2 inches thick on buildings of Type 4 construction.

**821.3.1 Dimensions:** Stairs shall be at least 22 inches (559 mm) wide with risers not more and treads not less than 8 inches (203 mm) and landings at the foot of stairs not less than 40 inches (1016 mm) wide by 36 inches (914 mm) long, located not more than 8 inches (203 mm) below the access window or door.

**821.3.2 Opening protectives:** Doors and windows along the fire escape shall be protected with three quarter hour fireresistance rated opening protectives.

## SECTION 822.0 SLIDESCAPES

**822.1 Where permitted:** Slidescapes and safety chutes shall be permitted in buildings of Use Group H, in existing school buildings of Use Group A-4 and in existing buildings of Use Group I when approved by the building official and constructed in accordance with the approved rules.

**822.2 Location:** The arrangement and location of slidescapes shall conform to

this article for means of egress and shall be designated by *Exit* signs and lights as provided in Section 823.0.

**822.3 Construction:** All chutes shall be constructed of approved noncombustible materials with a pitch in the line of travel of not less than 24 nor more than 42 degrees (0.42 rad to 0.73 rad), measured on the developed circumference of spiral chutes. Straight chutes shall be not less than 24 inches (610 mm) and spiral chutes not less than 28 inches (711 mm) in clear width; nor more than 44 inches (1118 mm) wide in any case. When erected on the interior of a building, they shall be enclosed as required in Section 816.9.2 for interior stairways with direct means of egress to a street or other public way.

**822.4 Capacity:** Slidescapes, where permitted as an element of a required exit, shall be rated at one unit of egress width per slide, with rated capacity of 60. Slidescapes, except as permitted for buildings of Use Group H shall not constitute more than 25 percent of the required number of units of egress width from any building or structure or any individual story.

## SECTION 823.0 EXIT SIGNS AND LIGHTS

**823.1 Location:** In all buildings having an occupant load of 50 or more, all required means of egress shall be indicated with approved internally illuminated signs reading *Exit,* visible from the exit access and, when necessary, supplemented by directional signs in the access corridors indicating the direction and way of egress. All *Exit* signs shall be located at exit doors or exit access areas, so as to be readily visible.

**823.2 Size and color:** *Exit* signs shall have red letters at least 6 inches (152 mm) high and the minimum width of each stroke shall be ¾ inch (19 mm) on a white background or in other approved distinguishable colors. If an arrow is provided as part of an *Exit* sign, the construction shall be such that the arrow direction cannot be readily changed. The letters *Exit* shall be clearly discernible when the internally illuminated sign is not energized.

**823.3 Illumination:** Each sign shall be illuminated by a source providing not less than five foot candles (53.82 lux) at the illuminated surface.

**823.4 Power source:** All *Exit* signs shall be illuminated at all times, when the building is occupied, from an emergency electrical system. In those buildings required by Section 824.4 to have an independent power source for means of egress lighting, *Exit* signs shall be connected to the independent power source or other approved auxiliary source of power to assure continued illumination in case of emergency or primary power loss.

## SECTION 824.0 MEANS OF EGRESS LIGHTING

**824.1 Artificial lighting:** All means of egress in other than buildings of Use Group R-3 shall be equipped with artificial lighting facilities to provide the intensity of illumination herein prescribed continuously during the time that conditions of occupancy of the building require that the exits be available.

Lighting shall also be provided to illuminate the exit discharge. In buildings of Use Group R-2, means of egress lighting, except that lighting within a dwelling unit, shall be wired on a circuit independent of circuits within any dwelling unit. The disconnecting means and overcurrent protection device shall not be located within a dwelling unit or such that access must be obtained by going through a dwelling unit.

**824.2 Intensity of illumination:** The intensity of floor lighting shall be not less than one foot candle (10.76 lux).

**824.3 Use Group A:** In buildings of Use Group A for the exhibition of motion pictures or other projections by means of directed light, the illumination of aisles may be reduced during such period of projection to not less than 0.2 foot candle (2.15 lux).

**824.4 Emergency lighting system:** Means of egress lighting shall be provided from an independent power source or other approved auxiliary source of power to assure continued illumination in case of emergency or primary power loss for a duration of one hour in buildings listed in Sections 824.4.1 through 824.4.6.

**824.4.1 Use Groups A and I:** In all buildings of Use Groups A and I.

**824.4.2 Use Group B:** In all buildings of Use Group B containing more than 1,000 occupants.

**824.4.3 Use Group M:** In all buildings of Use Group M when greater than 3,000 square feet (279 $m^2$) in area on any floor, or when having one or more floors above or below grade floor.

**824.4.4 Use Group R-1:** In buildings of Use Group R-1 containing more than 25 sleeping rooms.

**824.4.5 Use Group R-2:** In all buildings of Use Group R-2 containing more than 50 occupants.

**824.4.6 Windowless buildings:** In all windowless buildings or portions thereof containing more than 100 occupants except buildings of Use Group R-3.

## SECTION 825.0 HAZARDS TO MEANS OF EGRESS

**825.1 Floor openings:** Manholes or floor access panels shall not be located in the line of egress which reduce the clearance to less than 32 inches (813 mm).

**825.2 Protrusions:** There shall not be low hanging door closers that remain within the opening of a doorway when the door is open, or that protrude hazardously into the corridor or line of egress when the door is closed. There shall not be low hanging signs, ceiling lights or similar fixtures which protrude into corridors or lines of egress.

**825.3 Identification of hazardous exits:** Doors leading to dangerous areas such as fire escapes, loading platforms, switch rooms and mechanical rooms shall be equipped with knobs, handles or push bars that have been knurled.

**825.4 Floor surface:** All floors of corridors and lines of egress shall have a slip resistant surface.

**825.5 Open sided floor areas:** Guards at least 42 inches (1067 mm) in height shall be located along open sided floor areas, mezzanines and landings. The space between guardrails shall conform to Section 816.5.2.

**Exception:** In buildings of Use Group R-3, guards shall be at least 36 inches (914 mm) in height.

**825.6 Elevation change:** Where changes in elevation exist in exit access corridors, exits or exit discharge, ramps shall be used when the difference in elevation is less than 12 inches (305 mm).

**Exception:** At exterior doors not required for the physically handicapped and aged by Section 515.0, a maximum of 8 inches (203 mm) step down shall be permitted.

## SECTION 826.0 AISLES AND SEATS

**826.1 General:** Buildings of Use Group A which contain seats, tables, displays, equipment, or other material shall be provided with aisles leading to the required exits.

**826.2 Aisle width:** In theater style seating, aisle width shall be sufficient to accommodate the capacity as indicated in Section 808.0 for corridors and shall be not less than 36 inches (914 mm) in width if serving only one side and not less than 42 inches (1067 mm) in width if serving both sides. Such minimum width shall be measured at the point farthest from an exit and shall be increased at the rate of 1½ inches (38 mm) for each 5 feet (1524 mm) in length towards an exit. With continental seating, as specified in Section 826.6, side aisles shall be not less than 44 inches (1118 mm).

**826.3 Aisle spacing:** There shall be a maximum of six intervening seats between any seat and the nearest aisle. With continental seating, as specified in Section 826.6, the number of intervening seats may be increased to 29 where egress doors are provided along each side aisle of the row of seats at the rate of one pair of egress doors for each five rows of seats. Such egress doors shall provide a minimum clear width of 66 inches (1676 mm).

**826.4 Cross aisles:** Aisles shall terminate at a cross aisle, foyer or exit without a dead end length over 20 feet (6096 mm).

**826.5 Aisle gradient:** The aisle slope shall not exceed one unit vertical in 8 units horizontal (1:8). Steps shall not be used in aisles where differences in elevation can be accommodated by a slope of less than one unit vertical in 8 units horizontal (1:8). Where steps are used in aisles, such steps shall extend across the full aisle width with treads and risers complying with Section 816.4 and shall be illuminated. Isolated steps shall not be permitted.

**826.6 Seat spacing:** Seating other than continental spacing shall be spaced not less than 12 inches (305 mm) from the back of the row ahead and the nearest projection of the row behind.

With continental seating, the spacing of rows of unoccupied seats shall provide a clear width between rows measured horizontally as follows (automatic or self rising seats shall be measured in the seat up position, other seats shall be measured in the seat down position); 18 inches (457 mm) clear width between rows of 18 seats or less, 20 inches (508 mm) clear width between rows of 35 seats or less, 21 inches (533 mm) clear width between rows of 45 seats or less and 22 inches (559 mm) clear width between rows of 46 seats or more.

**826.7 Seats:** The capacity of seats without dividing arms shall be equal to one person per 18 inches (457 mm). For seating booths, the capacity shall be equal to one person per 24 inches (610 mm).

# ARTICLE 9

## STRUCTURAL LOADS AND STRESSES

### SECTION 900.0 GENERAL

**900.1 Scope:** The provisions of this article shall control the structural design of all buildings and structures hereafter erected to insure adequate strength of all parts thereof for the safe support of all superimposed live and special loads in addition to their own dead load, without exceeding the allowable stresses or design capabilities. The loads specified herein are the minimum suitable for use with stresses and load factors prescribed in this code.

**900.2 Certificate of compliance:** The provisions of this article and Article 10 may be deemed to have been satisfied when certification of an architect or engineer registered in Kentucky to that effect is placed on drawings submitted to the building official.

### SECTION 901.0 DESIGN SAFE LOAD

**901.1 Safe support required:** Buildings or other structures, and all parts thereof, shall be designed and constructed to support safely all loads, including dead loads, without exceeding the allowable stresses (or ultimate strengths when appropriate load factors are applied) for the materials of construction in the structural members and connections.

**901.2 Progressive collapse:** Buildings and structural systems shall provide such structural integrity that the hazards associated with the progressive collapse, such as that due to local failure caused by severe overloads or abnormal loads not specifically covered herein, are reduced to a level consistent with good engineering practice.

**901.3 Load tests:** The building official may require a load test, or shall accept certified reports of such tests conducted in accordance with the approved rules by approved testing agencies, of any construction, whenever there is reason to question its safety for the intended occupancy or use.

### SECTION 902.0 TEST SAFE LOAD

**902.1 When required:** When not capable of design by accepted engineering analysis, any system of construction or structural unit and its connections

shall be subjected to the tests prescribed in Article 11 or in the test standards listed in Appendix A, or to such other tests approved by the building official that simulate the actual loads and conditions of application that occur in normal use; or the building official shall accept certified reports of such tests conducted by an approved testing agency, providing such tests meet the requirements of this code and the approved rules.

**902.2 Test load:** When approved by test, every structural assembly shall sustain without failure minimum superimposed loads equal to two and one half times the required live load; and under the approved working load, the deflection shall not exceed the limits prescribed in Section 1103.0.

## SECTION 903.0 DESIGN LIVE LOAD

**903.1 Required live load:** The live loads to be assumed in the design of buildings and structures shall be the greatest load produced by the intended use and occupancy, but not less than the minimum uniformly distributed unit loads required in Section 906.0 for specific uses.

**903.2 Loads not specified:** The building official shall approve the required live load for any use not specifically provided for in Table 906.

## SECTION 904.0 DESIGN DEAD LOAD

**904.1 Weights of materials and construction:** In estimating dead load for the purposes of structural design, the actual weights of materials and constructions shall be used, but not less than the unit dead loads prescribed in Appendix C and ANSI A58.1 listed in Appendix A. In the absence of definite information, any values assumed by the designers shall be subject to the approval of the building official.

**904.2 Weight of fixed service equipment:** In estimating dead loads for purposes of design, the weight of fixed service equipment such as plumbing stacks and risers, electrical feeders, heating, ventilating, air conditioning and sprinkler systems shall be included.

**904.3 Partition load:** In offices and other buildings, in which subdividing partitions may be subsequently erected, rearranged or relocated, provision shall be made to support the actual weight of such partitions where they occur, or for an equivalent uniform load, which shall be assumed not less than 20 pounds per square foot (97.64 kg/m$^2$) of floor area in addition to the specified uniformly distributed live load. Provision for partition weight shall be made whether or not partitions are shown on the plans, unless the specified live load exceeds 80 psf (390.56 kg/m$^2$).

## SECTION 905.0 EXISTING BUILDINGS

**905.1 General:** In the reconstruction, repair, extension or alteration of existing buildings, the allowable working stresses used in design shall be as indicated in the following Sections 905.2 through 905.5.

**905.2 Building extended:** When an existing building is altered by an extension in height or area, all existing structural parts affected by the addition shall be strengthened where necessary, and all new structural parts shall be designed to meet the requirements for buildings hereafter erected.

**905.3 Building repaired:** When repairs are made to the structural portion of an existing building, and the uncovered structural portions are found unsound, such parts shall be made to conform to the requirements for buildings hereafter erected.

**905.4 Existing live load:** When an existing building heretofore approved is altered or repaired in accordance with Section 103.3, the structure may be designed for the loads and stresses applicable at the time of erection, provided the public safety is not endangered thereby.

**905.5 Posted live load:** Any existing building heretofore approved, in which there is not a change in use to a new use group requiring greater floor loads, may be posted for the originally approved live loads, provided the building is structurally safe in all its parts and adequate for its existing use, and the public safety is not endangered thereby.

## SECTION 906.0 UNIFORMLY DISTRIBUTED LIVE LOADS

**906.1 Uniform live load:** The minimum uniformly distributed live load in pounds per square foot shall be as provided in Table 906, and for all concentrated loads wherever they occur as provided in Section 907.0. The live loads in Table 906 are the minimum loads to be used for the occupancies listed. Where the buildings will be subjected to greater live loads, such loads will be used for design.

**Table 906**
**MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS**

| Occupancy or use | Live load (psf) |
|---|---|
| Apartments (see Residential) | |
| Armories and drill rooms | 150 |
| Assembly areas: | |
| Fixed seats | 50 |
| Movable seats | 100 |
| Platforms (assembly) | 100 |
| Stage floors | 150 |
| Balcony (exterior) | 100 |
| One and two family dwellings only | 60 |
| Bowling alleys, poolrooms and billiard rooms | 75 |
| Cornices | 60 |
| Corridors, except as otherwise indicated | 100 |
| Dwellings (see Residential) | |
| Fire escapes | 100 |
| Single family residential buildings only | 40 |
| Garages: | |
| Passenger cars | 50 |
| Trucks and buses | Note a |

**Table 906 (cont'd.)**
**MINIMUM UNIFORMLY DISTRIBUTED LIVE LOADS**

| Occupancy or use | Live load (psf) |
|---|---|
| Grandstands (see Reviewing stands) | |
| Gymnasiums, main floors and balconies | 100 |
| Hospitals: | |
| Operating rooms, laboratories | 60 |
| Private rooms | 40 |
| Wards | 40 |
| Corridors, above first floor | 80 |
| Hotels (see Residential) | |
| Libraries: | |
| Reading rooms | 60 |
| Stack rooms | 150 |
| Manufacturing: | |
| Light | 100 |
| Heavy | 150 |
| Marquees | 75 |
| Office buildings: | |
| Offices | 50 |
| Lobbies | 100 |
| Corridors, above first floor | 80 |
| File and computer rooms require heavier loads based upon anticipated occupancy | |
| Penal institutions: | |
| Cell blocks | 40 |
| Residential: | |
| Attics | 20[b] |
| Multi-family dwellings: | |
| Dwelling units | 40 |
| Public rooms | 100 |
| Corridors | 80 |
| One and two family dwellings | 40 |
| Sleeping rooms | 30 |
| Hotels: | |
| Guest rooms | 40 |
| Public rooms | 100 |
| Corridors serving public rooms | 100 |
| Corridors | 80 |
| Reviewing stands, grandstands and bleachers | 100[c] |
| Schools: | |
| Classrooms | 40 |
| Corridors | 80 |
| Sidewalks, vehicular driveways, subject to trucking | 250 |
| Skating rinks | 100 |
| Stairs and exits | 100 |
| Storage areas: | |
| Light | 125 |
| Heavy | 250 |
| Stores: | |
| Retail | 75 |
| Wholesale | 100 |
| Yards and terraces, pedestrians | 100 |

**Note a.** Minimum live loads shall be in accordance with lane loads of AASHTO HB-12 listed in Appendix A but shall not be less than 50 psf.

**906.2 Posting of live loads:** In every building or other structure or part thereof of Use Groups B, F, M or S the design loads shall be marked on plates of approved design which shall be supplied and securely affixed by the owner of the building, or the owner's authorized agent, in a conspicuous place in each space to which they relate. Any plates lost, removed or defaced shall be replaced by the owner or the owner's agent.

## SECTION 907.0 CONCENTRATED LOADS

**907.1 General:** Floors of buildings in the locations specified in Table 907 shall be designed to support the uniformly distributed live loads prescribed in Section 906.0 or the following concentrated loads in pounds, whichever

**Table 907**
**MINIMUM CONCENTRATED LOADS**

| Location | Pounds[a] |
|---|---|
| Elevator machine room grating (on area of 4 sq. in.) | 300 |
| Finish light floor plate construction (on area of 1 sq. in.) | 200 |
| Garages | See Note b |
| Greenhouse roof bars, purlins and rafters | 100 |
| Hospitals and ward rooms | 1,000 |
| Libraries | 1,000 |
| Manufacturing and storage buildings | 2,000 |
| Mercantile areas | 2,000 |
| Office | 2,000 |
| Schools | 1,000 |
| Scuttles, skylight ribs and accessible ceilings | 200 |
| Sidewalks or vehicular driveways subject to trucking | 8,000 |
| Stair treads (on area of 4 sq. in.) | 300 |

**Note a.** Applied to an area 2½ feet by 2½ feet (762 mm by 762 mm) unless otherwise indicated. These are the minimum concentrated loads, if anticipated loads are higher the actual loads shall be used.

**Note b.** Minimum concentrated loads for garages or portions of buildings used for parking motor vehicles shall be:

1. For passenger cars accommodating not more than nine passengers, 2,000 pounds acting on an area of 20 square inches;
2. Mechanical parking structures without slab, passenger cars only, 1,500 pounds per wheel; and
3. For trucks or buses, on slabs, maximum axle load on an area of 20 square inches.

**Note c.** 1 pound = 4.448 N; 1 square inch = 645.16 square mm.

**Notes to Table 906 (cont'd.)**

**Note b.** Live load need be applied to joists or to bottom chords of trusses or trussed rafters only in those portions of attic space having a clear height of 42 inches or more between joist and rafter in conventional rafter construction; and between bottom chord and any other member in trusses or trussed rafter construction. However, joists or the bottom chords of trusses or trussed rafters shall be designed to sustain the imposed dead load or 10 psf whichever be greater, uniformly distributed over the entire span.

A further ceiling dead load reduction to a minimum of 5 psf or the actual dead load, whichever is greater, may be applied to joists in conventional rafter construction or to the bottom chords of trusses or trussed rafters under either or both of the following conditions:

1. If the clear height is not over 30 inches between joist and rafter in conventional construction and between the bottom chord and any other member for trusses or trussed rafter construction.
2. If a clear height of greater than 30 inches, as defined in item 1 directly above, does not exist for a horizontal distance of more than 12 inches along the member.

**Note c.** Loads of 120 pounds per lineal foot on footboards and seatboards shall be used. Lateral sway bracing loads of 24 pounds per foot parallel and to 10 pounds per lineal foot perpendicular to seats and footboards shall be used.

**Note d.** 1 inch = 25.4 mm; 1 psf = 4.882 kg/m².

produces the greater stresses. Unless otherwise specified, the indicated concentration shall be assumed to occupy an area of 2½ feet (762 mm) square and shall be so located as to produce the maximum stress conditions in the structural members.

## SECTION 908.0 IMPACT LOADS

**908.1 General:** The live loads specified in Section 906.0 shall be assumed to include adequate allowance for ordinary impact conditions. Provision shall be made in the structural design for special uses and loads which involve vibration and impact forces.

**908.2 Elevators:** All moving elevator loads shall be increased 100 percent for impact, and the structural supports shall be designed within the limits of deflection prescribed by ANSI A17.1 listed in Appendix A.

**908.3 Machinery:** For the purpose of design, the weight of machinery and moving loads shall be increased as follows to allow for impact:

| | |
|---|---|
| Elevator machinery | 100 percent |
| Light machinery, shaft or motor driven | 20 percent |
| Reciprocating machinery or power driven units | 50 percent |
| Hangers for floors or balconies | 33 percent |

These percentages shall be increased when so recommended by the manufacturer.

**908.4 Craneways:** All craneways shall have their design loads increased for impact as follows:

1. A vertical force equal to 25 percent of the maximum wheel load;
2. A lateral force equal to 20 percent of the weight of the trolley and lifted load only, applied one half at the top of each rail; and
3. A longitudinal force of 10 percent of the maximum wheel loads of the crane applied at top of rail.

**908.5 Assembly structures:** Grandstands, stadiums and similar assembly structures shall be designed to resist a horizontal swaying load applied parallel to the rows of seats, in addition to any wind loads, of not less than 24 pounds per lineal foot (35.74 kg/m) of seats; and of not less than 10 pounds per lineal foot (14.89 kg/m) of seats applied transversely.

## SECTION 909.0 SPECIAL LOADS

**909.1 General:** Provisions shall be made for all special loads herein prescribed and all other special loads to which the building or structure may be subjected.

**909.2 Retaining walls:** Retaining walls shall be designed to resist the lateral pressure of retained material. Walls retaining drained earth may be designed for pressure equivalent to that exerted by fluid weighing not less than 30 pounds per cubic foot (20.47 kg/m$^3$) and having a depth equal to that of the retained earth. Any surcharge shall be in addition to the equivalent fluid pressure.

**909.3 Hydrostatic uplift:** All foundation slabs and other footings subjected to water pressure shall be designed to resist a uniformly distributed uplift equal to the full hydrostatic pressure.

**909.4 Handrails and guardrails:** Handrails and guardrails around stairwells, balconies and other floor openings, both exterior and interior, shall be designed to resist a load of at least 200 pounds (889.60 N) applied in any direction at any point of the top rail and also a vertical and horizontal thrust of 50 pounds per lineal foot (74.45 kg/m) applied at the top railing. The concentrated load and distributed loads need not be assumed to act concurrently. Railings and guards of reviewing stands, grandstands, bleachers and similar assembly structures shall be capable of resisting a lateral force of 50 pounds per lineal foot (74.45 kg/m) and sustaining a vertical load of 100 pounds per lineal foot (148.9 kg/m).

**Exception:** Handrails within a dwelling unit may be reduced to 20 pounds per lineal foot (29.78 kg/m) applied horizontally at the top.

**909.5 Construction loads and erection stresses:** Provision shall be made for temporary construction and wind loads which may occur during the erection of the building; and all structural members and connections shall be designed and erected so as to prevent overstressing during construction.

**909.6 Partial loading:** The full intensity of the appropriately reduced live load applied only to a portion of the length of a structure or member shall be considered if it produces a more unfavorable effect than the same intensity applied over the full length of the structure or member.

**909.7 Interior finish:** Finish materials used on interior walls and partitions shall have adequate strength to resist a horizontal load of not less than 5 psf (24.41 kg/m$^2$).

## SECTION 910.0 ROOF LOADS

**910.1 General:** The structural supports of roofs and marquees shall be designed to resist wind and, where applicable, snow and earthquake loads in addition to the dead load of construction and the appropriate live loads as prescribed below, or in Table 906 (snow load as provided in Section 911.0; wind load as provided in Section 912.0; and earthquake load as provided in Section 916.0).

**910.2 Minimum roof loads:** Ordinary roofs, either flat, pitched, or curved, shall be designed for the live loads as specified in Table 910 or the snow load, whichever is greater.

**910.3 Overhanging eaves:** In other than buildings of Use Group R-3, and except where framing of overhang is a continuation of the roof framing, overhanging eaves, cornices and other roof projections shall be designed for a minimum uniformly distributed live load of 60 psf (292.92 kg/m$^2$).

**910.4 Ponding:** Roofs shall be designed for the maximum possible depth of water that may be ponded thereon as determined by the relative levels of roof

deck and overflow weirs, scuppers, edges or serviceable drains in combination with the deflected structural elements. In determining the maximum possible depth of water, all primary roof drainage means shall be assumed to be blocked.

**910.5 Special purpose roofs:** When used for incidental promenade purposes, roofs shall be designed for a minimum live load of 60 psf (292.92 kg/ m²); and 100 psf (488.20 kg/ m²) when designed for roof gardens or assembly uses.

**910.5.1 Landscaped roofs:** Where roofs are to be landscaped, the uniform design live load in the landscaped area shall be 20 psf (97.64 kg/ m²). The weight of the landscaping materials shall be considered as dead load and shall be computed on the basis of saturation of the soil.

**910.5.2 Special purpose roofs:** Roofs to be used for other special purposes shall be designed for appropriate loads, or as approved by the building official.

**Table 910**
**MINIMUM ROOF LIVE LOADS[a]**

| Roof slope | Tributary loaded area in square feet for any structural member | | |
|---|---|---|---|
| | 0 to 200 | 201 to 600 | Over 600 |
| Flat or rise less than 4 inches per foot (1:3) Arch or dome with rise less than ⅛ of span | 20 | 16 | 12 |
| Rise 4 inches per foot (1:3) to less than 12 inches per foot (1:1) Arch or dome with rise ⅛ of span or less than ⅜ of span | 16 | 14 | 12 |
| Rise 12 inches per foot (1:1) and greater Arch or dome with rise ⅜ of span or greater | 12 | 12 | 12 |

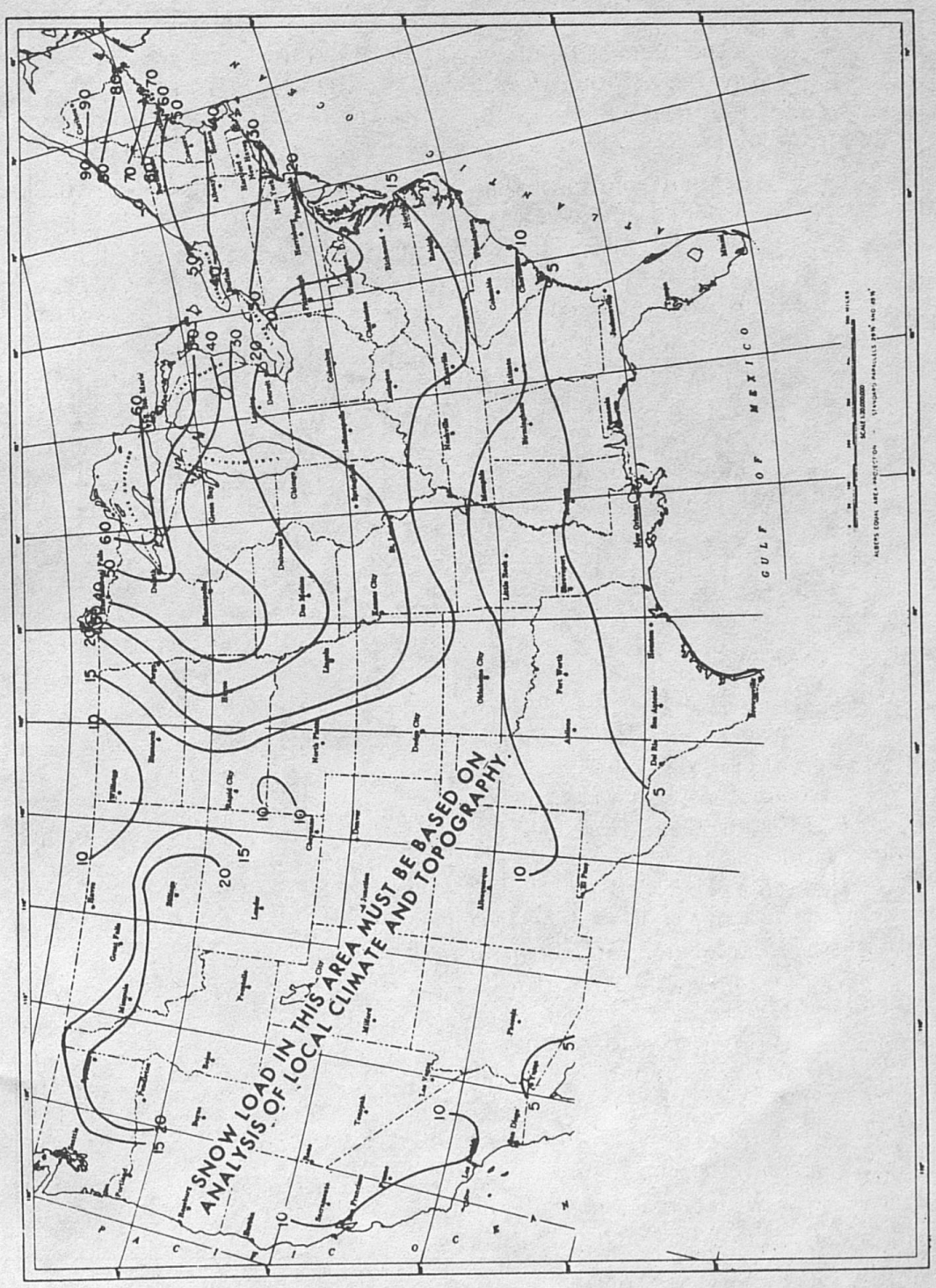
**Note a.** In pound-force per square foot or horizontal projection.
**Note b.** 1 square foot = 0.093 m²; 1 psf = 4.882 kg/m².

## SECTION 911.0 SNOW LOAD

**911.1 General:** The basic snow loads to be assumed in the design of buildings or other structures are given in Figures 911.1a, 911.1b and 911.1c for the portion of the United States for which isolines of ground snow are shown. These loads correspond to the ground snow load in pound-force per square foot for 100, 50 and 25 year mean recurrence intervals, respectively.

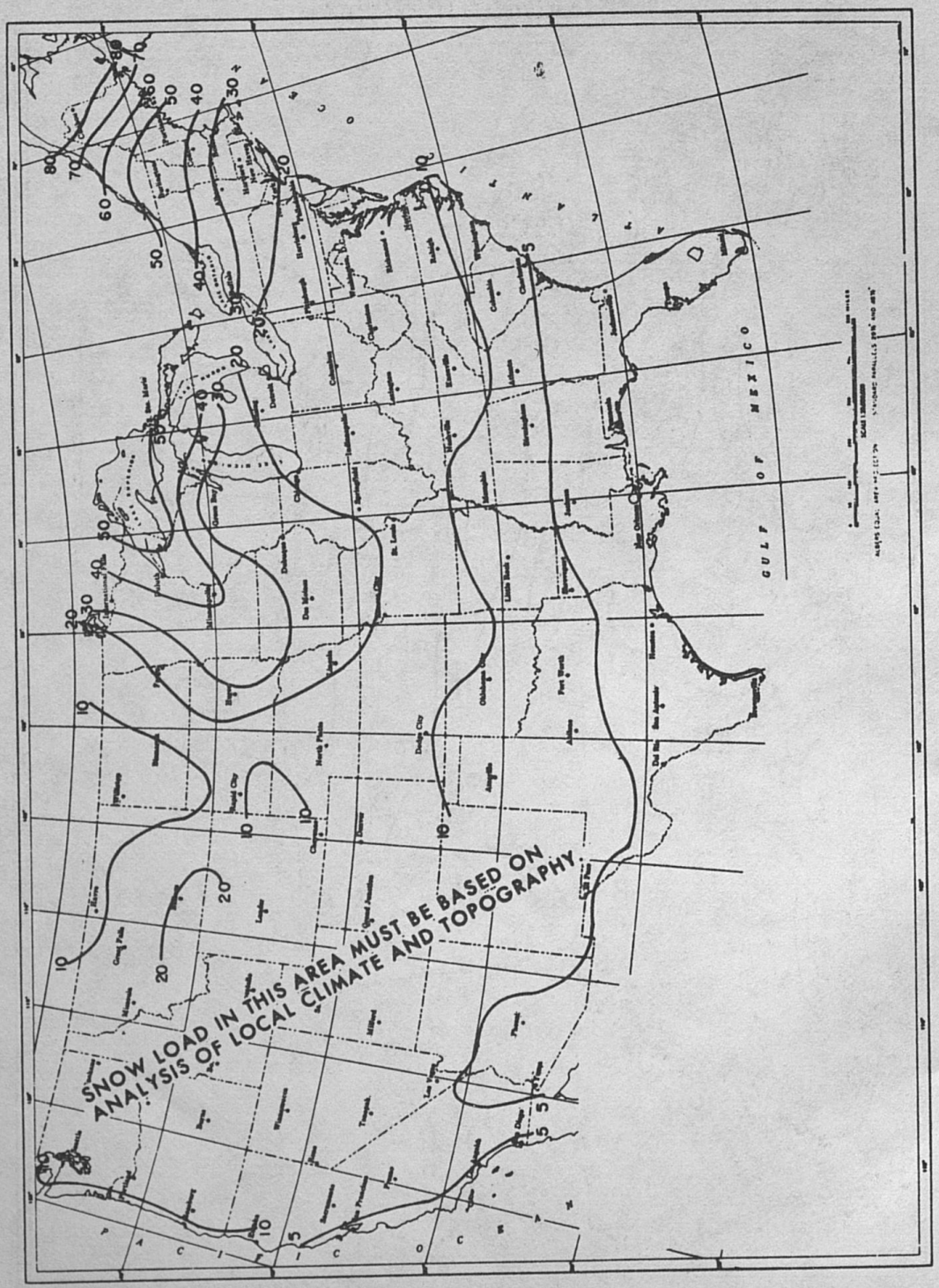
**911.2 Design snow load:** Figure 911.1a shall be used for all buildings in Use Group A, H, I and R-1. Figure 911.1b shall be used for all buildings in Use Groups B, F, M, R-2 and R-3. Figure 911.1c shall be used for buildings in Use Groups S and any building in miscellaneous Use Group T which does not

Figure 911.1a
SNOW LOAD IN POUND-FORCE PER SQUARE FOOT ON THE GROUND,
100 YEAR MEAN RECURRENCE INTERVAL



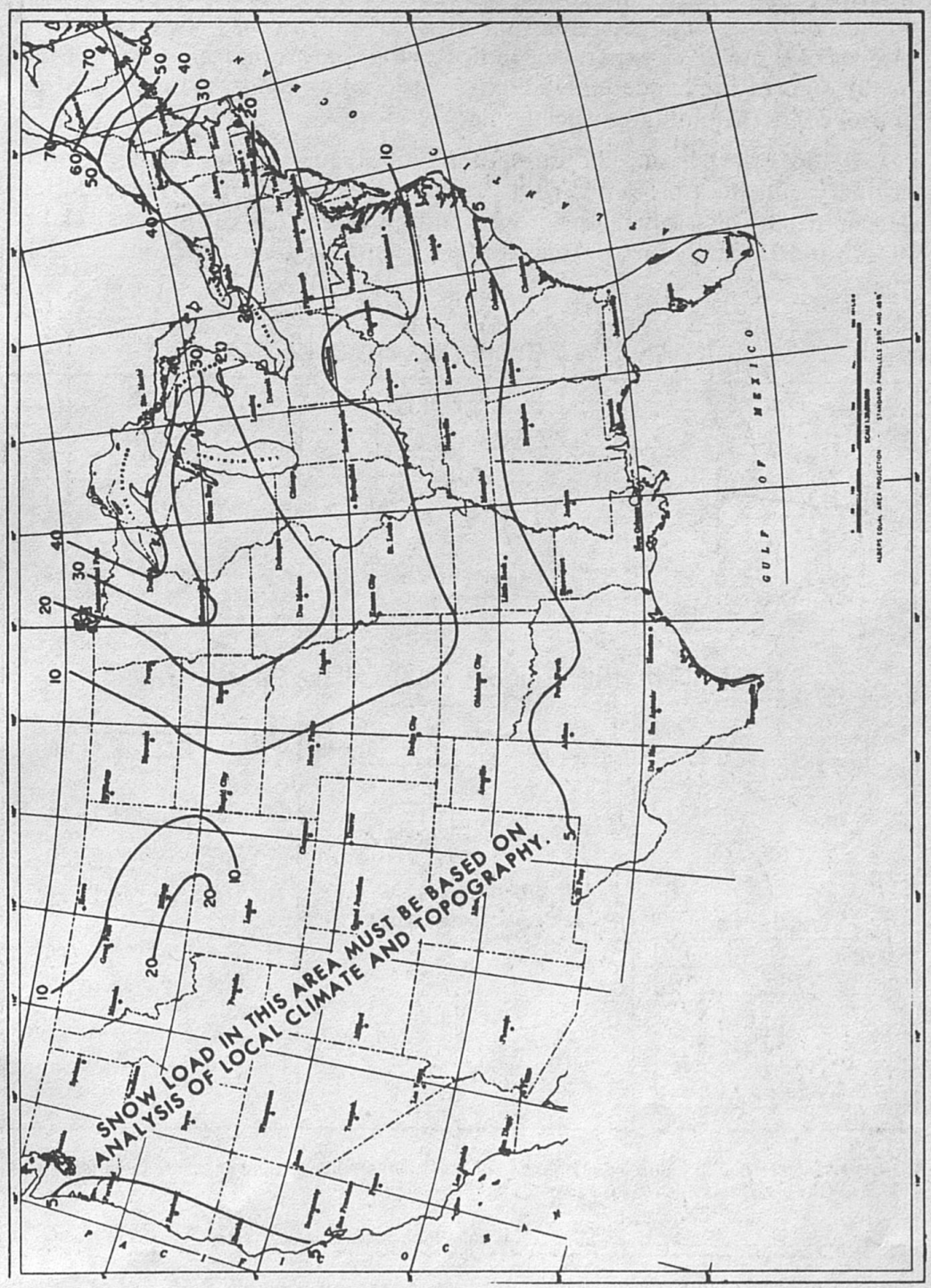

Note a. 1 psf = 4.882 kg/m².

**Figure 911.1b**
**SNOW LOAD IN POUND-FORCE PER SQUARE FOOT ON THE GROUND, 50 YEAR MEAN RECURRENCE INTERVAL**




**Note a.** 1 psf = 4.882 kg/m².

Figure 911.1c
SNOW LOAD IN POUND-FORCE PER SQUARE FOOT ON THE GROUND,
25 YEAR MEAN RECURRENCE INTERVAL




**Note a.** 1 psf = 4.882 kg/m².

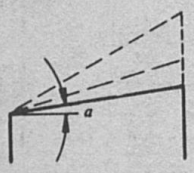
have human occupants. The snow load design used for temporary Use Group T buildings shall be approved by the building official.

**911.2.1 Special snow regions:** Special consideration shall be given to regions where design loads are not shown in Figures 911.1a, 911.1b and 911.1c and where unusually high accumulations of snow may occur. For areas where records of snowfall or experience indicates that the ground snow loads given in the figures are inadequate, higher basic snow loads shall be used as approved by the building official.

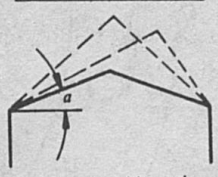
**911.3 Roof snow load:** The minimum snow loads for the design of both ordinary and multiple series roofs, either flat, pitched or curved, shall be determined by multiplying the ground snow load given in the Figures 911.1a, 911.1b and 911.1c by the appropriate coefficients, $C_s$, given in Section 911.3.1.

**Figure 911.3a**
**SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS**

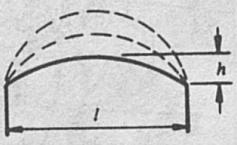
ROOF SHAPES




Simple flat and shed roofs




Simple gable and hip roofs




Simple arch and curved roofs

SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS. LIMITATIONS




$$C_s^* = 0.8 - \frac{a-30}{50}$$

**Typical Values**

| $a$ | $C_s$ | |
|---|---|---|
| | Shelt | Expd |
| 0 to 30° | 0.8 | 0.6 |
| 40° | 0.6 | 0.45 |
| 50° | 0.4 | 0.3 |
| 60° | 0.2 | 0.15 |
| 70° to 90° | 0 | 0 |

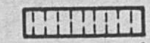
Case I  $C_s$*

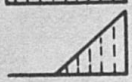
Case II  $C_s$*

For $a \leq 20°$ use case I only
For $a > 20°$ use cases I and II

Case I $C_s^* = 0.8 - \frac{a-30}{50}$

Case II $C_s^* = 1.25\left(0.8 - \frac{a-30}{50}\right)$

Case I  0.8*

Case II  2.0

For $\frac{h}{l} \leq \frac{1}{10}$ use case I only

For $\frac{h}{l} > \frac{1}{10}$ use cases I and II

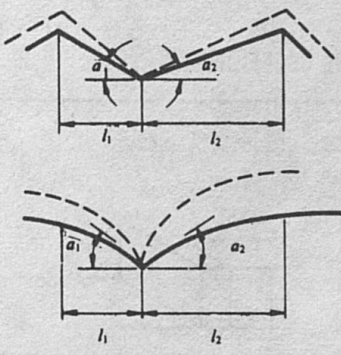
**Note a.** (Referenced in figure by asterisks.) For roofs conforming to wind exposure requirements of 911.3.1, values of $C_s$ may be reduced 25 percent.

The term $\frac{a-30}{50}$ is valid for greater than 30 degrees.

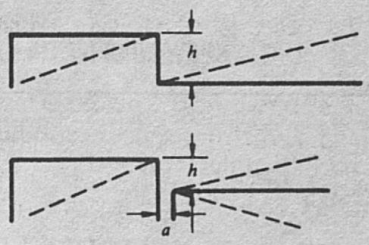
**Note b.** 1 degree = 0.01745 rad.

**Figure 911.3b**
**SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS**

ROOF SHAPES

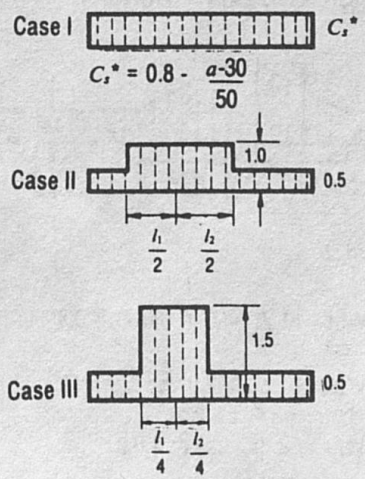



Valley areas of two-span and multiple series sloped or curved roofs



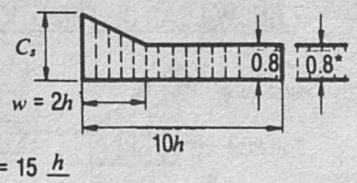

Lower level of multi-level roofs (when upper roof is part of the same building or on an adjacent building not more than 15 ft. away)

SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS. LIMITATIONS




$\beta = \frac{a_1 + a_2}{2}$

For $\beta \leq 10°$ use case I only
For $10° < \beta < 20°$ use cases I and II
For $\beta \geq 20°$ use cases I, II and III




$C_s = 15 \frac{h}{g}$

When $15 \frac{h}{g} < 0.8^*$ use $C_s = 0.8^*$

When $15 \frac{h}{g} > 3.0$ use $C_s = 3.0$

$w = 2h$

When $h < 5$ ft use $w = 10$ ft
$h > 15$ ft use $w = 30$ ft

$h$ = Difference of roof heights in ft
$g$ = Ground snow load in psf
$w$ = Width of drift from higher building in ft
$a$ = Distance between buildings $< 15$ ft

Design upper roof for loads applicable to single-level roofs

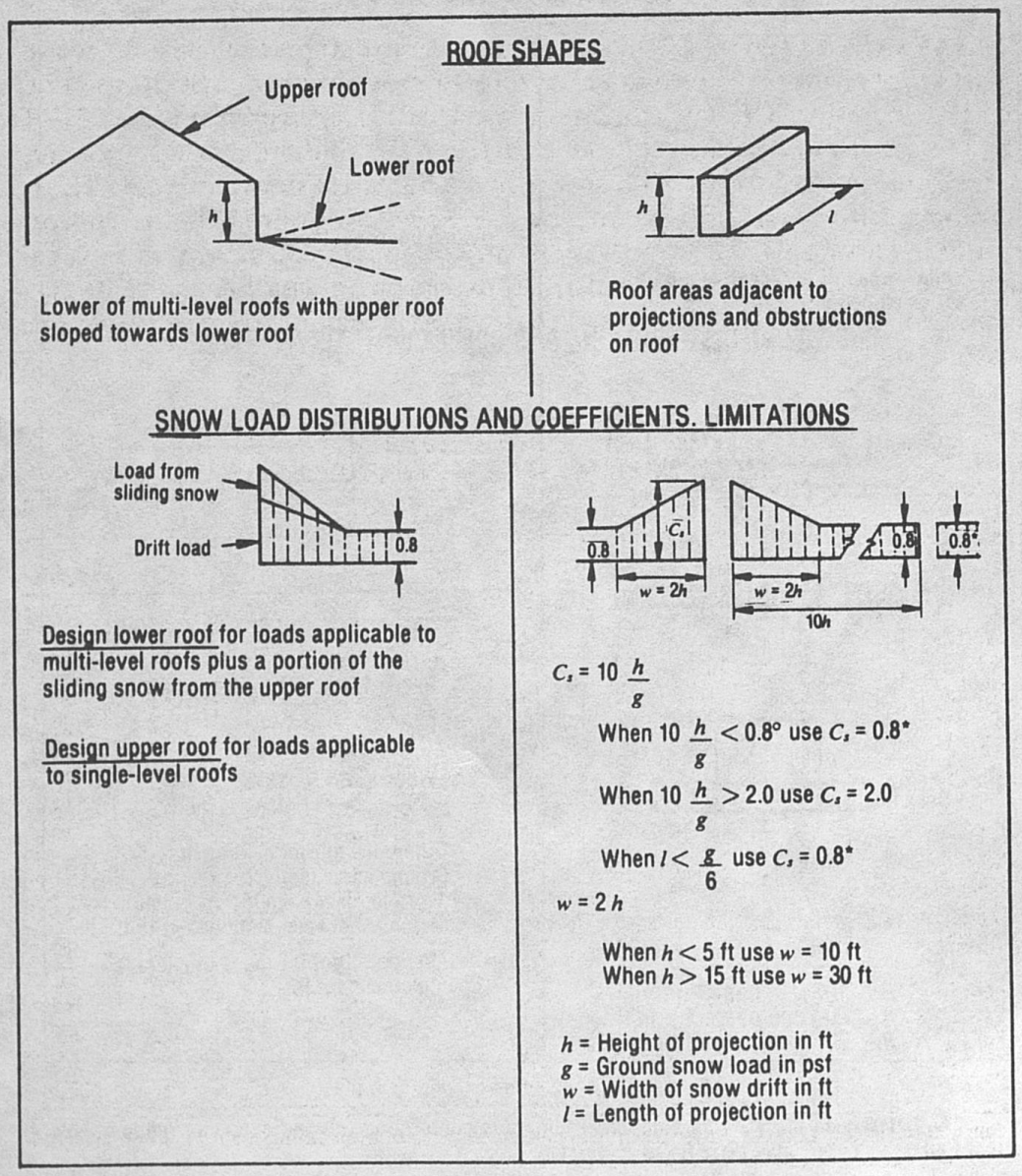
**Note a.** (Referenced in figure by asterisks.) For roofs conforming to wind exposure requirements of 911.3.1 all values of $C_s$ may be reduced 25 percent.

The term $\frac{a - 30}{50}$ is valid for greater than 30 degrees.

**Note b.** 1 degree = 0.01745 rad; 1 foot = 304.8 mm; 1 psf = 4.882 kg/m².

**911.3.1 Snow load coefficients:** The basic snow load coefficient, $C_s$, shall be taken as 0.8, and shall be increased or decreased in accordance with the Figures 911.3a, 911.3b and 911.3c. For roofs that have a clear exposure to winds of sufficient intensity to remove snow, and that do not have such projections as parapet walls, a basic snow load coefficient of 0.6 may be used.

**Figure 911.3c**
**SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS**




**Note a.** (Referenced in figure by asterisks.) For roofs conforming to wind exposure requirements of 911.3.1, values of $C_s$ may be reduced 25 percent.

**Note b.** 1 foot = 304.8 mm; 1 psf = 4.882 kg/m².

This coefficient may be applied only in those regions where the resulting reduced snow load is equal to, or greater than 12 psf (58.58 kg/m²). Roofs shielded on any side by obstructions within a distance of 10 *h* from the building (*h* is the height of the obstruction above the roof level) shall not be considered to have a clear exposure. Where more than one case is specified, each case shall be considered separately in designing structural elements and the more unfavorable effect shall be used for the building design.

## SECTION 912.0 WIND LOAD

**912.1 Design:** All exposed structures or parts of structures shall be designed to resist the pressures due to wind in any direction, as provided in Sections 912.0 to 915.0 inclusive. The basic minimum wind speeds are shown in Figure 912.1 for the geographic location of the structure. The minimum wind pressures corresponding to specific wind speeds and heights are shown in Table 912.1. In all cases, the wind loads shall be considered as acting normal to the surfaces to which they apply. These provisions do not apply to structures of unusual shape, exposure, or structural characteristics which would make them susceptible to unusual stresses. In such cases, special engineering investigations are required.

**Table 912.1**
**EFFECTIVE VELOCITY PRESSURES[a]**
**FOR ORDINARY BUILDINGS AND STRUCTURES**

| Height (ft) | Basic wind speed (mph) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 |
| Less than 30 | 10 | 10 | 10 | 10 | 13 | 16 | 20 | 23 | 27 |
| 30-40 | 10 | 10 | 11 | 14 | 17 | 21 | 27 | 31 | 36 |
| 40-75 | 10 | 10 | 12 | 15 | 19 | 24 | 29 | 34 | 40 |
| 75-125 | 10 | 11 | 15 | 19 | 24 | 30 | 36 | 43 | 51 |
| 125-175 | 10 | 12 | 17 | 22 | 28 | 34 | 41 | 49 | 58 |
| 175-225 | 10 | 14 | 18 | 24 | 31 | 38 | 46 | 54 | 64 |
| 225-275 | 10 | 15 | 20 | 26 | 33 | 41 | 49 | 59 | 69 |
| 275-325 | 11 | 16 | 21 | 28 | 35 | 43 | 52 | 62 | 73 |
| 325-375 | 11 | 16 | 22 | 29 | 37 | 45 | 55 | 65 | 77 |
| 375-425 | 12 | 17 | 23 | 31 | 39 | 48 | 58 | 69 | 81 |
| 425-475 | 12 | 18 | 24 | 32 | 40 | 50 | 60 | 72 | 84 |
| 475-525 | 13 | 18 | 25 | 33 | 42 | 51 | 62 | 74 | 87 |
| 525-575 | 13 | 19 | 26 | 34 | 43 | 53 | 64 | 76 | 90 |
| 575-625 | 14 | 20 | 27 | 35 | 44 | 55 | 66 | 79 | 92 |
| 625-675 | 14 | 20 | 28 | 36 | 46 | 57 | 69 | 82 | 96 |
| 675-725 | 14 | 21 | 28 | 37 | 47 | 58 | 70 | 83 | 98 |
| 725-775 | 15 | 21 | 29 | 38 | 48 | 59 | 72 | 86 | 100 |
| 775-825 | 15 | 22 | 30 | 39 | 49 | 61 | 73 | 87 | 102 |

**Note a.** Pressures, in pounds per square foot, are based on geographic locations such as suburban areas, towns, city outskirts, wooded areas and rolling terrain.
**Note b.** 1 foot = 304.8 mm; 1 mph = 0.447 m/s; 1 psf = 4.882 kg/m².

**912.2 Special wind conditions:** Special wind conditions shall be provided for in accordance with Sections 912.2.1 and 912.2.2.

**912.2.1 Increased loads:** For structures located in flat, open country, open flat coastal belts, grassland, unusually exposed positions or in geographical regions where local records indicate higher wind loads than established in Section 912.1 the higher wind load shall be used.

**912.2.2 Decreased loads:** For structures located in centers of large cities, very rough, hilly terrain and in geographical regions where substantiating data indicates lower wind loads than established in Section 912.1, designs based on lower wind loads may be approved.

**Exception:** Reduction in wind loads due to direct shielding afforded by adjacent structures shall not be permitted.

**912.3 Torsional resistance:** The structural frame of all structures subjected to wind or other lateral loads shall be designed to resist the torsional moment due to eccentricity of the resultant load with respect to the center of rigidity of the structure.

**912.4 Anchorage:** Anchorage of the roof to walls and columns, and of walls and columns to the foundation system shall be provided to resist overturning, uplift, and sliding forces.

**912.5 Overturning:** The overturning moment due to the wind load on all structures shall not exceed two thirds of the stabilizing moment resulting from the dead load of the structure, unless the structure is anchored to resist the excess overturning moment and the excess horizontal shear over sliding friction.

## SECTION 913.0 WIND ON VERTICAL SURFACES

**913.1 General:** The wind pressures on vertical surfaces to be considered in the design of the elements of the structure shall be those prescribed in Section 912.1, distributed and modified in accordance with this section. The wind pressure shall be applied to the gross area of the vertical surface of that portion of the structure above grade.

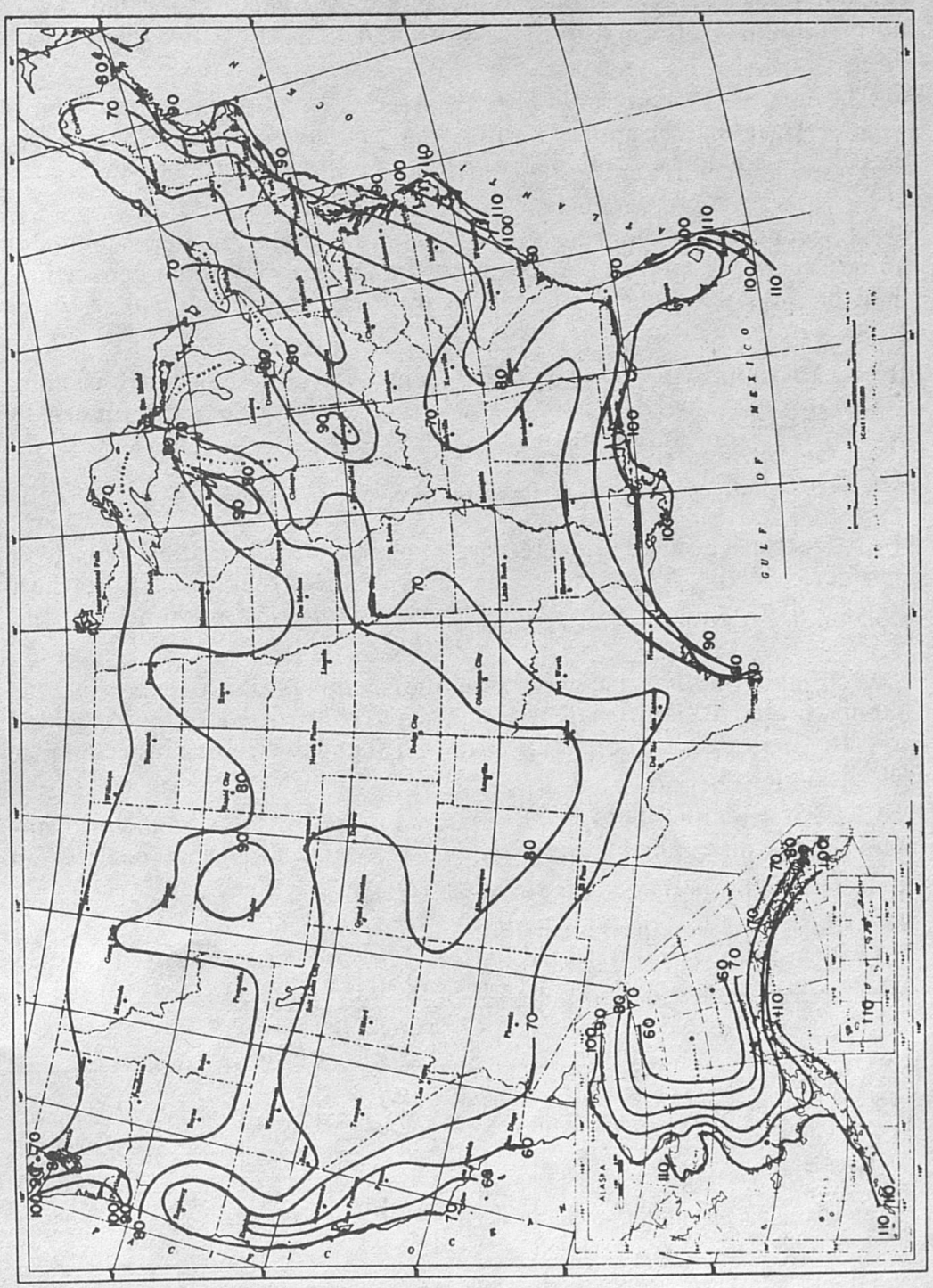
**913.2 Bracing system:** Forces due to wind loads shall be transferred to the ground by a properly designed structural system.

**913.3 Primary framing members:** Structural members and systems providing stability for the structure shall be designed and constructed for the basic wind pressures indicated in Table 912.1 and modified in Sections 913.3.1 and

**Table 913.3.1**
**EXTERNAL DISTRIBUTION COEFFICIENTS FOR VERTICAL SURFACES**
**PRIMARY FRAMES AND SYSTEMS**

| | |
|---|---|
| Windward wall | 0.8 |
| Leeward wall | 0.5 |
| If height/width and height/length ratios are greater than 2.5 | 0.6 |
| Side walls | 0.7 |

**Figure 912.1**
**BASIC WIND SPEED IN MILES PER HOUR**
Annual Extreme Fastest-Mile Speed 30 Feet Above Ground,
50 Year Mean Recurrence Interval[a]




**Note a.** This figure applies to all types of storms except tornadoes.
**Note b.** 1 foot = 304.8 mm; 1 mph = 0.447 m/s.

913.3.2. Pressures shall be multiplied by the coefficients indicated in Table 913.3.1 and in Section 913.3.2.

**913.3.1 External distribution:** The wind pressure shall be distributed between exterior walls as a normal inward pressure on the windward wall and as a normal outward pressure on the leeward and sidewalls in accordance with Table 913.3.1.

**913.3.2 Internal pressures:** An internal pressure equal to 1.0 times the basic wind pressure shall be applied to all primary members acting outward. This pressure is not to be combined with the pressures determined in Section 913.3.1.

**913.4 Secondary components:** Girts, windows and glazing, doors and door frames, spandrels and similar secondary components and their connections shall be designed and constructed to transfer the wind pressures to the primary framing members.

**913.4.1 Distribution:** Secondary components shall be designed to resist internal and external wind pressures equal to 1.5 times those determined by Section 912.1, but not less than 15 psf (3.23 kg/ $m^2$).

## SECTION 914.0 WIND ON INCLINED SURFACES

**914.1 General:** The wind pressures on inclined surfaces, including roofs, to be considered in the design of the elements of the structure shall be those prescribed in Section 912.1, distributed and modified in accordance with this section.

**914.2 Primary framing members:** Structural members and systems providing stability for the structure shall be designed and constructed for the basic wind pressures indicated in Table 912.1 as modified and distributed in accordance with Section 914.2.1.

**914.2.1 External distribution:** The external wind pressures on inclined surfaces shall be distributed as indicated in Table 914.2.1 and shall be based on

**Table 914.2.1**
**EXTERNAL DISTRIBUTION FACTORS[a] FOR INCLINED SURFACES**
**PRIMARY FRAMES AND SYSTEMS**

| | Windward slopes angle with horizontal | | | | | | |
|---|---|---|---|---|---|---|---|
| Ratio of sidewall height to building width | Flat to 15° | 15° to 25° | 25° to 35° | 35° to 45° | 45° to 60° | More than 60° | All leeward slopes |
| 0.3 or less | —1.0 | 0.2 | 0.3 | 0.4 | 0.5 | 0.8 | —0.7 |
| 0.5 | —1.0 | —0.8 | —0.2 | 0.3 | 0.5 | 0.8 | —0.7 |
| 1.0 | —1.0 | —1.0 | —0.6 | —0.1 | 0.5 | 0.8 | —0.7 |
| 1.5 or more | —1.0 | —1.0 | —0.9 | —0.4 | 0.2 | 0.8 | —0.7 |

**Note a.** — indicates forces outward; all others indicate forces inward.
**Note b.** 1 degree = 0.01745 rad.

the average height of the lower edge or roof eave above grade, the slope of the surface at the location under consideration and the ratio of sidewall height to building width.

**914.2.2 Arched surfaces:** The external wind pressures assumed to be acting on the primary framing members of external arched surfaces shall not be less than those indicated in Table 912.1 as distributed in accordance with Table 914.2.2.

**Table 914.2.2**
**EXTERNAL DISTRIBUTION FACTOR[a] FOR ARCHED SURFACES ON ELEVATED SUPPORTED PRIMARY FRAMES AND SYSTEMS**

| Rise to span ratio | Windward quarter | Center half | Leeward quarter |
|---|---|---|---|
| less than 0.2 | —0.9 | —0.8 | —0.5 |
| 0.2 to 0.25 | —0.6 | —0.9 | —0.5 |
| 0.25 to 0.3 | —0.5 | —1.0 | —0.5 |
| 0.35 to 0.35 | 0.2 | —1.0 | —0.5 |
| 0.35 to 0.4 | 0.4 | —1.1 | —0.5 |
| 0.4 to 0.5 | 0.6 | —1.2 | —0.5 |
| more than 0.5 | 0.9 | —1.3 | —0.5 |

**Note a.** —indicates forces outward; all others indicate forces inward.

**914.3 Secondary members:** Secondary roof framing, purlins, roof panels, glazing and sheathing and their connections shall be designed to resist wind pressures as specified in Section 913.4.1.

**914.4 Overhang uplift:** Overhanging eaves, cornices and other roof projections shall be designed and constructed to withstand an upward pressure of 2.0 times the wind pressures given in Table 912.1.

## SECTION 915.0 WIND LOADS ON SIGNS, TANK TOWERS AND CHIMNEYS

**915.1 Ground signs and towers:** The wind pressure on ground signs and towers other than radio and television towers, shall be those prescribed in Section 913.4 for secondary components.

**915.2 Roof structures:** The wind pressure on roof signs, tank towers, stacks, chimneys and other exposed roof structures with plane surfaces shall be those prescribed in Section 913.4 for secondary components except as provided in Sections 915.3 and 915.4.

**915.3 Shielding effect:** The shielding effect of one element by another shall not be considered when the distance between them exceeds four times the projected smallest dimension of the windward element.

**915.4 Effect of shape:** Net pressure coefficients for chimneys, tanks and similar structures are prescribed in Table 915.4. These coefficients apply to the projected area of the structure on a vertical plane normal to the wind direction. For slender structures such as flagpoles, a minimum net pressure coefficient of 1.2 shall be used if $d\sqrt{q} < 2.5$.

**Table 915.4**
**NET PRESSURE COEFFICIENTS FOR CHIMNEYS AND TANKS [a]**

| Shape | Type or surface | h/d | | |
|---|---|---|---|---|
| | | 1 | 7 | 25 |
| Square (wind normal to a face) | Smooth or rough | 1.3 | 1.4 | 2.0 |
| Square (wind along diagonal) | Smooth or rough | 1.0 | 1.1 | 1.5 |
| Hexagonal or octagonal ($d\sqrt{q} > 2.5$.) | Smooth or rough | 1.0 | 1.2 | 1.4 |
| Round ($d\sqrt{q} > 2.5$.) | Moderately smooth [b] | 0.5 | 0.6 | 0.7 |
| | Rough ($d'/d \cong 0.02$) | 0.7 | 0.8 | 0.9 |
| | Very rough ($d'/d \cong 0.08$) | 0.8 | 1.0 | 1.2 |

**Note a.** $h$ = height of structure in feet; $d$ = diameter or least horizontal dimension in feet; $d'$ = depth in feet of protruding elements such as ribs and spoilers; $q$ = the effective velocity pressure in psf from Table 912.1.
**Note b.** Metal, timber, concrete.
**Note c.** 1 foot = 304.8 mm; 1 psf = 4.882 kg/m².

## SECTION 916.0 EARTHQUAKE LOAD

**916.1 General:** In regions where local experience or the records of the U.S. Geological Survey (USGS) show loss of life or damage of buildings resulting from earthquakes, buildings and structures hereafter erected shall be designed to withstand lateral forces as provided in Section 916.3, except as exempted in Section 916.2.

**916.2 Exemptions:** Earthquake loading shall not be required in calculating the structural frame of a building or structure when the building complies with one or more of the following conditions.

1. Is located in Zone 0 of Figure 916.
2. Is located where local experience or the records of the U.S. Geological Survey (USGS) do not show loss of life or damage to property, regardless of zone.
3. Is a building of Use Group R-3.
4. Is a minor accessory building.

**916.3 Earthquake load design:** The load design criteria provided in this section shall be used to calculate and effectively provide for the loads and stresses acting upon a structure.

**916.3.1 General:** When required to withstand lateral forces under Section 916.1, buildings and structures shall be designed in accordance with the following provisions of this section according to the zone in which they are located on the seismic probability map in Figure 916.

**916.3.1.1 Application of provisions:** These lateral force requirements are intended to make buildings earthquake resistive. The provisions apply to the buildings as a unit and also to all parts thereof, including the structural frame or walls, floor and roof systems, and other structural features. In specific cases, they may be interpreted or added to as to detail by approval of the building official in order that the intent shall be fullfilled.

**916.3.1.2 Additions:** Where applicable, every addition to an existing building or structure shall be designed and constructed to resist and withstand the forces provided for herein, and in any case where an existing building or structure is increased in height all portions thereof affected by such increased height shall be reconstructed to resist and withstand the forces provided for herein.

**916.3.1.3 Alterations:** Where applicable, an existing building or structure shall not be altered or reconstructed in such a manner that the resistance to the forces provided for herein will be less than that before such alteration or reconstruction was made; provided, however, that this provision shall not apply to nonbearing partitions, and shall not apply to other minor alterations which are made in accordance with Section 103.3.

**916.3.2 Plans and design data:** Where earthquake loads are applicable, a brief statement of the items indicated in Sections 916.3.2.1 through 916.3.2.3 shall be included with each set of plans filed.

**916.3.2.1 Dead and live loads:** A summation of the dead and live loads of the building, floor by floor, which was used in figuring the shear for which the building is designed.

**916.3.2.2 Bracing:** A brief description of the bracing system used, the manner in which the designer expects such system to act and a clear statement of any assumption used. Assumptions as to location of all points of counter flexure in members must be stated.

**916.3.2.3 Sample calculation:** Sample calculation of a typical bent or equivalent. For combined stresses due to the lateral forces and other loads, the allowable unit stresses and the allowable load in connections may be increased as provided in Section 917.0.

**916.3.3 Lateral force requirements:** Where earthquake loads are applicable, every building or structure and every portion thereof, except as exempted in Section 916.2, shall be designed and constructed to resist stresses produced by lateral forces as provided in this section. Stresses shall be calculated as the effect of a force applied horizontally at each floor or roof level above the foundation. The force shall be assumed to act from any horizontal direction. In those zones where wind, snow, or other loads impose a greater load than those provided herein, such other loads shall be provided for.

**916.3.4 Definitions:** The definitions listed below apply only to the provisions of this section.

**Space frame:** A three dimensional structural system composed of interconnected members, other than shear or bearing walls, laterally supported so as to function as a complete self contained unit with or without the aid of horizontal diaphragms or floor bracing systems.

**Space frame, vertical load carrying:** A space frame designed to carry all vertical loads.

**Space frame, moment resisting:** A vertical load carrying space frame in which

the members and joints are capable of resisting design lateral forces by bending moments and column shears.

**Space frame, ductile moment resisting:** A space frame which complies with the requirements for a ductile moment resisting space frame as set forth in Section 916.3.11.

**Box system:** A structural system without a complete vertical load carrying space frame. In this system, the required lateral forces are resisted by shear walls as hereinafter defined.

**Shear wall:** A wall designed to resist lateral forces parallel to the wall. Braced frames subjected primarily to axial stresses shall be considered as shear walls for the purpose of this definition.

**Lateral force resisting system:** That part of the structural system to which the lateral forces prescribed in Section 916.3.5.1 are assigned.

**916.3.4.1 Symbols and notations:** The following symbols and notations apply only to the provisions of this section.

| | |
|---|---|
| $C$ | = Numerical coefficient for base shear as defined in Section 916.3.5.2. |
| $C_p$ | = Numerical coefficient as defined in Section 916.3.5.2 and set forth in Table 916.3.5.2. |
| $D$ | = The dimension of the building in feet in a direction parallel to the applied forces (see also Section 916.3.10). |
| $D_s$ | = The plan dimension in feet of the vertical lateral force resisting system in the direction of the applied force. |
| $F_i$, $F_n$, $F_x$ | = Lateral force applied to level $i$, $n$, or $x$ respectively. |
| $F_p$ | = Lateral forces on the part of the structure, and in the direction, under consideration. |
| $F_t$ | = That portion of $V$ considered concentrated at the top of the structure, at the level $n$. The remaining portion of the total base shear ($V$) shall be distributed over the height of the structure including level $n$ according to the equation for $F_x$ in Section 916.3.5.1. |
| $h_i$, $h_n$, $h_x$ | = The height in feet above the base to level $i$, $n$, or $x$ respectively. |
| $J$ | = Numerical coefficient for base overturning moment as defined in Section 916.3.9. |
| $J_x$ | = Numerical coefficient for overturning moment at level $x$. |
| $K$ | = Numerical coefficient as set forth in Table 916.3.5.1. |
| *Level i* | = Level of the structure referred to by the subscript $i$. |
| *Level n* | = That level which is uppermost in the main portion of the structure. |
| *Level x* | = That level which is under design consideration. |
| $M$ | = That overturning moment at the base of the building or structure. |
| $M_x$ | = The overturning moment at level $x$. |

$N$ = The total number of stories above exterior grade to level $n$.

$T$ = Fundamental period of vibration of the building or structure in seconds in the direction under consideration.

$V$ = The total lateral force or shear at the base.

$$V = F_t = \sum_{i=1}^{n} F_i$$

where $i = 1$ designates first level above the base.

$W$ = The dead load

$$W = \sum_{i=1}^{n} W_i$$

**Exception:** $W$ shall be equal to the total dead load plus 25 percent of the floor live load in Use Group S.

$W_i, W_x$ = That portion of $W$ which is located at or is assigned to level $i$ or $x$ respectively.

$W_p$ = The weight of a portion of a structure.

$Z$ = Numerical coefficient dependent upon the zone as determined by the maps in Figure 916. For locations in Zone 1, $Z$ shall be equal to 0.25. For locations in Zone 2, $Z$ shall be equal to 0.50. For locations in Zone 3, $Z$ shall be equal to 1.0.

**916.3.5 Minimum earthquake forces for structures:** Minimum earthquake forces shall be determined in accordance with Sections 916.3.5.1 through 916.3.5.3.

**916.3.5.1 Total lateral force and distribution of lateral force:** Every structure shall be designed and constructed to withstand minimum total lateral seismic forces assumed to act nonconcurrently in the direction of each of the main axes of the structure in accordance with the following formula:

$$V = ZKCW$$

The value of $K$ shall be not less than that in Table 916.3.5.1. The value of $C$ shall be determined in accordance with the following formula:

$$C = 0.05 \div \sqrt[3]{T}$$

**Exception:** $C$ shall be 0.10 for all one and two story buildings.

$T$ is the fundamental period of vibration of the structure in seconds in the direction under consideration. Properly substantiated technical data for establishing the period $T$ for the contemplated structure may be submitted. In the absence of such data, the value $T$ for buildings shall be determined by the following formula:

$$T = 0.05\, h_n \div \sqrt{D}$$

**Exception:** In all buildings in which the lateral force resisting system consists of a moment resisting space frame which resists 100 percent of the

required lateral forces, and which frame is not enclosed by or adjoined by more rigid elements which would tend to prevent the frame from resisting lateral forces:

$$T = 0.10\ N$$

The total lateral force $V$ shall be distributed in the height of the structure in the following manner:

$$F_t = .004\ V\ (h_n \div D_s)^2$$

$F_t$ need not exceed $0.15\ V$ and may be considered as 0 for values $(h_n \div D_s)$ of 3 or less, and

$$F_x = (V\text{-}F_t)\ w_x h_x \div \sum_{i=1}^{n} w_i h_i$$

**Exception:** One and two story buildings shall have uniform distribution. At each level designated as $x$, the force $F_x$ shall be applied over the area of the building in accordance with the mass distribution on that level.

**Table 916.3.5.1**
**HORIZONTAL FORCE FACTOR *K* FOR BUILDINGS OR OTHER STRUCTURES[a]**

| Type or arrangement of resisting elements | Value of $K^b$ |
|---|---|
| All building framing systems except as hereinafter classified | 1.00 |
| Buildings with a box system as defined in Section 916.3.4 | 1.33 |
| Buildings with a dual bracing system consisting of a ductile moment resisting space frame and shear walls designed in accordance with the following criteria.<br>1. The frames and shear walls shall resist the total lateral force in accordance with their relative rigidities considering the interaction of the shear walls and frames.<br>2. The shear walls acting independently of the ductile moment resisting space frame shall resist the total required lateral force.<br>3. The ductile moment resisting space frame shall have the capacity to resist not less than 25 percent of the required lateral force. | 0.80 |
| Buildings with a ductile moment resisting space frame designed to resist the total required lateral force. | 0.67 |
| Elevated tanks plus full contents, on four or more crossbraced legs and not supported by a building[c, d, e] | 3.00 |
| Structures other than buildings and other than those set forth in Table 916.3.5.2 | 2.00 |

**Note a.** Where wind load would produce higher stresses, these loads shall be used in lieu of the loads resulting from earthquake forces.
**Note b.** See maps in Figure 916 for seismic probability zones and definitions of $Z$ as specified in Section 916.3.4.1.
**Note c.** The minimum value of $KC$ shall be 0.12 and the maximum value of $KC$ need not exceed 0.25.
**Note d.** For overturning, the factor $J$ as specified in Section 916.3.9 shall be 1.00.
**Note e.** The torsional requirements of Section 916.3.8 shall apply.

**916.3.5.2 Lateral forces on parts or portions of buildings and other structures:** Parts or portions of buildings or structures and their anchorage shall be

designed for lateral forces in accordance with the following formula:

$$F_p = ZC_pW_p$$

The values of $C_p$ are in Table 916.3.5.2. The distribution of these forces shall be according to the gravity loads pertaining thereto.

**916.3.5.3 Pile foundations and caisson footings:** Individual pile and caisson footings of every building or structure shall be interconnected by ties, each of which can carry by tension and compression a horizontal force equal to 10 percent of the larger pile cap loading, unless it can be demonstrated that equivalent restraint can be provided by other means.

**916.3.6 Distribution of horizontal shear:** Total shear in any horizontal plane shall be distributed to the various elements of the lateral force resisting system in proportion to their rigidities, considering the rigidity of the horizontal bracing system or diaphragm. Rigid elements that are assumed not to be part of the lateral force resisting system may be incorporated into buildings provided that their effect on the action of the system is considered and provided for in the design.

**916.3.7 Drift:** Lateral deflections or drift of a story relative to its adjacent stories shall be considered.

**Table 916.3.5.2**
**HORIZONTAL FORCE FACTOR $C_p$ FOR PARTS OR PORTIONS OF BUILDINGS OR OTHER STRUCTURES**

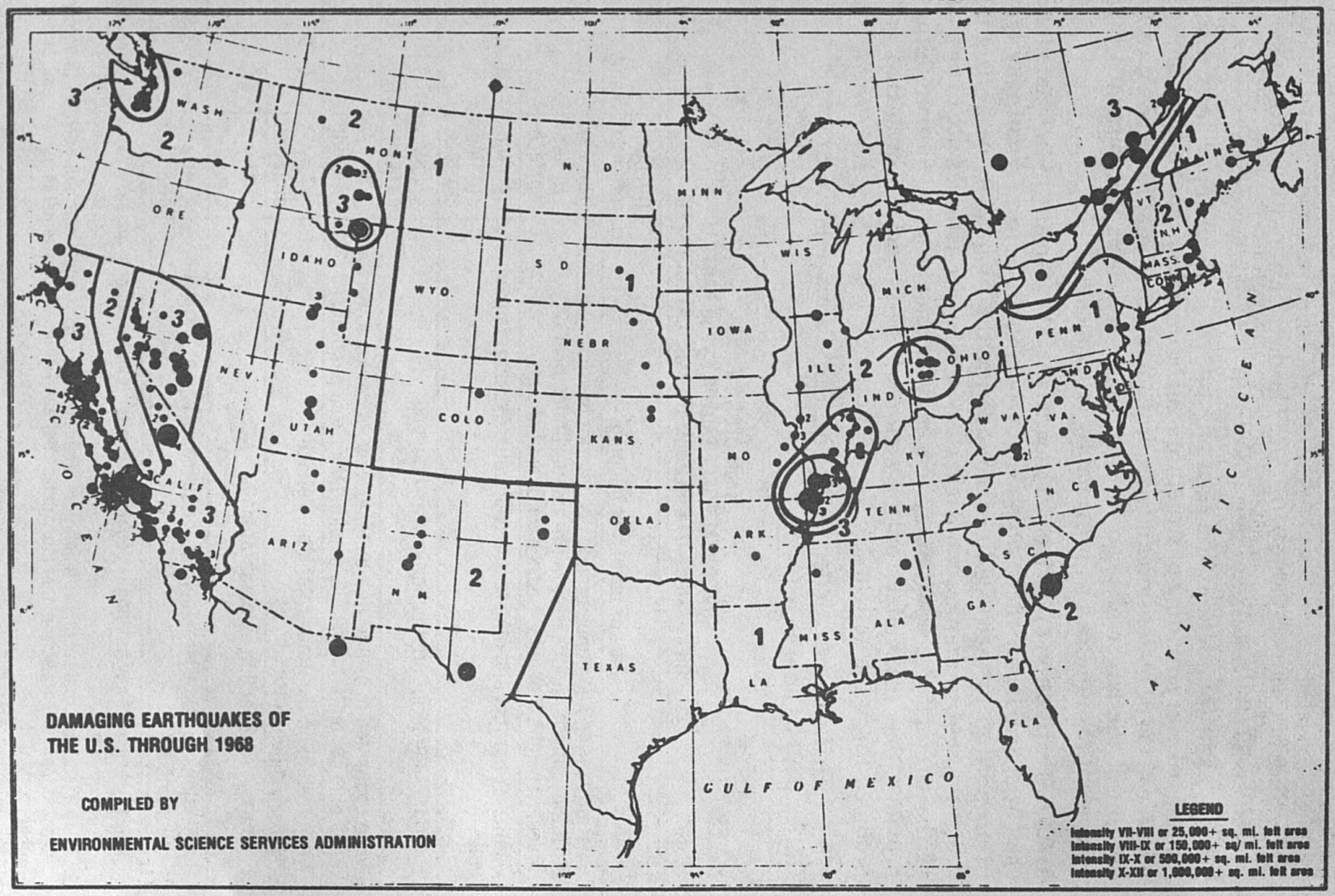
| Part or portion of building | Direction of force | Value of $C_p$ |
|---|---|---|
| Exterior bearing and nonbearing walls, interior bearing walls and partitions, interior nonbearing walls and partitions over 10 feet in height, masonry fences over 6 feet in height | Normal to flat surface | 0.20 |
| Cantilever parapet and other cantilever walls, except retaining walls | Normal to flat surface | 1.00 |
| Exterior and interior ornamentations and appendages | Any direction | 1.00 |
| When connected to or part of a building: towers, tanks, towers and tanks plus contents, chimneys, smokestacks, and penthouses | Any direction | 0.20[a] |
| When resting on the ground, tank plus effective mass of its contents | Any direction | 0.10 |
| Floors and roofs acting as diaphragms[b] | Any direction | 0.10 |
| Connections for exterior panels or for elements complying with Section 916.3.12.5 | Any direction | 2.00 |

**Note a.** When $\frac{h_n}{D}$ of any building is equal to or greater than five to one, increase value by 50 percent.

**Note b.** Floors and roofs acting as diaphragms shall be designed for a minimum value of $C_p$ of 10 percent applied to loads tributary from that story unless a greater value of $C_p$ is required by the basic seismic formula $V = ZKCW$.

**Note c.** 1 foot = 304.8 mm.

Figure 916
DAMAGING EARTHQUAKES IN THE UNITED STATES THROUGH 1968



**Notes to Figure 916**

**Note a.** Maps of the three separate areas of the United States which indicated earthquake risk zones to supplement coefficient *Z*. This zoning was superimposed on maps showing the damaging earthquakes of the United States through 1968 that were compiled and supplied by the USGS. The earthquake risk zones were determined by ANSI Committee A58.

**Note b.** Large number represents zone classification: Zone 0, no damage; Zone 1, minor damage; Zone 2, moderate damage; Zone 3, major damage. Small number next to dots represents approximate number of recorded earthquakes in area of the intensity shown by size of dot.

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**Earthquake Risk Zone #1**

Adair
Allen
Anderson
Barren
Bath
Bell
Boone
Bourbon
Boyd
Boyle
Bracken
Breathitt
Breckinridge
Bullitt
Butler
Campbell
Carroll
Carter
Casey
Christian
Clark
Clay
Clinton
Cumberland
Daviess
Edmonson
Elliott
Estill
Fayette
Fleming
Floyd
Franklin
Gallatin
Garrard
Grant
Grayson
Green
Greenup
Hancock
Hardin
Harlan
Harrison
Hart
Henry
Jackson
Jefferson
Jessamine
Johnson
Kenton
Knott
Knox
Larue
Laurel
Lawrence
Lee
Leslie
Letcher
Lewis
Lincoln
Logan
Madison
Magoffin
Marion
Martin
Mason
Meade
Menifee
Mercer
Metcalfe
Monroe
Montgomery
Morgan
Muhlenberg
McCreary
McLean
Nelson
Nicholas
Ohio
Oldham
Owen
Owsley
Pendleton
Perry
Pike
Powell
Pulaski
Robertson
Rockcastle
Rowan
Russell
Scott
Shelby
Simpson
Spencer
Taylor
Todd
Trimble
Warren
Washington
Wayne
Whitley
Wolfe
Woodford

**Earthquake Risk Zone #2**

Caldwell
Calloway
Crittenden
Henderson
Hopkins
Lyon
Trigg
Union
Webster

**Earthquake Risk Zone #3**

Ballard
Carlisle
Fulton
Graves
Hickman
Livingston
Marshall
McCracken

**916.3.8 Horizontal torsional moments:** Provisions shall be made for the increase in shear resulting from the horizontal torsion due to an eccentricity between the center of mass and the center of rigidity. Negative torsional shears shall be neglected. Where the vertical resisting elements depend on diaphragm action for shear distribution at any level, the shear resisting elements shall be capable of resisting a torsional moment assumed to be equivalent to the story shear acting with an eccentricity of not less than 5 percent of the maximum building dimension at that level.

**916.3.9 Overturning:** Every building or structure shall be designed to resist the overturning effects caused by wind forces and the related requirements, or the earthquake forces specified in this section, whichever governs.

**Exception:** The axial loads from earthquake force on vertical elements and footings in every building or structure may be modified in accordance with the following provisions.

1. Overturning moment ($M$) at the base of the building or structure shall be determined in accordance with the following formula:

$$M = J(F_t h_n = \sum_{i=1}^{n} F_i h_i)$$

where $J = 0.6 \div \sqrt[3]{T^2}$

The value of $J$ need not be more than 1.00.

2. For structures other than buildings, the value of $J$ shall not be less than 0.45, and the overturning moment ($M_x$) at any level designated as $x$ shall be determined in accordance with the following formula:

$$M_x = J_x \left[F_t(h_n - h_x) + \sum_{i=i}^{n} F_i(h_i - h_x)\right]$$

where $J_x = J + (1-J)\,(h_x \div h_n)^3$

**916.3.9.1 Overturning moment distribution:** At any level, the incremental changes of the design overturning moment in the story under consideration shall be distributed to the various resisting elements in the same proportion as the distribution of the shears in the resisting system. Where other vertical members are provided which are capable of partially resisting the overturning moments, a redistribution may be made to these members if framing members of sufficient strength and stiffness to transmit the required loads are provided.

Where a vertical resisting element is discontinuous, the overturning moment carried by the lowest story of that element shall be carried down as a load to the foundation.

**916.3.10 Setbacks:** Buildings having setbacks wherein the plan dimension of the tower in each direction is at least 75 percent of the corresponding plan dimension of the lower part may be considered as a uniform building without setbacks for the purpose of determining seismic forces.

For other conditions of setbacks, the tower shall be designed as a separate building using the larger of the seismic coefficients at the base of the tower determined by considering the tower as either a separate building for its own height or as part of the overall structure. The resulting total shear from the tower shall be applied at the top of the lower part of the building which shall be otherwise considered separately for its own height.

**916.3.11 Structural systems:** Buildings more than 160 feet (48768 mm) in height shall have ductile moment resisting space frames which (including connections) are capable of resisting not less than 25 percent of the required seismic force for the structure as a whole. All buildings designed with a horizontal force factor $K$ of 0.67 or 0.80 shall be ductile moment resisting space frames.

**Exceptions**

1. Buildings more than 160 feet (48768 mm) in height in Zone 1 may have shear walls or braced frames in lieu of a ductile moment resisting space frame, provided a $K$ value of 1.00 or 1.33 is utilized in the design.
2. Other structural systems may be approved by the building official when evidence is submitted showing that adequate energy absorption and ductility are provided to withstand the anticipated earthquakes based on a seismological evaluation for the location.

Moment resisting space frames and ductile moment resisting space frames may be enclosed or adjoined by more rigid elements which would tend to prevent the space frame from resisting lateral forces where it can be shown that the action or failure of the more rigid elements will not impair the vertical and lateral load resisting ability of the space frame.

The necessary ductility for a ductile moment resisting space frame shall be provided by a frame which will incorporate approved criteria for achieving ductility in the elastic and inelastic range. Shear walls in buildings where $K = 0.80$ shall be constructed to achieve ductile systems in accordance with approved criteria.

**916.3.12 Design requirements:** The design requirements of Sections 916.3.12.1 through 916.3.12.5 shall apply to the earthquake design required by this section.

**916.3.12.1 Building separations:** All portions of structures shall be designed and constructed to act as an integral unit in resisting horizontal forces unless separated structurally by a distance sufficient to avoid contact under deflection from seismic action or wind forces.

**916.3.12.2 Minor alterations:** Minor structural alterations may be made in existing buildings and other structures; but the resistance to lateral forces shall be not less than that before such alterations were made, unless the building as altered meets the requirements of this section.

**916.3.12.3 Structural elements:** All elements within the structure which are considered to resist seismic forces or movement, or are connected so as to participate with the structural system, shall be designed in accordance with approved structural practice.

**916.3.12.4 Combined vertical and horizontal forces:** In computing the effect of seismic force in combination with vertical loads, gravity load stresses induced in members by dead load plus design live load, except roof live load and snow load, shall be considered.

**916.3.12.5 Exterior elements:** Nonbearing nonshear wall panels, or other elements which are attached to or enclose the exterior, shall accommodate movements of the structure resulting from lateral forces or temperature changes. These panels or other elements shall be supported by approved means or by mechanical fasteners in accordance with the provisions of Sections 916.3.12.5.1 through 916.3.12.5.3.

**916.3.12.5.1 Movement between stories:** Connections and panel joints shall allow for a relative movement between stories of not less than two times story drift caused by wind or seismic forces, or ¼ inch (6 mm), whichever is greater.

**916.3.12.5.2 Ductility and rotation capacity:** Connections shall have sufficient ductility and rotation capacity so as to preclude fracture or brittle failures at or near connections.

**916.3.12.5.3 Sliding or ductile connections:** Connections to permit movement in the plane of the panel for story drift may be properly designed sliding connections using slotted or oversize holes, or may be connections which permit movement by bending of ductile material.

## SECTION 917.0 COMBINATION OF LOADS

**917.1 General:** Loads listed herein shall be considered to act in the following combinations, whichever produce the most unfavorable effects in the building, foundation, or structural member concerned, reduced when appropriate according to Section 918.0. The most unfavorable effect may occur when one or more of the contributing loads are not acting:

1. Dead load,
2. Dead load plus live load,
3. Dead load plus (wind load or earthquake load),
4. Dead load plus internal load,
5. Dead load plus live load plus (wind load or earthquake load),
6. Dead load plus live load plus internal load,
7. Dead load plus (wind load or earthquake load) plus internal load, and
8. Dead load plus live load plus (wind load or earthquake load) plus internal load.

**917.2 Probability factor:** The total of the combined load effects may be multiplied by the following load combination probability factors. An increase in the allowable stresses will not be allowed in conjunction with a decrease due to the above load combinations.

1. 1.00 for combinations 1 through 4 listed in Section 917.1 above.
2. 0.75 for combinations 5 through 7 listed in Section 917.1 above.
3. 0.66 for combination 8 listed in Section 917.1 above.

**917.3 Dead load counteracting live load:** When loads other than dead loads

counteract dead loads in a structural member or joint, special care shall be exercised by the designer to ensure adequate safety for possible stress reversals.

**917.4 Stress increases:** All allowable stresses and soil bearing values specified in this code for working stress design may be increased one third when considering wind or earthquake forces either acting alone or when combined with vertical loads. An increase will be not allowed for vertical loads acting alone.

## SECTION 918.0 LIVE LOAD REDUCTION

**918.1 General:** In all buildings and structures the design live loads may be reduced on columns, piers, walls, trusses, girders and slab systems designed for flexure in more than one direction, and on foundations as herein specified.

**918.2 Live loads 100 psf or less:** For live loads of 100 pounds or less per square foot (488.20 kg/m$^2$) the design live load on any member supporting 150 square feet (13.95 m$^2$) or more may be reduced at the rate of 0.08 percent per square foot of area supported by the members, except that a reduction shall not be made for garages, open parking structures, roofs or for areas to be occupied as places of public assembly. The reduction shall exceed neither $R$ as determined by the following formula, nor 60 percent:

$$R = 23\,[1 + (D \div L)]$$

where
$R$ = reduction in percent;
$D$ = dead load per square foot of area supported by the member; and
$L$ = design live load per square foot of area supported by the member.

**918.3 Live loads more than 100 psf:** For live loads exceeding 100 psf (488.20 kg/m$^2$) a reduction shall not be made, except that the design live loads on columns may be reduced 20 percent.

## SECTION 919.0 DESIGN STRENGTHS OF MATERIALS

**919.1 Controlled materials:** The design strengths and permissible stresses of all controlled materials as defined in Section 201.0, or any structural material that is identified as to manufacture and grade by mill tests, or the strength and stress grade is otherwise confirmed to the satisfaction of the building official, shall conform to the specifications and methods of design of accepted engineering practice or to the approved rules in the absence of applicable standards. A building or structure may be erected in whole or in part of controlled materials or ordinary materials (see Section 919.2).

**919.2 Ordinary materials:** The use of ordinary materials without selection and without controlled design and supervision, or when the material is not identified as to strength and stress grade, shall be limited to the design strengths and permissible stresses prescribed in Appendix D.

**919.3 New materials:** For materials which are not specifically provided for in

this code, the design strengths and permissible stresses shall be established by tests as provided in Sections 902.0 and 1102.0.

# ARTICLE 10

## FOUNDATION SYSTEMS

### SECTION 1000.0 GENERAL

**1000.1 Scope:** The provisions of this article shall control the foundation design and construction of all buildings and structures hereafter erected to insure adequate strength of all parts thereof for the safe support of all superimposed live and special loads, in addition to their own dead load, without exceeding the allowable stresses or design capabilities.

### SECTION 1001.0 BEARING VALUE OF SOILS

**1001.1 Soil analysis:** All applications for permits for the construction of new buildings or structures, and for the alteration of permanent structures which require changes in foundation loads and distribution shall be accompanied by a statement describing the soil in the ultimate bearing strata, including sufficient records and data to establish its character, nature and loadbearing capacity. Such records shall be certified by a licensed professional engineer or a licensed architect.

**1001.2 Satisfactory foundation materials:** Satisfactory bearing materials for spread footings shall include ledge rock on its natural bed; natural deposits of sand, gravel or firm clay, or a combination of such materials, provided they do not overlie an appreciable amount of peat, organic silt, soft clay or other objectionable materials.

**1001.3 Presumptive bearing values:** Except when determined by field loading tests or as otherwise provided herein, the maximum allowable pressure on supporting soils under spread footings at or near the surface shall not exceed the values specified in Table 1001. Presumptive bearing values shall apply to all materials of similar physical characteristics and disposition. Surface values shall be adjusted for deep footings, and for the bearing strata under piles, as provided in this code. When foundation piles are driven to penetrate into sound rock, the allowable bearing values in Table 1001 may be increased as prescribed in Section 1021.0.

**1001.4 Lightweight structures:** Mud, organic silt, or unprepared fill shall be assumed not to have presumptive bearing capacity unless approved by test,

**Table 1001**
**PRESUMPTIVE SURFACE BEARING VALUES OF FOUNDATION MATERIALS**

| Class of material | Tons per square foot |
|---|---|
| 1. Massive crystalline bedrock including granite, diorite, gneiss, trap rock, hard limestone and dolomite | 100 |
| 2. Foliated rock including bedded limestone, schist and slate in sound condition | 40 |
| 3. Sedimentary rock including hard shales, sandstones, and thoroughly cemented conglomerates | 25 |
| 4. Soft or broken bedrock (excluding shale), and soft limestone | 10 |
| 5. Compacted, partially cemented gravels, and sand and hardpan overlying rock | 10 |
| 6. Gravel and sand gravel mixtures | 6 |
| 7. Loose gravel, hard dry clay, compact coarse sand, and soft shales | 4 |
| 8. Loose, coarse sand and sand gravel mixtures and compact fine sand (confined) | 3 |
| 9. Loose medium sand (confined), stiff clay | 2 |
| 10. Soft broken shale, soft clay | 1.5 |

**Note a.** 1 ton per square foot = 9765 kg/m².

except where the bearing capacity is deemed adequate by the building official for the support of lightweight and temporary structures.

## SECTION 1002.0 FOUNDATION INVESTIGATIONS

**1002.1 When required:** In the absence of satisfactory data from immediately adjacent areas, the owner or applicant shall make borings, test pits, or other soil investigations at such locations and to sufficient depths of the bearing materials to the satisfaction of the building official. For all buildings which are more than three stories or 40 feet (12192 mm) in height, and whenever it is proposed to use float, mat or any type of deep foundation, there shall be at least one exploratory boring to rock or to an adequate depth below the loadbearing strata for every 2500 square feet (232.5 m²) of built over area, and such additional tests that the building official may direct. When the safe sustaining power of the soil is in doubt, or superior bearing value than specified in this code is claimed, the building official shall direct that the necessary borings or tests be made.

**1002.2 Soil samples:** Samples of the strata penetrated in test borings or test pits, representing the natural disposition and conditions at the site, shall be available for examination by the building official. Wash or bucket samples shall not be approved.

**1002.3 Varying soil values:** When test borings indicate nonuniformity of bearing materials, a sufficient number of additional borings shall be made to establish strata levels of equal bearing capacity.

**1002.4 Cost of tests:** Costs of soil investigations shall be at the expense of the owner.

## SECTION 1003.0 SOIL TEST PROCEDURE

**1003.1 Soil test method:** The test procedure and testing apparatus shall be approved by the building official before they are used; and a complete record of the tests, together with a record of the soil profile, shall be filed by the licensed engineer or architect who shall have a fully qualified representative on the site during all boring and test operations.

**1003.2 Loaded areas:** For spread footings, the soil shall be loaded at one or more places and at the required level or levels. The loaded area shall be approximately 4 square feet (0.37 $m^2$) for all bearing materials; except that when the footing overlies wet clay or other soft materials, the test load shall be applied to an area of not less than 10 square feet (0.93 $m^2$).

**1003.3 Recorded settlements:** Loads shall be applied in continuous increments of not more than one fourth of the proposed safe load. When the proposed load has been reached, it shall remain undisturbed and readings shall be recorded to determine the rate of settlement until the settlement in eight consecutive hours is less than 0.01 inches (0.25 mm). A 50 percent excess load shall then be applied and allowed to remain in place until the rate of settlement is less than 0.01 inches (0.25 mm) in 24 hours.

**1003.4 Accuracy of loading:** Test loads applied by mechanical devices shall be automatically controlled so as to insure not more than 5 percent variation in applied load. Such devices shall be calibrated prior to the test.

**1003.5 Test acceptance:** The load settlement shall be represented diagramatically, and a test shall not be deemed satisfactory if the net settlement after removal of the test load exceeds 0.01 inches per ton (0.00028 mm/kg) of gross load applied.

## SECTION 1004.0 ALLOWABLE FOUNDATION LOADS

**1004.1 General:** The maximum allowable loads under all types of foundations shall be limited as provided herein.

**1004.2 Rock foundations:** Where subsurface explorations at the project site indicate variations or doubtful characteristics in the structure of the rock upon which it is proposed to construct foundations, a sufficient number of borings shall be made to a depth of not less than 10 feet (3048 mm) below the level of the footings to provide assurance of the soundness of the foundation bed and its bearing capacity.

**1004.3 Increased rock capacity:** The presumptive bearing capacity of Class 1 or Class 2 rock may be increased when the surface is leveled or benched; provided such increased safe capacity is determined by load tests on an area of not less than 1 square foot (0.093 $m^2$) in accordance with the provisions of Section 1003.0; but such loads shall not be increased to exceed the unit compressive stress permitted on reinforced concrete footings under the provisions of this code.

## SECTION 1005.0 DEPTH OF FOOTINGS

**1005.1 Frost protection:** Except when erected upon solid rock or otherwise protected from frost, foundation walls, piers and other permanent supports of all buildings and structures larger than 100 square feet (9.30 $m^2$) in area or 10 feet (3048 mm) in height shall extend below the frost line of the locality, and spread footings of adequate size shall be provided when necessary to properly distribute the load within the allowable bearing value of the soil. Or, such structures shall be supported on piles or ranging timbers when solid earth to rock is not available. Footings shall not be founded on frozen soils unless such frozen condition is of a permanent character.

**1005.2 Isolated footings:** Footings on granular soil of Classes 5 to 10 inclusive in Table 1001 shall be so located that the line drawn between the lower edges of adjoining footings shall not have a steeper slope than 30 degrees (0.52 rad.) with the vertical, unless the material supporting the higher footing is braced or retained or otherwise laterally supported in an approved manner.

**1005.3 Floating mat:** Floating mat foundations shall be located on permanently undisturbed soil of adequate bearing capacity. The building official may approve a continuous foundation mat which is located directly on the ground when adequate subsoil drainage and a ratproof apron as specified in Section 1316.0 are provided when required. Where subject to freezing, the footings shall be designed to resist frost action. The requirements of Section 707.0 governing the ventilation of crawl spaces under grade construction shall be waived provided adequate provision is made for dampproofing and waterproofing when required.

## SECTION 1006.0 FOOTING DESIGN

**1006.1 Design loads:** The full dead load including the weight of foundations, footings, and overlying fill, and the reduced live loads as specified in Section 918.0, shall be used in designing footings.

**1006.2 Pressure due to lateral loads:** If the increased pressure on any footing due to wind, earthquake or other lateral loads does not exceed one third of the dead and live load pressures alone, such loads may be neglected. When such increased pressure is more than one third, the lateral loads shall be considered in the design with a one third increase in allowable soil pressure under the combined load.

**1006.3 Earthquake loads:** In localities subject to seismic disturbances, special provision shall be made in the foundation design to comply with the provisions of Section 916.0.

**1006.4 Vibratory loads:** Where machinery operation or other vibrations may be transmitted through the foundations, consideration shall be given in the footing design to prevent detrimental disturbances of the soil.

**1006.5 Varying unit pressures:** Footings shall be so designed that the unit soil

pressure under the dead load shall be as uniform as possible under all parts of the building or structure. When necessary for stability in the structure due to settlement or varying soil conditions, variations may be permitted in the unit pressure under different footings.

## SECTION 1007.0 TIMBER FOOTINGS, WOOD FOUNDATIONS

**1007.1 Timber footings:** Timber footings may be used for buildings of Type 4 construction and as otherwise approved by the building official. Such footings shall be treated in accordance with AWPA C2 or C3 listed in Appendix A or shall be placed entirely below permanent water level, except that untreated timbers may be used as capping of wood piles which project above the water level over submerged or marsh lands. The compressive stresses perpendicular to grain in untreated timber footings supported upon piles shall not exceed 70 percent of the allowable stresses for the species and grade of timber as specified in the NFoPA *National Design Specification for Wood Construction* listed in Appendix A.

**1007.2 Pole buildings:** Pole type buildings shall be designed and erected in accordance with AWPI *Pole Building Design* listed in Appendix A. The poles shall be treated in accordance with AWPA C2 or C4 listed in Appendix A.

**1007.3 Wood foundations:** Wood foundation systems shall be designed and installed in accordance with NFoPA TR7 listed in Appendix A. All lumber and plywood shall be treated in accordance with AWPB-FDN listed in Appendix A and shall be identified as to conformance with such standards by an approved agency.

## SECTION 1008.0 STEEL GRILLAGES

**1008.1 General:** All steel grillage beams shall be separated with approved steel spacers and shall be entirely encased in at least 3 inches (76 mm) of concrete and the spaces between the beams shall be completely filled with concrete or cement grout. When used on yielding soils, steel grillages shall rest on approved concrete beds not less than 6 inches (152 mm) thick.

## SECTION 1009.0 CONCRETE FOOTINGS

**1009.1 Concrete strength:** Concrete in footings shall have an ultimate compressive strength of not less than 2500 psi (1.76 kg/ mm$^2$) at 28 days.

**1009.2 Design:** Concrete footings shall comply with Sections 1215.0 and 1216.0 and ACI 318 listed in Appendix A.

**1009.3 Thickness:** The thickness of concrete footings shall comply with Sections 1009.3.1 and 1009.3.2.

**1009.3.1 Plain concrete:** In plain concrete footings, the edge thickness shall be not less than 8 inches (203 mm) for footings on soil; except that for buildings of Use Group R-3 and buildings less than two stories in height of Type 4 construction, the edge thickness may be reduced to 6 inches (152 mm)

provided the footing does not extend beyond 4 inches (102 mm) on either side of the supported wall.

**1009.3.2 Reinforced concrete:** In reinforced concrete footings the thickness at the edge above the bottom reinforcement shall be not less than 6 inches (152 mm) for footings on soil, nor less than 12 inches (305 mm) for footings on piles. The clear cover on reinforcement where the concrete is cast against the earth shall not be less than 3 inches (76 mm). Where concrete is exposed to soil after it has been cast, the clear cover shall be not less than 1½ inches (38 mm) for reinforcement smaller than No. 5 bars or ⅝ inch (16 mm) diameter wire, nor 2 inches (51 mm) for larger reinforcement.

**1009.4 Footings on piles and pile caps:** Footings on piles and pile caps shall be of reinforced concrete. The soil immediately below the pile cap shall not be considered as carrying any vertical load. The top of all piles shall be embedded not less than 3 inches (76 mm) into pile caps and the caps shall extend at least 4 inches (102 mm) beyond the edge of all piles.

**1009.5 Deposition:** Concrete footings shall not be poured through water unless otherwise approved by the building official. When poured under or in the presence of water, the concrete shall be deposited by approved means which insure minimum segregation of the mix and negligible turbulence of the water.

**1009.6 Protection of concrete:** Concrete footings shall be protected from freezing during depositing and for a period of not less than 5 days thereafter. Water shall not be allowed to flow through the deposited concrete.

## SECTION 1010.0 MASONRY UNIT FOOTINGS

**1010.1 Dimensions:** Masonry unit footings shall be laid in Type M or S mortar complying with Section 1115.0, and the depth shall be not less than twice the projection beyond the wall, pier or column. The width shall be not less than 8 inches (203 mm) wider than the wall supported thereon.

**1010.2 Offsets:** The maximum offset of each course in brick foundation walls stepped up from the footings shall be 1½ inches (38 mm) if laid in single courses, and 3 inches (76 mm) if laid in double courses.

## SECTION 1011.0 MAT, RAFT AND FLOAT FOUNDATIONS

**1011.1 General:** Mat, raft and float foundations shall be used only when the applied loads of the building or structure are so arranged as to result in practically uniformly balanced loading, and the soil immediately below the mat is of uniform bearing capacity. The characteristics of the soil under the mat or raft shall be considered in the analysis of loading on mats and other continuous footings, and due allowance shall be made for possible concentrated soil pressures under heavily loaded columns.

## SECTION 1012.0 PIER FOUNDATIONS

**1012.1 Lateral dimensions and height:** Except for buildings of Use Group R-3

and other light structures, the minimum dimension of isolated piers used as foundations shall be 2 feet (610 mm), and the height shall not exceed 12 times the least horizontal dimension, unless constructed of reinforced concrete or structural steel, or when entirely encased in steel shell at least ¼ inch (6 mm) thick. Greater heights may be approved by the building official when surrounding foundation materials furnish adequate lateral support.

**1012.2 Belled bottoms:** When pier foundations are belled at the bottom, the edge thickness of the bell shall be not less than that required for the edge of footings. If the sides of the bell slope at an angle less than 60 degrees (1.05 rad) from the horizontal, the effects of vertical shear shall be considered.

**1012.3 Plain concrete:** When the unsupported height of foundation piers exceeds six times the least dimension, the allowable working stress on piers of unit masonry or plain concrete shall be reduced in accordance with ANSI/NBS 211 and ACI 318 listed in Appendix A.

**1012.4 Reinforced concrete:** When constructed of reinforced concrete, foundation piers may be reinforced with spiral or vertical reinforcement in accordance with ACI 318 listed in Appendix A. When adequate lateral support is furnished by the surrounding materials as defined in Section 1014.0, the requirements for long columns shall be waived.

**1012.5 Steel shell:** When concrete piers are entirely encased with a circular steel shell, the area of the shell steel may be considered as reinforcing steel, provided the steel is protected under the conditions specified in Section 1013.0. All horizontal joints in the shell shall be spliced to comply with Section 1013.0.

**1012.6 Dewatering:** When piers are carried to depths below water level, the piers shall be constructed by a method which will insure accurate preparation and inspection of the bottom, and the depositing or construction of sound concrete or other masonry in the dry.

## SECTION 1013.0 PILE FOUNDATIONS

**1013.1 Investigation:** Pile foundations shall be designed and installed on the basis of a foundation investigation and report which shall include borings, test pits or other subsurface exploration at locations and depths sufficient to determine the position and adequacy of the bearing soils, except where sufficient data upon which to base the design and installation is available. The investigation and report shall include, but not be limited to, the following:

1. Recommended pile types and installed capacities.
2. Driving criteria.
3. Installation and field inspection procedures.
4. Pile load test requirements.
5. Durability of pile materials.
6. Designation of bearing stratum or strata.

**1013.2 Special types of piles:** The use of types of piles not specifically mentioned herein may be permitted, subject to the approval of the building

official, upon the submission of acceptable test data, calculations and other information relating to the structural properties and load capacity of such piles. The allowable stresses shall not in any case exceed the limitations specified herein.

**1013.3 Protection of pile materials:** Where boring records or site conditions indicate possible deleterious action on pile materials because of soil constituents, changing water levels or other factors, the pile materials shall be adequately protected by materials, methods or processes approved by the building official. Protective materials shall be applied to the piles so as not to be rendered ineffective by driving.

**1013.4 Lateral support:** Any soil other than fluid soil shall be deemed to afford sufficient lateral support to the pile to prevent buckling and to permit the design of the pile in accordance with the applicable provisions of this code. All piles standing unbraced in air, water or soils not capable of providing lateral support shall be designed as columns in accordance with the provisions of this code.

**1013.5 Group action:** In cohesive soils, the compressive load capacity of a group of friction piles shall be analyzed by a rational method approved by the building official and, where such analysis indicates, the individual allowable pile load shall be reduced accordingly.

**1013.6 Stability:** All piles shall be braced to provide lateral stability in all directions. Three or more piles connected by a rigid cap shall be considered as being braced, provided that the piles are located in a radial direction from the centroid of the group, not less than 60 degrees (1.05 rad) apart. A two pile group in a rigid cap shall be considered to be braced along the axis connecting the two piles. Methods used to brace piles shall be subject to the approval of the building official.

Piles supporting walls shall be driven alternately in lines at least 1 foot (305 mm) apart and located symmetrically under the center of gravity of the wall load carried, unless effective measures are taken to provide for eccentricity and lateral forces, or the wall piles are adequately braced to provide for lateral stability. A single row of piles without lateral bracing may be used for buildings of Use Group R-3 and lightweight construction not exceeding two stories or 35 feet (10668 mm) in height, provided the centers of the piles are located within the width of the foundation wall.

**1013.7 Structural integrity:** Piles shall be installed in such a manner and sequence as to prevent distortion or damage to piles being installed or already in place, to the extent that such distortion or damage affects the structural integrity of the piles.

**1013.8 Spacing:** The minimum center to center spacing of piles shall be not less than twice the average diameter of a round pile, nor less than one and three quarters times the diagonal dimension of a rectangular pile. When driven to or penetrating into rock, the spacing shall be not less than 24 inches (610 mm). When receiving principal support from end bearing on materials

other than rock, or through friction resistance, the spacing shall be not less than 30 inches (762 mm) except that for piles having enlarged bases formed either by compacting concrete or driving a precast base the minimum center to center spacing shall be 4½ feet (1372 mm). The spacing of piles shall be such that the average load on the supporting strata will not exceed the safe bearing value of those strata as determined by test borings or other approved methods.

**1013.9 Splices:** Splices shall be constructed so as to provide and maintain true alignment and position of the component parts of the pile during installation and subsequent thereto and shall be of adequate strength to transmit the vertical and lateral loads and moments occuring at the location of the splice during driving and under service loading. Splices shall develop not less than 50 percent of the least value of the pile in bending. In addition, all pile splices occurring in the upper 10 feet (3048 mm) of the embedded portion of the pile shall be capable of resisting at allowable working stresses the moment and shear that would result from an assumed eccentricity of the pile load of 3 inches (76 mm) or the pile shall be braced in accordance with Section 1013.6 to other piles that do not have splices in the upper 10 feet (3048 mm) of embedment.

**1013.10 Pile caps:** Pile caps shall be of reinforced concrete. The soil immediately below the pile cap shall not be considered as carrying any vertical load. The tops of all piles shall be embedded not less than 3 inches (76 mm) into pile caps and the caps shall extend at least 4 inches (102 mm) beyond the edges of all piles. The top of all piles shall be cut back to sound material before capping.

**1013.11 Preexcavation:** The use of jetting, augering or other methods of preexcavation shall be subject to the approval of the building official. When permitted, preexcavation shall be carried out in the same manner as used for piles subject to load tests and in such a manner that will not impair the carrying capacity of the piles already in place or damage adjacent structures. Pile tips shall be driven below the preexcavated depth until the required resistance or penetration is obtained.

**1013.12 Inspection:** A qualified inspector approved by the building official shall be present when pile foundations are being installed or during tests. The inspector shall make and submit to the building official detailed records of the installation of each pile and the results of load tests. Records shall include the cutoff and tip elevation of each pile relative to a permanent reference.

**1013.13 Identification:** All pile materials shall be identified for conformity to the specified grade with this identification maintained continuously from the point of manufacture to the point of installation or shall be tested by an approved agency to determine conformity to the specified grade and the approved agency shall furnish an affidavit of compliance to the building official.

**1013.14 Pile location plan:** A plan showing the location and designation of all

piles by an identification system shall be filed with the building official prior to installation of such piles. All detailed records for individual piles shall bear an identification corresponding to that shwon on the plan.

**1013.15 Use of existing piles:** Piles left in place where a structure has been demolished shall not be used for the support of new construction unless satisfactory evidence is submitted to the building official indicating that the piles are sound and meet all the requirements of this code. Such piles shall be load tested or redriven to verify their capacities. The design load applied to such piles shall be the lowest allowable load as determined by tests or redriving data.

**1013.16 Pile driveability:** Pile cross sections shall be of sufficient size and strength to withstand driving stresses without damage to the pile, and to provide sufficient stiffness to transmit the required driving forces.

**1013.17 Heaved piles:** All piles that have heaved during the driving of adjacent piles shall be redriven as necessary to develop the required capacity and penetration, or the capacity of the pile shall be verified by load test in accordance with Section 1014.4.

**1013.18 Settlement analysis:** The settlement of individual piles or groups of piles shall be estimated based upon approved methods of analysis. The predicted settlement shall not cause harmful distortion of, or instability in, the structure; nor shall it lead to any stresses exceeding allowable values.

**1013.19 Use of vibratory drivers:** Vibratory drivers may be used to install piles only if the pile load capacity is verified by load tests in accordance with Section 1014.4. The installation of production piles shall be controlled according to power consumption and rate of penetration, or other means approved by the building official that assures pile capacities equal or exceeding that of test piles.

**1013.20 Installation sequence:** Piles shall be installed in such sequence to avoid compacting the surrounding soil to the extent that other piles cannot be installed properly, and to prevent ground movements that could damage adjacent structures.

## SECTION 1014.0 ALLOWABLE PILE LOADS

**1014.1 Determination of allowable loads:** The allowable axial and lateral loads on piles shall be determined by an approved formula, load tests or method of analysis.

**1014.2 Piles in subsiding areas:** Where piles are driven through subsiding fills or other subsiding strata and derive support from underlying firmer materials, the downward friction forces which are imposed on the piles by the subsiding upper strata shall be included in the design.

**1014.3 Driving formula:** The allowable compressive load on any pile when determined by the application of an approved driving formula shall not exceed 40 tons (36287 kg). The formula load shall be determined for gravity

drop or power actuated hammers, and the hammer energy used shall be the maximum consistent with the size, strength and weight of the driven piles. The use of a follower shall be permitted only with the approval of the building official. The introduction of fresh hammer cushion or pile cushion material just prior to final penetration shall not be permitted.

**1014.4 Load tests:** When greater compressive loads per pile than permitted by Section 1014.3 are desired or when the design load for any pile foundation is in doubt, control test piles shall be tested in accordance with ASTM D1143 listed in Appendix A. At least one pile shall be test loaded in each area of uniform subsoil conditions. When required by the building official, additional piles shall be load tested if necessary to establish the safe design capacity. The resulting allowable loads shall be not more than one half of that test load which produces a permanent net settlement of not more than 0.01 inch per ton (0.000028 mm/ kg) of test load, and not more than ¾ inch (19 mm). In subsequent driving of the balance of foundation piles, all piles shall be deemed to have a supporting capacity equal to the control pile when such piles are of the same type, size and relative length as the test pile, are installed using the same or comparable methods and equipment as the test pile, are installed in similar subsoil conditions as the test pile, and when the rate of penetration of such piles is equal to or less than that of the test pile through a comparable driving distance.

**1014.5 Use of higher allowable stresses:** Allowable stresses greater than those specified for each pile type in this article shall be permitted when supporting data justifying such higher stresses are filed with the building official. Such substantiating data shall include a foundation investigation in accordance with Section 1013.1 and pile load tests in accordance with Section 1014.4, regardless of the load supported by the pile. The design and installation of the pile foundation shall be under the direct supervision of a registered professional engineer knowledgeable in the field of soil mechanics and pile foundations, who shall certify to the building official that the piles as installed satisfy the design criteria.

**1014.6 Allowable lateral load:** When required by the design, the lateral load capacity of a single pile or a pile group shall be determined by an approved method of analysis or by lateral load tests to at least twice the proposed design working load. The resulting allowable load shall be not more than one half of that test load which produces a gross lateral movement of 1 inch (25 mm) at the ground surface.

**1014.7 Uplift capacity:** When required by the design, the uplift capacity of a single pile shall be determined in accordance with ASTM D3689 listed in Appendix A or an approved method of analysis based upon a minimum safety factor of three. The maximum allowable uplift load shall be one half that load which produces an upward movement of the pile but equal to the gross elastic extension of the pile plus 0.1 inch (3 mm). For pile groups subjected to uplift, the allowable working uplift load for the group shall be the lesser of the proposed individual pile uplift working load times the number of

piles in the group, or two thirds of the effective weight of the pile group and the soil contained within a block defined by the perimeter of the group and the length of the pile.

**1014.8 Bearing capacity:** Individual piles and groups of piles shall develop ultimate load capacities of at least twice the design working loads in the designated bearing layers. Analysis shall show that no soil layer underlying the designated bearing layers causes the bearing capacity safety factor to be less than two.

**1014.9 Bent piles:** The load carrying capacity of piles discovered to have a sharp or sweeping bend may be determined by an approved method of analysis or by load testing a representative pile.

**1014.10 Overloads on piles:** The maximum compressive load on any pile due to mislocation shall not exceed 110 percent of the allowable design load.

## SECTION 1015.0 STRUCTURAL STEEL PILES

**1015.1 Materials:** Structural steel piles, steel pipe and fully welded steel piles fabricated from plates shall conform to ASTM A36, A252, A283, A572, A588 or A690 listed in Appendix A.

**1015.2 Allowable stresses:** The allowable design compressive stresses shall not exceed 0.35 of the minimum specified yield strength of the steel, except that allowable design stresses may be increased up to 0.50 of the minimum specified yield strength of steel where substantiated by Section 1014.5.

**1015.3 Dimensions of H-piles:** Sections of H-piles shall comply with the criteria of Sections 1015.3.1 through 1015.3.3.

**1015.3.1 Flanges:** The flange projections shall not exceed 14 times the minimum thickness of metal in either the flange or the web, and the flange widths shall be not less than 80 percent of the depth of the section.

**1015.3.2 Depth:** The nominal depth of the direction of the web shall be not less than 8 inches.

**1015.3.3 Thickness:** Flanges and web shall have a minimum nominal thickness of ⅜ inch.

**1015.4 Dimensions of steel pipe piles:** Steel pipe piles driven open ended shall have a nominal outside diameter of not less than 10 inches and a minimum wall thickness of not less than 0.25 inch (6 mm) for diameters less than 14 inches (356 mm), and of not less than 0.375 inch (10 mm) for diameters 14 inches (356 mm) and over. Pipe of less wall thickness may be driven open ended if a suitable cutting shoe is provided.

## SECTION 1016.0 CONCRETE FILLED STEEL PIPE AND TUBE PILES

**1016.1 Material:** Steel pipe and tube piles shall conform to ASTM A252 or A283 listed in Appendix A. Concrete shall conform to Section 1017.1.1. The maximum size coarse aggregate shall be ¾ inch (19 mm).

**1016.2 Allowable stresses:** The allowable design compressive stresses in the concrete shall not exceed 0.33 of the 28 day ultimate strength ($f'_c$). The allowable design compressive stress in the steel shall not exceed 0.35 of the minimum specified yield strength of the steel, except that the allowable design compressive stress may be increased up to 0.50 of the minimum specified yield strength of the steel where substantiated by Section 1014.5.

**1016.3 Minimum dimensions:** Piles shall have a nominal outside diameter of not less than 8 inches and a minimum wall thickness in accordance with Section 1015.4. For mandrel driven pipe piles, the minimum wall thickness may be 0.10 inches (3 mm).

**1016.4 Reinforcement:** Reinforcement steel shall conform to Section 1017.1.2. Reinforcement shall not be placed within 1 inch (25 mm) of the steel casing.

**1016.5 Placing concrete:** Placing concrete shall conform to Section 1017.1.3.

## SECTION 1017.0 CAST IN PLACE CONCRETE PILES

**1017.1 General:** The materials, reinforcement and installation of cast in place concrete piles shall conform to Sections 1017.1.1 through 1017.1.3.

**1017.1.1 Material:** All concrete shall have a 28 day ultimate compressive strength ($f'_c$) of not less than 2,500 psi (1.76 kg/ mm$^2$). When concrete is placed through a funnel hopper at the top of the pile, the concrete mix shall be designed and proportioned so as to produce a cohesive workable mix having a slump of not less than 4 inches (102 mm) and not more than 6 inches (152 mm). If concrete is to be pumped, the mix design including slump shall be adjusted to produce a pumpable concrete.

**1017.1.2 Reinforcement:** Except for steel dowels embedded 5 feet (1524 mm) or less in the pile and as provided in Section 1017.2 reinforcement when required shall be assembled and tied together and shall be placed in the pile as a unit before the reinforced portion of the pile is filled with concrete.

**1017.1.3 Installation:** Concrete shall be placed in such a manner as to insure the exclusion of any foreign matter and to secure a full sized shaft. Concrete shall not be placed through water except when tremie methods are approved by the building official. When depositing concrete from the top of the pile, the concrete shall not be chuted directly into the pile but shall be poured in a rapid and continuous operation through a funnel hopper centered at the top of the pile.

**1017.2 Drilled or augered uncased piles:** Drilled or augered uncased piles shall conform to Sections 1017.2.1 through 1017.2.4.

**1017.2.1 Allowable stresses:** The allowable design stress in the concrete of drilled uncased piles shall not exceed 33 percent of the 28 day ultimate compressive strength ($f'_c$). The allowable design stress in the concrete of augered cast in place piles shall not exceed 25 percent of the 28 day ultimate compressive strength ($f'_c$).

**1017.2.2 Dimensions:** The pile length shall not exceed 30 times the average diameter. The minimum diameter shall be 12 inches (305 mm).

**1017.2.3 Installation:** If pile shafts are formed through unstable soils and concrete is placed in an open drilled hole, a steel liner shall be inserted in the hole prior to placing concrete. If the steel liner is withdrawn during concreting, the level of concrete shall be maintained above the bottom of the liner a sufficient height to offset any hydrostatic or lateral soil pressure.

If concrete is placed by pumping through a hollow stem auger, the auger shall not be permitted to rotate during withdrawal and shall be withdrawn in a steady continuous motion. Concreting pumping pressures shall be measured and shall be maintained high enough at all times to offset hydrostatic and lateral earth pressures. Concrete volumes shall be measured to insure that the volume of concrete placed in each pile is equal to or greater than the theoretical volume of the hole created by the auger. If the installation process of any pile is interrupted or a loss of concreting pressure occurs, the pile shall be redrilled to original depth and reformed. Augered cast in place piles shall not be installed within six pile diameters center to center of a pile filled with concrete less than 24 hours old unless approved by the building official. If the concrete level in any completed pile drops, the pile shall be rejected and replaced.

**1017.2.4 Reinforcement:** For piles installed with a hollow stem auger, longitudinal steel reinforcement may be placed without lateral ties provided it is placed through ducts in the auger prior to filling the pile with concrete. All pile reinforcement shall have a concrete cover of not less than 2½ inches (64 mm).

**1017.3 Driven uncased piles:** Driven uncased piles shall conform to Sections 1017.3.1 through 1017.3.4.

**1017.3.1 Allowable stress:** The allowable design stress in the concrete shall not exceed 25 percent of the 28 day ultimate compressive strength ($f'_c$) applied to a cross sectional area not greater than the inside area of the drive casing or mandrel.

**1017.3.2 Dimensions:** The pile length shall not exceed 30 times the average diameter. The minimum diameter shall be 12 inches (305 mm).

**1017.3.3 Installation:** Piles shall not be driven within six pile diameters center to center in granular soils or within one half the pile length in cohesive soils of a pile filled with concrete less than 48 hours old, unless approved by the building official. If the concrete surface in any complete pile rises or drops, the pile shall be rejected and replaced. Piles shall not be installed in soils which could cause pile heave.

**1017.3.4 Concrete cover:** All pile reinforcement shall have a concrete cover of not less than 2½ inches (64 mm), measured from the inside face of the drive casing or mandrel.

**1017.4 Enlarged base piles:** Enlarged base piles shall conform to Sections 1017.4.1 through 1017.4.5.

**1017.4.1 Materials:** The maximum size for coarse aggregate for all concrete shall be ¾ inch (19 mm). Compacted concrete shall have a zero slump.

**1017.4.2 Allowable stress:** The allowable design compressive stress in the concrete shall not exceed 25 percent of the 28 day ultimate compressive strength ($f'_c$), except that where the concrete is placed in a permanent steel casing the allowable concrete stress may be increased to 33 percent of the 28 day ultimate compressive strength ($f'_c$).

**1017.4.3 Installation:** Enlarged bases formed either by compacting concrete or driving a precast base shall be formed in or driven into granular soils. All piles shall be constructed in the same manner as successful prototype test piles driven for the project. Pile shafts extending through peat or other organic soil shall be encased in a permanent steel casing. If a cased shaft is used, it shall be adequately reinforced to resist column action or the annular space around the pile shaft shall be filled sufficiently to reestablish the lateral support of the soil. If pile heave occurs, the pile shall be rejected unless it can be demonstrated that the pile is undamaged and capable of carrying twice its design load.

**1017.4.4 Bearing capacity:** Pile bearing capacity shall be verified by load tests in accordance with Section 1014.4.

**1017.4.5 Concrete cover:** The minimum concrete cover shall be 2½ inches (64 mm) for uncased shafts and 1 inch (25 mm) for cased shafts.

**1017.5 Steel cased piles:** Steel cased piles shall comply with Sections 1017.5.1 through 1017.5.4.

**1017.5.1 Material:** Pile shells or casings shall be of steel and shall be sufficiently strong to resist collapse and sufficiently water tight to exclude any foreign materials during the placing of concrete. Steel shells shall have a sealed tip with a diameter of not less than 8 inches (203 mm).

**1017.5.2 Allowable stress:** The allowable design compressive stress in the concrete shall not exceed 33 percent of the 28 day ultimate compressive strength ($f'_c$), except that the allowable concrete stress may be increased to a maximum value of $0.40 f'_c$ for that portion of the pile meeting the conditions specified in Sections 1017.5.2.1 through 1017.5.2.4.

**1017.5.2.1 Thickness:** The thickness of the steel shell is not less than No. 14 gage (0.0068 inch) minimum.

**1017.5.2.2 Shell type:** The shell is seamless or is provided with seams of strength equal to the basic material and is of a configuration which will provide confinement to the cast in place concrete.

**1017.5.2.3 Strength:** The ratio of steel yield strength ($f_y$) to design $f'_c$ shall be not less than six.

**1017.5.2.4 Diameter:** The nominal pile diameter is not greater than 16 inches.

**1017.5.3 Installation:** Piles shall have steel shells, mandrel driven their full length in contact with the surrounding soil, left permanently in place and

filled with concrete. A pile shall not be driven within four and one half average pile diameters of a pile filled with concrete less than 24 hours old unless approved by the building official. Concrete shall not be placed in steel shells within heave range of driving.

**1017.5.4 Reinforcement:** Reinforcement shall not be placed within 1 inch (25 mm) of the steel shell. Reinforcing shall be considered necessary only for unsupported pile lengths or when the pile is designed to resist uplift or unbalanced lateral loads.

## SECTION 1018.0 PRECAST CONCRETE PILES

**1018.1 Design and manufacture:** All piles shall be designed and manufactured in accordance with accepted practice, and to resist all stresses induced by handling, driving and service loads. The minimum lateral dimension shall be 10 inches (254 mm). All corners of square piles shall be chamfered. Longitudinal steel shall be arranged in a symmetrical pattern and shall be laterally tied with steel ties or wire spiral spaced not more than 3 inches (76 mm) apart, center to center, for a distance of 2 feet (610 mm) from the ends of the pile; and not more than 6 inches (152 mm) elsewhere except that at the ends of each pile the first five ties or spirals shall be spaced 1 inch (25 mm) center to center.

**1018.1.1 Installation:** All piles shall be handled and driven so as not to cause injury or overstressing which will affect their durability or strength.

**1018.2 Reinforced piles:** Reinforced precast concrete piles shall conform to Sections 1018.2.1 through 1018.2.5.

**1018.2.1 Design:** The minimum amount of longitudinal reinforcement shall be 2 percent of the concrete section and shall consist of at least four bars.

**1018.2.2 Material:** All concrete shall have a 28 day ultimate compressive strength ($f'_c$) of not less than 4,000 psi (2.81 kg/ mm$^2$).

**1018.2.3 Allowable stress:** The allowable compressive stress in the concrete shall not exceed 33 percent of the 28 day ultimate strength ($f'_c$) applied to the gross cross sectional area of the pile.

**1018.2.4 Concrete cover:** All pile reinforcement shall have a concrete cover of not less than 2 inches (51 mm) except that for piles exposed to seawater, the minimum protective concrete cover shall be 3 inches (76 mm).

**1018.2.5 Installation:** A precast concrete pile shall not be driven before the concrete has attained a compressive strength of at least 3,000 psi (2.11 kg/ mm$^2$), except that in all cases the concrete strength shall be sufficient to withstand handling and driving forces.

**1018.3 Prestressed piles:** Prestressed concrete piles shall conform to Sections 1018.3.1 through 1018.3.4.

**1018.3.1 Design:** The effective prestress in the pile shall be not less than 700 psi (0.49 kg/ mm$^2$).

**1018.3.2 Material:** Prestressing steel shall conform to ASTM A416 listed in

Appendix A. All concrete shall have a 28 day ultimate compressive strength ($f'_c$) of not less than 5,000 psi (3.52 kg/mm$^2$).

**1018.3.3 Allowable stress:** The maximum allowable design compressive stress ($f'_c$) in concrete shall be determined as follows:

$$f_c = 0.33\, f'_c - 0.27\, f_{pc}$$

where $f_{pc}$ is the effective prestress stress on the gross section.

**1018.3.4 Installation:** A prestressed pile shall not be driven before the concrete has attained a compressive strength of at least 4,000 psi (2.81 kg/mm$^2$), except that in all cases the concrete shall be of sufficient strength to withstand handling and driving forces.

## SECTION 1019.0 TIMBER PILES

**1019.1 Materials:** Timber piles shall conform to ASTM D25 listed in Appendix A.

**1019.2 Preservative treatment:** Timber piles used to support permanent structures shall be treated in accordance with this section unless it is established that the tops of untreated timber piles will be below lowest ground water level assumed to exist during the life of the structure. Preservative and minimum final retention shall be in accordance with AWPA C3 listed in Appendix A. When timber piles are used in salt water, the treatment shall conform to AWPB MP1, MP2 or MP4 listed in Appendix A. Pile cutoffs shall be treated in accordance with AWPA M4 listed in Appendix A.

**Table 1019.3**
**ALLOWABLE UNIT STRESSES FOR TREATED ROUND TIMBER PILES, NORMAL LOAD DURATION—VALUES AT TIP OF PILE**

| Species | Compression parallel to grain psi[d] | Bending psi[d] | Shear horiz. psi[d] | Comp. perp. to grain psi[d] | Modulus of elasticity |
|---|---|---|---|---|---|
| Pacific Coast Douglas fir[a] | 1,250 | 2,450 | 115 | 230 | 1,500,000 |
| Southern pine[a, b] | 1,200 | 2,400 | 110 | 250 | 1,500,000 |
| Red oak[c] | 1,100 | 2,450 | 135 | 350 | 1,250,000 |
| Red pine[e] | 900 | 1,900 | 85 | 155 | 1,280,000 |

**Note a.** The allowable unit stresses in compression parallel to grain for Pacific Coast Douglas fir and Southern pine may be increased 0.2 percent for each foot (305 mm) of length from the tip of the pile to the critical section. The increase shall not exceed 10 percent for any pile. The stress increase is cumulative with increase in section properties due to pile taper.

**Note b.** Southern pine values apply to longleaf, slash, loblolly and shortleaf pines.

**Note c.** Red oak values apply to northern and southern red oak.

**Note d.** The working stresses in the above table have been adjusted to compensate for strength reductions due to conditioning prior to treatment. Where piles are air dried or kiln dried prior to pressure treatment, or where untreated piles are to be used, the above working stresses shall be increased by multiplying the tabulated values by the following factors:

| | |
|---|---|
| Pacific Coast Douglas fir, red oak, red pine | 1.11 |
| Southern pine | 1.18 |

**Note e.** Red pine values apply to red pine grown in the United States.

**Note f.** 1 psi = 0.000703 kg/mm$^2$.

**1019.3 Allowable stresses:** The allowable stresses for treated round timber piles shall not exceed those set forth in Table 1019.3.

**1019.4 End bearing piles:** Any sudden decrease in driving resistance of an end bearing timber pile shall be investigated with regard to the possibility of damage. If the sudden decrease in driving resistance cannot be correlated to bearing data, the pile shall be removed for inspection or rejected.

## SECTION 1020.0 COMPOSITE PILES

**1020.1 Design:** Composite piles consisting of two or more approved pile types shall be designed to meet the conditions of installation.

**1020.2 Limitation of load:** The maximum allowable load shall be limited by the capacity of the weakest section incorporated in the pile.

**1020.3 Splices:** Splices between concrete and steel or wood sections shall be designed to prevent separation both before and after the concrete portion has set, and to insure the alignment and transmission of the total pile load. Splices shall be designed to resist uplift due to upheaval during driving of adjacent piles, and shall develop the full compressive strength and not less than 50 percent of the tension and bending strength of the weaker section.

## SECTION 1021.0 CAISSON PILES

**1021.1 Construction:** Caisson piles shall consist of a shaft section of concrete filled pipe extending to bedrock with an uncased socket drilled into the bedrock and filled with concrete. The caisson pile shall have a full length structural steel core or a stub core installed in the rock socket and extending into the pipe portion a distance equal to the socket depth.

**1021.2 Design:** The depth of the rock socket shall be sufficient to develop the full loadbearing capacity of the caisson pile with a minimum safety factor of two, but the depth shall be not less than the outside diameter of the pipe. The design of the rock socket may be predicated on the sum of the allowable bearing pressure on the bottom of the socket plus bond along the sides of the socket. The minimum outside diameter of the caisson pile shall be 18 inches (457 mm), and the diameter of the rock socket shall be approximately equal to the inside diameter of the pile.

**1021.3 Material:** Pipe and steel cores shall conform to the material requirements in Section 1015.0. Pipe shall have a minimum wall thickness of ⅜ inch (10 mm) and shall be fitted with a suitable steel driving shoe welded to the bottom of the pipe. All concrete shall have a 28 day compressive strength ($f'_c$) of not less than 4,000 psi (2.81 kg/ mm$^2$). The concrete mix shall be designed and proportioned so as to produce a cohesive workable mix with a slump of from 4 inches (102 mm) to 6 inches (152 mm).

**1021.4 Structural core:** The gross cross sectional area of the structural steel core shall not exceed 25 percent of the gross caisson section. The minimum clearance between the structural core and the pipe shall be 2 inches (51 mm). If

cores are to be spliced, the ends shall be milled or ground to provide full contact and shall be full depth welded.

**1021.5 Allowable stresses:** The allowable design compressive stresses shall not exceed the following: concrete, $0.33f'_c$; steel pipe, $0.35f_y$; structural steel core, $0.50f_y$.

**1021.6 Installation:** The rock socket and pile shall be thoroughly cleaned of all foreign materials before filling with concrete. Steel cores shall be bedded in cement grout at the base of the rock socket. Concrete shall not be placed through water except when tremie methods are approved by the building official.

# ARTICLE 11

## MATERIALS AND TESTS

### SECTION 1100.0 GENERAL

**1100.1 Scope:** The provisions of this article shall govern the quality, workmanship and requirements for all materials hereafter used in the construction of buildings and structures. All materials of construction and tests shall conform to the applicable standards listed in this code.

**1100.2 New materials:** All new building materials, equipment, appliances, systems or methods of construction not provided for in this code, and any material of questioned suitability proposed for use in the construction of a building or structure, shall be subjected to the tests prescribed in this article and in the approved rules to determine character, quality and limitations of use.

**1100.3 Used materials:** The use of all second hand materials which meet the minimum requirements of this code for new materials shall be permitted.

**1100.4 Alternate test procedure:** In the absence of approved rules or other approved standards, the building official shall make or cause to be made the necessary tests and investigations; or the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided in Section 110.0. The cost of all tests and other investigations required under the provisions of this code shall be borne by the applicant.

### SECTION 1101.0 BASIC CLASSIFICATION OF CONSTRUCTION MATERIALS

**1101.1 General:** All materials and methods used in the design and construction of buildings and structures shall be classified as controlled materials and ordinary materials as defined in Sections 201.0 and 919.0. Design and construction shall be based on the assumptions, limitations, and methods of stress determination of approved design procedures.

### SECTION 1102.0 TESTS

**1102.1 Test standards:** All structural units and assemblies shall be tested in accordance with the standards listed in Appendix A. In the absence of test

procedures governing any specific material or method of construction, the building official shall accept authenticated reports from approved agencies which meet the requirements of this code.

**1102.2 Strength tests:** To determine the safe uniformly distributed working load when not capable of design by approved engineering analysis, or to check the adequacy of the structural design of an assembly when there is reasonable doubt as to its strength or stability, every system of construction, subassembly or assembled unit and its connections shall be subjected to strength tests prescribed in this code, or to such other tests approved by the building official that simulate the loads and conditions of application that the completed structure will be subjected to in normal use.

**1102.2.1 Strength test for glass:** The working strength of glass for any location in which it is required to withstand wind or impact loads shall be determined according to Section 1301.5.4 for wind loads and Section 1301.5.6 for impact loads.

**1102.3 Durability and endurance tests:** Whenever required by the building official or specified herein or in the approved rules, the material or construction shall be subjected to sustained and repetitive loading to determine its resistance to fatigue, and to test for durability and weather resistance.

**1102.4 Maintenance test:** In addition to durability and endurance tests, tests of all materials shall be made to assure the maintenance of the standards of approved materials when reasonable doubt exists as to quality and when required by the building official.

**1102.5 Performance test:** All work shall be conducted and completed in an approved manner, so as to secure the results intended in all sections of this code. Whenever there is reasonable doubt as to the stability or structural safety of a completed building or structure or part thereof for the intended use, the building official may require a load test of the building unit or portion of the structure in question. Such existing structure shall be subjected to a superimposed load equal to two times the design live load. The test load shall be left in place for a period of 24 hours. If during the test, or upon removal of the test load, the structure shows evidence of failure, the building official shall order such reinforcement or modifications deemed necessary to insure adequacy of the structure for the rated capacity; or in lieu thereof, the building official may specify a reduced working load to which the structure shall be limited. The structure shall be considered to have successfully met the test requirements if the total deflection does not exceed the theoretical deflection computed by approved engineering formulae. When the total deflection is greater than such theoretical value, the structure shall be considered safe for the design load if it recovers 75 percent of the maximum deflection within 24 hours after the removal of the test load.

**1102.6 Tests of service equipment and devices:** Tests of service equipment and accessories shall include proscenium curtain and stage ventilation per Section 617.6; structural load tests per Section 902.0; flues and chimneys per Section

1502.0; boilers, the mechanical code listed in Appendix A; electric installations per Section 2002.0; escalators, elevator interlocks and safety devices per Section 2102.0; refrigerating equipment and other mechanical and plumbing systems and devices as required by the mechanical and plumbing codes listed in Appendix A, and all other service tests required by the approved rules.

**1102.7 Fire tests:** In the determination of flash points, combustibility, flame-resistance and fireresistance rating of construction materials and methods, all tests shall be conducted in conformity to Sections 1402.0, 1403.0 and 1404.0.

**1102.8 Prefabricated construction tests:** Prefabricated assemblies or subassemblies not capable of design by approved engineering analysis shall meet all the requirements and tests for at-site construction. The floor panels and other prefabricated units shall be assembled to form an integrated test specimen constructed as in practice, of not less than three units in width with two longitudinal joints; and when designed on the assumption of a simple span, such units shall be tested with flat end supports.

**1102.9 Test specimens:** The selection and construction of all test specimens and the details of test procedure herein required shall conform to the requirements of the specific test standard being followed. All test specimens and constructions shall be truly representative of the materials, workmanship and details to be normally applied in practice. When structural or fireresistance rated properties of the material are dependent upon adequate curing, the age of the specimen shall be not less than seven nor more than 28 days, unless otherwise approved by the building official.

**Note: Test procedures.** Test requirements constitute fundamental performance standards and therefore come within the scope of this code. The detail test specifications and procedures are formulated and defined in the approved rules or by reference to test standards of approved testing agencies and organizations. Details of test procedures have been omitted from this code, except for essential basic requirements when deemed necessary.

## SECTION 1103.0 CONDITIONS OF ACCEPTANCE

**1103.1 General:** In evaluating the physical properties of materials and methods of construction when not subject to design by approved engineering analysis, the structural requirements shall be based on the criteria established by the following Sections 1103.2 through 1103.7.

**1103.2 Test load factor:** The test assembly shall sustain without failure superimposed loads equal to two and one half times the design live load.

**1103.3 Working load deflection:** Under the approved working load, the deflection of floor and roof assemblies shall not be greater than $^{1}/_{360}$ of the span for plastered construction; $^{1}/_{240}$ of the span for unplastered floor construction; and $^{1}/_{180}$ of the span for unplastered roof construction.

**1103.4 Wall and partition assemblies:** Bearing wall and partition assemblies

shall sustain the load test both with and without window framing.

**1103.5 Comparative tests:** When not available from existing approved test data, the building official may require comparative tests of assemblies of standard traditional forms of construction used for similar purposes to assist in determining the adequacy of the new construction.

**1103.6 Concentrated load tests:** When not capable of design, all floor assemblies in the use classification groups specified in Table 907 shall be subjected to the concentrated loads therein prescribed when such loading exceeds in stress effect the uniformly distributed load specified for such uses in Table 906.

**1103.7 Puncture penetration tests:** All finish floor assemblies in which light gage metal or other thin materials are used as the structural floor shall withstand the application of a 200 pound (90.8 kg) concentrated load applied to the top surface on an area of 1 square inch (645 $mm^2$) at any point or points of the assembly designated by the building official.

## SECTION 1104.0 APPROVALS

**1104.1 Written approval:** Any material, appliance, equipment, system or method of construction meeting the requirements of this code shall be approved by the building official in writing within a reasonable time after satisfactory completion of all required tests and submission of required test reports.

**1104.2 Approved record:** Whenever any material, appliance, equipment, system or method of construction shall have been approved by the building official, a record of such approval, including all the conditions and limitations of its permitted use, shall be kept on file in the building official's office and shall be open to public inspection during business hours.

**1104.3 Identification of product:** When identification of a material is necessary for structural safety, the approved material shall be identified by the approved label and the grade mark, trademark or other manufacturer's identification for which official recognition is desired. A drawing of the identification marks shall be filed with the building official and kept in the official records.

**1104.4 Heretofore approved materials:** The use of any material already fabricated or of any construction already erected, which conformed to requirements or approvals heretofore in effect, shall be permitted to continue, if not detrimental to life, health or safety of the public.

## SECTION 1105.0 MASONRY CONSTRUCTION UNITS

**1105.1 Nominal dimensions:** Dimensions and thicknesses specified in this code are nominal dimensions. Actual dimensions may vary from the prescribed minimum in accordance with approved tolerances in the building industry.

**1105.2 Secondhand units:** Brick and other secondhand masonry units may be reused, subject to the approval of the building official as to quality, condition and compliance with the requirements for new masonry units. The unit shall be of whole, sound material, free from cracks and other defects that would interfere with its proper laying or use, and shall be cleaned free from old mortar before reuse.

## SECTION 1106.0 BRICK UNITS

**1106.1 General:** Brick of clay, shale and calcium silicate (sand/lime) shall conform to ASTM Standards listed in Appendix A as follows: C216 for solid units of face brick; C62 for solid units of building brick; C652 for hollow brick; and C73 for calcium silicate brick. Grade requirements for clay and shale brick units in contact with the ground or subject to water, frost and freezing action shall be governed by the applicable provisions of the ASTM Standards listed above.

## SECTION 1107.0 STRUCTURAL CLAY TILE UNITS

**1107.1 General:** Structural clay wall tile shall conform to ASTM Standards for structural clay tile units listed in Appendix A as follows: C34 for loadbearing wall tile; C212 for structural clay facing tile; C56 for structural clay nonloadbearing wall tile. Grade requirements for units subjected to the weather or contact with the ground shall be governed by the applicable provisions of the ASTM Standards listed above.

**1107.2 Fireproofing tile:** Structural clay tile for nonstructural use in fireproofing of structural members and in wall furring shall not be required to meet compressive strength specifications. The fireresistance rating shall be determined by standard test procedure to comply with the requirements of Table 401.

## SECTION 1108.0 GLAZED MASONRY UNITS

**1108.1 General:** Glazed masonry building units shall be of a quality equal to that required by ASTM C126 listed in Appendix A.

## SECTION 1109.0 CONCRETE UNITS

**1109.1 Quality:** Cast concrete units shall be of sound, compact structure, uniform in shape and free from cracks, warpage or other defects that would impair their serviceability or strength when laid in the wall.

**1109.2 Hollow loadbearing units:** Approved hollow loadbearing concrete units for use below grade or unprotected against the weather by stucco, brick or other approved facings or veneers shall have a minimum compressive strength on the gross area of 1,000 psi (0.70 kg/mm$^2$); and for protected exterior use and general interior construction not less than 700 psi (0.49 kg/mm$^2$).

**1109.3 Hollow nonloadbearing units:** Approved hollow nonloadbearing concrete units shall have a minimum compressive strength on the average gross area of 350 psi (0.25 kg/mm²).

**1109.4 Solid loadbearing units:** Approved solid loadbearing concrete masonry units, when unprotected against the weather or subject to frost and water action, shall have a minimum compressive strength of 1,800 psi (1.27 kg/mm²), and for protected exterior or general interior use not less than 1,200 psi (0.84 kg/mm²).

**1109.5 Concrete brick:** Approved concrete brick for use when exposed to freezing in the presence of moisture shall have a minimum compressive strength of 2,500 psi (1.76 kg/mm²); and when used as a backup in exterior walls or for general interior construction, a compressive strength of not less than 1,250 psi (0.88 kg/mm²).

**1109.6 Concrete fireproofing and furring units:** Approved concrete block or tile used in fireproofing or furring when not exposed to the weather shall have a minimum compressive strength of 300 psi (0.21 kg/mm²) of net area tested as laid in practice. When exposed to the weather, the compressive strength shall be not less than 700 psi (0.49 kg/mm²) of gross area. All nonbearing units shall be clearly marked to distinguish them from loadbearing units.

**1109.7 Concrete floor tile:** Concrete floor tile shall comply with Sections 1109.7.1 and 1109.7.2.

**1109.7.1 Structural fillers:** Structural concrete filler block or tile when included in strength calculations of ribbed floor construction shall have webs and shells not less than 1 inch (25 mm) thick and shall develop an average compressive strength on the net area not less than that of the rib concrete.

**1109.7.2 Other fillers:** Removable tile and permanent fillers which are not included in strength calculations shall be of adequate strength to insure integrity of the unit and safety in handling as approved by the building official.

## SECTION 1110.0 GYPSUM UNITS

**1110.1 General:** Gypsum tile or block shall not be used in bearing walls or in any location exposed to frequent or continuous wetting or in exterior walls unless protected from the weather. Approved gypsum units shall develop a compressive strength of not less than 75 psi (0.05 kg/mm²) on the gross area.

## SECTION 1111.0 STRUCTURAL GLASS BLOCK UNITS

**1111.1 General:** Solid or hollow approved structural glass blocks shall not be used in fire walls, party walls or fire separation walls, or for loadbearing construction. All mortar bearing surfaces of the block shall be precoated or prepared to insure adhesion between mortar and glass.

## SECTION 1112.0 ARCHITECTURAL TERRA COTTA

**1112.1 General:** All approved architectural terra cotta units shall be formed with a strong, homogeneous body of hardburned, weather resisting clay which gives off a sharp, metallic ring when struck and shall meet the strength and durability requirements of this code. All units shall be formed to engage securely with, and anchor to, the structural frame or masonry wall.

## SECTION 1113.0 NATURAL STONE

**1113.1 General:** Natural stone for masonry shall be sound and free from loose or friable inclusions. It shall meet the strength, fireresistance, durability and impact resistance required for the intended use.

## SECTION 1114.0 CAST STONE

**1114.1 General:** All approved cast stone shall be fabricated of concrete or other approved materials of required strength, durability and fireresistance for the intended use and shall be reinforced where necessary to comply with Section 1216.0.

## SECTION 1115.0 MORTAR AND GROUT FOR MASONRY

**1115.1 Materials:** All portland, natural and masonry cements, quicklime and hydrated lime for use in masonry mortar and grout shall meet the minimum strength and durability requirements of ASTM C270 and ASTM C476 listed in Appendix A.

**1115.2 Mortar and grout types and proportions:** Mortar and grout for masonry construction shall conform to those shown in Tables 1115.2a, 1115.2b and 1115.2c and shall be mixed to a consistent workability in the specified proportions measured by volume with clean, fresh water free from harmful amounts of acids, alkalis, oils or organic materials; and with

**Table 1115.2a**
**MORTAR PROPORTIONS (PARTS BY VOLUME)**

| Mortar type | Portland cement | Masonry cement | Hydrated lime or lime putty Min. | Hydrated lime or lime putty Max. | Damp loose aggregate |
|---|---|---|---|---|---|
| M | 1<br>1 | —<br>1 | —<br>— | ¼ | Not less than 2¼ and not more than 3 times the sum of the volumes of the cements and lime used. |
| S | 1<br>½ | —<br>1 | ¼<br>— | ½ | |
| N | 1<br>— | —<br>1 | ½<br>— | 1¼<br>— | |
| O | —<br>1 | 1<br>— | —<br>1¼ | —<br>2½ | |

approved aggregates composed of hard, strong, durable mineral particles well graded from fine to coarse, free from injurious amounts of acid, alkalis, oils, saline, organic and other deleterious substances in accordance with ASTM C404 and ASTM C144 listed in Appendix A. Masonry mortars shall have a flow after suction of not less than 70 percent.

**Table 1115.2b**
**MORTAR PROPORTIONS FOR REINFORCED MASONRY (PARTS BY VOLUME)**

| Mortar type | Portland cement or portland blast-furnace slag cement | Masonry cement | Hydrated lime or lime putty | Fine aggregate measured in a damp, loose condition |
|---|---|---|---|---|
| PM | 1 | 1 | — | 2¼ to 3 times the sum of the volumes of the cementitious material |
| PL | 1 | — | ¼ to ½ | |

**Table 1115.2c**
**GROUT PROPORTIONS FOR REINFORCED MASONRY (PARTS BY VOLUME)**

| Type | Portland cement or portland blast-furnace slag cement | Hydrated lime or lime putty | Aggregates, measured in a damp loose condition | |
|---|---|---|---|---|
| | | | Fine | Coarse |
| Fine grout | 1 | 0 to 1/10 | 2¼ to 3 times the sum of the volumes of the cementitious materials | — |
| Coarse grout | 1 | 0 to 1/10 | 2¼ to 3 times the sum of the volumes of the cementitious materials | 1 to 2 times the sum of of the volumes of the cementitious materials |

**1115.3 Types of mortar permitted:** Unit masonry shall be laid in mortar of the following types listed in Table 1115.3.

**1115.4 Special mortars:** The building official may approve other special masonry mortars in place of the mortar types listed in Table 1115.3, provided they develop the minimum compressive strengths specified for the respective mortars they replace. The strength classification of a special mortar or special mix may be determined by compressive strength tests with the materials and in the proportions representative of those to be used in actual practice. The allowable unit working stresses in the masonry shall not be more than one fourth the average ultimate compressive strength of the assembled test samples.

**1115.5 Gypsum mortar:** Gypsum mortar shall be composed of one part of unfibered calcined neat gypsum to not more than three parts sand by weight. Only gypsum mortar shall be used with gypsum tile and block units.

**Table 1115.3**
**MASONRY AND MORTAR TYPES**

| Types of masonry | Types of mortar permitted |
|---|---|
| Masonry in contact with earth | M or S |
| Grouted and filled cell masonry | M or S |
| Masonry above grade or interior masonry | |
| Piers of solid units | M, S or N |
| Piers of hollow units | M or S |
| Walls of solid units | M, S, N or O |
| Walls of hollow units | M, S or N |
| Cavity walls and masonry bonded hollow walls | |
| Design wind pressure exceeds 20 psf | M or S |
| Design wind pressure 20 psf or less | M, S or N |
| Glass block masonry | S or N |
| Nonloadbearing partitions and fireproofing | M, S, N, O or Gypsum |
| Gypsum partition tile or block | Gypsum |
| Fire brick | Refractory air setting mortar |
| Linings of existing masonry, above or below grade | M or S |
| Masonry other than above | M, S or N |

**Note a.** 1 psf = 4.882 kg/m².

**1115.6 Mortars for ceramic wall and floor tile:** Portland cement mortars for installing ceramic wall and floor tile shall be of the following compositions indicated in Table 1115.6.

**Table 1115.6**
**CERAMIC TILE MORTAR COMPOSITIONS**

| | | |
|---|---|---|
| Walls: | Scratchcoat | 1 cement; 1/5 hydrated lime; 4 dry or 5 damp sand |
| | Setting bed and leveling coat | 1 cement; ½ hydrated lime; 5 damp sand to 1 cement; 1 hydrated lime; 7 damp sand |
| Floors: | Setting bed | 1 cement; 1/10 hydrated lime; 5 dry or 6 damp sand; or 1 cement; 5 dry or 6 damp sand |
| Ceilings: | Scratchcoat and setting bed | 1 cement; ½ hydrated lime; 2½ dry sand or 3 damp sand |

**1115.6.1 Dry set portland cement mortars:** Premixed prepared portland cement mortars requiring only the addition of water may be used in the installation of ceramic tile if complying with ANSI A118.1 and ANSI A118.2 listed in Appendix A. Dry set mortars which are labeled for use with a particular type of tile, such as glazed wall tile, ceramic mosaics, pavers, and quarry tile, shall not be used to set other types of tile for which they are not intended. The shear bond strength for tile set in such mortar shall be as required for the kind of mortar used when tested in accordance with that standard. Mortars which are not restricted by their labeling to particular types of the tile shall pass all of the shear tests listed in the standard. Tile set in dry set portland cement mortar shall be installed in accordance with ANSI A108.5 and ANSI A108.7 listed in Appendix A.

**1115.6.2 Latex portland cement mortars:** Latex modified portland cement thin set mortar to which latex is added as a replacement for all or part of the gauging water may be used in the installation of ceramic tile if complying with ANSI A118.4 listed in Appendix A. Tile set in latex portland cement mortar shall be installed in accordance with ANSI A108.5 and ANSI A108.7 listed in Appendix A.

**1115.7 Organic adhesives:** Water resistant organic adhesives complying with ANSI A136.1 listed in Appendix A may be used in the installation of ceramic tile. The shear bond strength shall be not less than 40 psi (0.028 kg/ mm$^2$) for Type I adhesive, and not less than 20 psi (0.014 kg/ mm$^2$) for Type II adhesive, when tested in accordance with ANSI A136.1 listed in Appendix A. Tile set in organic adhesives shall be installed in accordance with ANSI A108.4 listed in Appendix A.

**1115.8 Epoxy mortar:** Ceramic tile may be set and grouted with epoxy complying with ANSI A118.3 listed in Appendix A. Tile set in epoxy shall be installed in accordance with ANSI A108.6 listed in Appendix A.

## SECTION 1116.0 CONCRETE AGGREGATES

**1116.1 Aggregate quality:** All concrete aggregates shall meet the requirements of ASTM C33, ASTM C330 and ASTM C332 listed in Appendix A for organic impurities, soundness, mortar strength, durability, weather resistance, fireresistance rating and wearing qualities.

**1116.2 Fireresistance rating:** Coarse aggregate in concrete shall be fireresistance rated in respect to the concrete made therewith on the basis of performance in fire test on building elements such as columns, floors, partitions and walls, conducted in accordance with ASTM E119 listed in Appendix A. Protective coverings of encasements of concrete for steel in fireresistance rated construction shall likewise be selected on the basis of performance in accordance with ASTM E119 listed in Appendix A. All concrete assemblies shall meet the requirements of Article 14 as regulated by the provisions of Table 401.

**1116.2.1 Grade 1 concrete:** Grade 1 concrete shall mean concrete made with aggregates such as blast furnace slag, burned clays, and calcareous, igneous, and most silicate crushed stones and gravels and shales, as well as any other aggregates performing as required by this code for the appropriate construction when tested in accordance with ASTM E119 listed in Appendix A.

**1116.2.2 Grade 2 concrete:** Grade 2 concrete shall mean concrete made with aggregates such as cinders and crushed stones and gravels composed essentially of quartz and quartzite cherts as well as any other aggregates performing as required by this code for the appropriate construction when tested in accordance with ASTM E119 listed in Appendix A.

**1116.3 Size of aggregates:** Fine aggregates shall meet all the requirements of the approved rules and shall be well graded from fine to coarse. Coarse

aggregates shall not exceed one fifth of the narrowest dimension between sides of the form nor three fourths of the minimum clear spacing between reinforcing bars.

**1116.4 Special aggregates:** Special aggregates, including among others, perlite, vermiculite and other processed mica, pumice, lava, tufa, volcanic glass, slag, coke, expanded clay and shale used in concrete and plaster construction shall meet all the requirements of the approved rules and shall be classified in their respective fireresistance rating grades as determined by ASTM E119 listed in Appendix A. When used for fire protection purposes only, the mortar strength requirements for such aggregates may be waived by the building official providing the concrete is shown by test to have adequate strength for the intended use.

## SECTION 1117.0 READY MIX CONCRETE

**1117.1 Control:** Ready mixed concrete for use in ordinary or controlled materials procedure shall conform to the applicable Section 1215.0 or 1216.1 for plain and reinforced concrete, and to ACI 318 listed in Appendix A.

**1117.2 Ordinary materials procedure:** When ready mix is used under the ordinary materials procedure, either the minimum cement content in bags per yard ($m^3$) of concrete together with the maximum allowable water content (water/ cement ratio), or the compressive strength and maximum permissible slump, shall be specified in accordance with Appendix D.

## SECTION 1118.0 INTERIOR LATHING AND PLASTERING

**1118.1 General:** All interior lathing and plastering shall conform to ASTM C841 listed in Appendix A, except as may be otherwise provided by this code for specific materials.

**1118.2 Inspection:** The building official shall be notified not less than 24 hours in advance of all plastering work. Plaster shall not be applied until after the lathing or other plaster base has been inspected and approved by the building official.

**1118.3 Weather protection:** When plastering work is in progress, the building or structure shall be temporarily enclosed, and in freezing weather the enclosure shall be heated to protect the plaster from injury.

## SECTION 1119.0 EXTERIOR LATHING AND STUCCO

**1119.1 General:** All exterior lathing, plastering and stucco work shall be installed of portland cement or other approved mortar as provided in this code for specific materials.

**1119.2 Reinforcement:** All stucco work shall be reinforced with approved metal lath or wire fabric except when applied directly to a masonry or concrete base, or when installed on a masonry base which is protected with bituminous surfacing.

**1119.3 Minimum weight:** Metal lath, expanded metal and wire reinforcing fabric shall weigh not less than that indicated in the following Table 1119.

**1119.4 Corrosion resistance:** All metal lath and stucco reinforcing fabric shall be protected with zinc or other approved rust resistive coating or rust-inhibitive paint, or shall be manufactured from approved corrosion resistive alloys.

**1119.5 Sheathing:** Except in back plastered construction, the studs shall be covered with approved sheathing complying with Section 1224.0; or not less than No. 18 Steel Wire Gage (0.048 inch) galvanized wire shall be stretched horizontally at 6 inch (152 mm) centers and shall be covered with not less than 14 pound waterproof felt or paper before applying the reinforced stucco; or an approved paper backed wire fabric may be used of not less than No. 16 Steel Wire Gage (0.063 inch) galvanized wire with stiffening ribs not more than 5 inches (127 mm) on centers to which is attached a double layer of fibrous waterproof backing. The mesh opening shall not exceed 2x2 inch (51 mm x 51 mm).

**Table 1119**
**MINIMUM REINFORCEMENT WEIGHT**

| Type of reinforcement | Minimum steel wire gage | Maximum mesh (inches) | Minimum weight (pounds per square yard) |
|---|---|---|---|
| Metal lath | — | — | 3.4 |
| Expanded metal | — | — | 1.8 |
| Woven wire | 18 (0.048 in.) | 1 | 1.74 |
| Woven wire | 17 (0.054 in.) | 1½ | 1.41 |
| Woven wire | 16 (0.063 in.) | 2 | 1.47 |
| Welded wire | 18 (0.048 in.) | 4 sq. in. | 0.67 |
| Welded wire | 17 (0.054 in.) | 4 sq. in. | 0.82 |
| Welded wire | 16 (0.063 in.) | 4 sq. in. | 1.10 |

**Note a.** 1 inch = 25.4 mm; 1 lb/yds$^2$ = 0.543 kg/m$^2$.

**1119.6 Back plastered construction:** In back plastered construction, when the spacing of studs exceeds 16 inches (406 mm), approved horizontal noncombustible cross furring at not more than 16 inch (406 mm) centers shall be first applied, unless approved stiffened lath is used and the frame is adequately stiffened as provided in Section 1225.0.

**1119.7 Application on masonry base:** When applied directly to masonry or monolithic concrete, the surfaces shall be roughened, hacked or bushhammered to provide bond, or a preparatory dash coat of portland cement grout shall be applied. The dash coat shall be kept damp for at least two days after application and before applying succeeding stucco coats.

**1119.8 Protection from freezing:** At all times during application and for a period of not less than 48 hours after application of each coat, provision shall be made to keep stucco work above 50 degrees F. (10 degrees C.).

**1119.9 Protection from moisture:** Stucco shall be kept a sufficient height

above ground surfaces as provided in Section 1225.0 and all sills, coping and projecting courses shall be flashed and provided with drips as therein specified.

## SECTION 1120.0 PLASTERING MATERIALS

**1120.1 General:** All sand, quicklime, hydrated lime, hair binder, gypsum, keene and portland cements, pozzolanic cements and aggregates and other materials used in plastering shall be stored, protected and applied in accordance with ASTM C59 and ASTM C61 listed in Appendix A.

**1120.2 Special cements and plasters:** Approved cements used in plastering may have admixtures of approved plasticity agents added in the manufacturing process or when mixing the plaster at the site in the approved proportions. All premixed special plasters, cements and aggregates shall be packaged and identified with an approved label.

**1120.3 Lime plaster:** Lime and hydrated lime plasters for use in base and finish coats shall be applied in accordance with ASTM C5, ASTM C6 and ASTM C206 listed in Appendix A, and the manufacturer's specifications.

**1120.4 Gypsum plaster:** All gypsum plaster shall comply with ASTM C28 and ASTM C842 listed in Appendix A for gypsum plaster, and ASTM C587 and ASTM C843 listed in Appendix A for gypsum veneer plaster.

**1120.5 Gypsum plasters with special aggregates:** When gypsum is used with manufactured aggregates in place of natural sand for plaster, the mixture shall be proportioned and applied in accordance with the manufacturer's recommendations and ASTM C35 listed in Appendix A.

## SECTION 1121.0 PLASTER BASES

**1121.1 Fiber boards:** Approved fiber boards used as plaster bases shall comply with Section 1122.0. The surface of such boards shall be of a rough, fibrous texture to insure mechanical and suction bond; and the boards shall meet the bond and strength tests specified by ASTM C532 listed in Appendix A.

**1121.2 Gypsum lath:** Except when greater thickness is required for fireresistance rating under the provisions of Article 14, or as herein specified, gypsum lath used for plastering shall be not less than ⅜ inch (10 mm) thick and shall comply with ASTM C37 listed in Appendix A for gypsum lath, and ASTM C588 and ASTM C844 for gypsum base to receive gypsum veneer plaster.

**1121.3 Perforated gypsum lath:** Where required to provide specified time-temperature performance, perforated gypsum lath shall be not less than ⅜ inch (10 mm) thick. The openings shall be equivalent to ¾ inch (19 mm) diameter holes for each 16 square inches (10322 $mm^2$) of lath surface; or the lath shall be perforated as determined by full size tests for load, strength and fireresistance ratings.

**1121.4 Metal lath:** The dimensions and sizes of expanded, ribbed and sheet metal lath shall comply with ASTM C847 listed in Appendix A; and shall be fabricated from not less than No. 30 Manufacturer's Standard Gage (0.012 inch) steel sheets. It shall be manufactured from copper bearing steel, coated with rust inhibitive paint after cutting, or cut from zinc coated steel sheets.

**1121.5 Wire lath:** All types of wire lath shall be fabricated from woven or welded wire of not less than No. 19 Steel Wire Gage (0.041 inch) with not more than two and one half meshes to the inch (98 meshes per meter). Woven or welded wire reinforcement shall be coated with zinc or rust inhibitive paint.

**1121.6 Paper backed lath:** Expanded metal or wire lath backed with integral approved paper shall be fabricated from the minimum gages and weights specified in Sections 1121.4 and 1121.5.

**1121.7 Combustible lath:** Wood lath shall be erected horizontally on walls and partitions and ceiling lath shall run in one direction only; but in either case it shall not extend through cross partitions from room to room. Wood lath shall be not less than one inch (25 mm) wide nor less than 5/16 inches (8 mm) thick and shall comply with all the requirements of accepted engineering practice. The lath joints shall be staggered so that not more than seven laths occur in any one continuous break.

## SECTION 1122.0 FIBER BOARDS

**1122.1 General:** Insulating boards manufactured with wood or other vegetable fibers used as building boards for sheathing, roof decks, plaster bases, interior wall and ceiling finish, roof insulation or sound deadening, shall be vermin proof, resistant to rot producing fungi, water repellent and shall meet the strength and durability tests specified in DOC PS 57, ASTM C208 and ASTM C532 listed in Appendix A. Sheathing, when used structurally, shall be so identified by an approved agency. When required under the provisions of Article 14, the boards shall be protected or treated to develop the required fireresistance rating or flameresistance as determined by test.

**1122.2 Jointing:** To insure tight fitting assemblies, edges shall be manufactured square or shiplapped, beveled, tongue and groove or U-jointed.

**1122.3 Plaster base:** When used as a plaster base, fiber boards shall be permitted in fireresistive construction complying with the test provisions of Article 14, except where specifically prohibited in Type 1 and Type 2 construction.

**1122.4 Roof insulation:** When used as roof insulation in all types of construction, fiber boards shall be protected with an approved roof covering.

**1122.5 Wall insulation:** When installed and firestopped to comply with Article 14, fiber boards may be used for wall insulation in all types of construction. In fire wall and fire separation wall construction, unless treated to be fireretardant as provided in Section 1404.0 for Class I materials, the boards shall be cemented directly to the masonry or other noncombustible base and

shall be protected with an approved noncombustible veneer anchored to the base without intervening air spaces.

**1122.6 Dry wall construction:** Where fireresistance ratings are required, provision shall be made for interlocking, lapping or otherwise protecting the joints between adjacent boards to insure smoke and flame tightness.

**1122.7 Insulating roof deck:** When used as roof decking in open beam construction, fiber board insulating roof deck shall have a minimum nominal thickness not less than 1 inch.

**1122.8 Siding:** Hardboard siding shall comply with DOC PS 60 listed in Appendix A.

## SECTION 1123.0 PLYWOOD

**1123.1 Quality:** All plywood when used structurally shall meet the performance standards and all other requirements of DOC PS 1 and DOC PS 51 listed in Appendix A for the type, grade and identification index or species group of plywood involved and shall be so identified by an approved agency. Working stresses shall conform to APA E30, APA Y510 and HPMA-HP-SG listed in Appendix A.

**1123.2 Types:** Plywood for interior use may be either of the moisture resistant or exterior type. Plywood for exterior use shall be of the exterior waterproof type. Exterior plywood may be applied directly to the framing as a siding, provided it has a nominal thickness of ⅜ inch. Joints shall occur over framing members, unless wood or plywood sheathing is used or joints are lapped horizontally a minimum of 1½ inches (38 mm) or otherwise made waterproof to the satisfaction of the building official. If plywood is used as lapped siding without sheathing, the wall framing to which it is attached shall be diagonally braced.

**1123.3 Spans:** The maximum spans for plywood sheathing shall be limited by the allowable stresses and deflections for the design live load, but shall not be greater than the spans specified in Tables 1123.3.1, 1123.3.1a, 1123.3.2 and 1123.3.3.

**1123.3.1 Floor and roof sheathing:** Allowable spans for floor and roof sheathing shall be as specified in the following Tables 1123.3.1 and 1123.3.1a. The values in Table 1123.3.1 apply to Structural I and II, C-D and C-C grades only.

**1123.3.1.1 Floor sheathing:** Edges of plywood floor sheathing shall have approved tongue and groove joints or shall be supported with blocking, unless ¼ inch minimum thickness underlayment is installed, or finish floor is $^{25}/_{32}$inch wood strip. Allowable uniform load based on deflection of $^{1}/_{360}$ of the span is 165 psf (806 kg/ m$^2$).

**1123.3.2 Plywood combination subfloor underlayment:** Allowable spans for combination subfloor underlayment shall be as specified in the following Table 1123.3.2.

**1123.3.2.1 Limitations:** Table 1123.3.2 is applicable to underlayment grade, C-C (plugged) and all grades of sanded exterior type plywood. Allowable uniform load based on deflection of 1/360 of span is 125 psf (610 kg/m²). Plywood edges shall have approved tongue and groove joints or shall be supported with blocking, unless ¼ inch minimum thickness underlayment is installed, or finish floor is 25/32 inch wood strip. If wood strips are perpendicular to supports, thicknesses shown for 16 inch (406 mm) and 20 inch (508 mm) spans may be used on 24 inch (610 mm) span. Except for ½ inch, underlayment grade and C-C (plugged) panels may be of nominal thickness 1/32 inch less than the nominal thicknesses shown when marked with the reduced thicknesses.

**1123.3.3 Vertical maximum stud spacing:** Stud spacing for vertical sheathing shall be as specified in the following Table 1123.3.3.

**1123.4 Stress skin panel:** For use in stress skin or other prefabricated construction, plywood design shall be determined by approved engineering analysis or by the tests prescribed for prefabricated assemblies in Section 1102.0.

**Table 1123.3.1**
**ALLOWABLE SPANS FOR PLYWOOD FLOOR AND ROOF SHEATHING CONTINUOUS OVER TWO OR MORE SPANS AND FACE GRAIN PERPENDICULAR TO SUPPORTS[a] (SPAN IN INCHES)**

| Panel Index[b] roof span, roof/floor span | Roof | | | | | Floor |
|---|---|---|---|---|---|---|
| | Maximum span (inches) | | | Load (psf) | | |
| | Thickness (inches) | Edges blocked[c] | Edges unblocked | Total load | Live load | Maximum span[e] (inches) |
| 12/0 | 5/16 | 12 | 12 | 155 | 150 | 0 |
| 16/0 | 5/16, 3/8 | 16 | 16 | 95 | 75 | 0 |
| 20/0 | 5/16, 3/8 | 19.2 | 19.2 | 75 | 65 | 0 |
| 24/0 | 3/8 | 24 | 20 | 65 | 50 | 0 |
| 24/0 | 1/2 | 24 | 24 | 65 | 50 | 0 |
| 30/12 | 5/8 | 30 | 26 | 70 | 50 | 12[f] |
| 32/16 | 1/2, 5/8 | 32 | 28 | 55 | 40 | 16[g] |
| 36/16 | 3/4 | 36 | 30 | 55 | 50 | 16[g] |
| 42/20 | 5/8, 3/4, 7/8 | 42 | 32 | 40[d] | 35[d] | 20[g,h] |
| 48/24 | 3/4, 7/8 | 48 | 36 | 40[d] | 35[d] | 24 |

**Note a.** These values apply to Structural I and II, C-D and C-C grades only. Spans shall be limited to values shown because of possible effect of concentrated loads (see Section 1123.3.1).

**Note b.** Identification index appears on all panels in the construction grades listed in Note a.

**Note c.** Edges may be blocked with lumber or other approved type of edge support.

**Note d.** For roof live load of 40 psf or total load of 55 psf, decrease spans by 13 percent or use panel with next greater identification index.

**Note e.** Plywood edges shall have approved tongue and groove joints or shall be supported with blocking, unless ¼ inch minimum thickness underlayment is installed, or finish floor is 25/32 inch wood strip. Allowable uniform load based on deflection of 1/360 of the span is 165 psf (see Section 1123.3.1.1).

**Note f.** May be 16 inches if 25/32 inch wood strip flooring is installed at right angles to joists.

**Note g.** May be 24 inches if 25/32 inch wood strip flooring is installed at right angles to joists.

**Note h.** For joists spaced 24 inches on center, plywood sheathing with Identification Index Numbers 42/20 or greater can be used for subfloors when supporting 1½ inches of lightweight concrete.

**Note i.** 1 inch = 25.4 mm; 1 psf = 4.882 kg/m².

**Table 1123.3.1a**
**ALLOWABLE LOADS FOR PLYWOOD ROOF SHEATHING CONTINUOUS OVER TWO OR MORE SPANS AND FACE GRAIN PARALLEL TO SUPPORTS[a] (SPAN IN INCHES)**

| | Thickness (inches) | No. of plies | Span (inches) | Total load (psf) | Live load (psf) |
|---|---|---|---|---|---|
| Structural I | 1/2 | 4 | 24 | 35 | 25 |
| | 1/2 | 5 | 24 | 55 | 40 |
| Other grades covered in PS 1 | 1/2 | 5 | 24 | 30 | 25 |
| | 5/8 | 4 | 24 | 40 | 30 |
| | 5/8 | 5 | 24 | 55 | 45 |

**Note a.** Uniform load deflection limitations: 1/180 of span under live load plus dead load, 1/120 under live load only. Edges shall be blocked with lumber or other approved type of edge supports.
**Note b.** 1 inch = 25.4 mm; 1 psf = 4.882 kg/m².

**Table 1123.3.2**
**ALLOWABLE SPANS FOR PLYWOOD COMBINATION SUBFLOOR—UNDERLAYMENT,[a] PLYWOOD CONTINUOUS OVER TWO OR MORE SPANS AND FACE GRAIN PERPENDICULAR TO SUPPORT (THICKNESS IN INCHES)**

| Species groups | Maximum spacing of joists (inches) | | |
|---|---|---|---|
| | 16 | 20 | 24 |
| 1 | 1/2 | 5/8 | 3/4 |
| 2, 3 | 5/8 | 3/4 | 7/8 |
| 4 | 3/4 | 7/8 | 1 |

**Note a.** Applicable to underlayment grade, C-C (plugged) and all grades of sanded exterior type plywood. Spans limited to values shown because of possible effect of concentrated loads. Allowable uniform load based on deflection of 1/360 of span is 125 psf. Plywood edges shall have approved tongue and groove joints or shall be supported with blocking, unless 1/4 inch minimum thickness underlayment is installed, or finish floor is 25/32 inch wood strip. If wood strips are perpendicular to supports, thicknesses shown for 16 inch and 20 inch spans may be used on 24 inch span. Except for 1/2 inch, underlayment grade and C-C (plugged) panels may be of nominal thickness 1/32 inch less than the nominal thicknesses shown when marked with the reduced thickness (see Section 1123.3.2.1).
**Note b.** 1 inch = 25.4 mm; 1 psf = 4.882 kg/m².

**Table 1123.3.3**
**ALLOWABLE STUD SPACING FOR PLYWOOD WALL SHEATHING**

| Panel identification index | Panel thickness (inch) and construction | Maximum stud spacing (inches) Exterior coverings nailed to:[a] | |
|---|---|---|---|
| | | Stud | Sheathing |
| 12/0, 16/0, 20/0 | 5/16 | 16 | 16[b] |
| 16/0, 20/0, 24/0, 32/16 | 3/8 and 1/2 3-ply | 24 | 16<br>24[b] |
| 24/0, 32/16 | 1/2 (4 & 5 ply) | 24 | 24 |

**Note a.** Blocking of horizontal joints not required.
**Note b.** Apply plywood sheathing with face grain perpendicular to studs.
**Note c.** 1 inch = 25.4 mm.

## SECTION 1124.0 WALLBOARDS AND SHEATHING

**1124.1 Wallboards and sheathing:** Wallboards of particleboard, gypsum, processed fiber or other approved materials shall conform to DOC PS 58, ANSI A208.1, DOC PS 57, ASTM C36, ASTM C208, ASTM C79, GA 216 and ASTM D2277 listed in Appendix A. All wallboards shall be identified as to compliance with appropriate standards. When required to meet fireresistance ratings, the assembled construction shall comply with Table 401 for structural elements and Article 14 for trim and finishes.

**1124.2 Water resistant gypsum backer board:** In all areas subjected to repeated damp conditions and moisture accumulation such as bathtub and shower compartments, water resistant gypsum backer board complying with ASTM C630 listed in Appendix A shall be used as a substratum unless protected with a moisture proof and vapor proof covering.

## SECTION 1125.0 HARDBOARD

**1125.1 Basic hardboard:** Basic hardboard shall meet the requirements of DOC PS 58 listed in Appendix A.

**1125.2 Siding:** Hardboard siding shall meet the requirements of DOC PS 60 listed in Appendix A, and when used structurally shall be so identified by an approved agency.

# ARTICLE 12

# STEEL, MASONRY, CONCRETE, GYPSUM AND LUMBER CONSTRUCTION

## SECTION 1200.0 GENERAL

**1200.1 Scope:** The provisions of this article shall govern the quality, workmanship and requirements for all methods of construction hereafter used in the construction of buildings and structures. All methods of construction shall conform to the applicable standards listed in this code.

## SECTION 1201.0 STRUCTURAL STEEL CONSTRUCTION

**1201.1 General:** Structural steel construction used in all buildings and structures shall be fabricated from materials of uniform quality, free from defects that would vitiate the strength or stability of the structure. Workmanship, design, fabrication, transportation and erection shall conform to AISC S326 listed in Appendix A.

**1201.2 Plans:** Design plans drawn to appropriate scale shall show the size, section and relative locations of all structural members with floor levels, column centers and all offsets fully dimensioned. The design loads shall be clearly indicated for all parts of the building or structure.

**1201.3 Temporary and special stresses:** Due provision shall be made in the design for temporary stresses occurring during erection, and for the influence of special loads producing impact or vibrations as provided in Section 909.5. Stresses caused by eccentric loading shall be fully provided for and eccentric details shall be shown on the design and shop drawings.

**1201.4 Shop drawings:** Complete shop drawings shall be prepared in conformance with the best modern practice in advance of the actual fabrication. Such drawings shall clearly distinguish between shop and field rivets, bolts and welds in all connections and details.

**1201.5 Welding:** All welded construction shall be designed and supervised by engineers experienced and skilled in welded construction and the welded work shall be performed by qualified and approved operators in accordance with AWS D1.1 listed in Appendix A.

**1201.6 Painting and special protection:** All painting shall comply with AISC S326 listed in Appendix A. When exposed to highly corrosive fumes or vapors, or subject to destruction from other highly hazardous industrial processes, all structural steelwork shall be protected in accordance with AISC S326 listed in Appendix A.

## SECTION 1202.0 FORMED STEEL CONSTRUCTION

**1202.1 Design:** The design of all cold formed steel members and assembled wall, floor and roof panels, used alone or in combination with other structural members, or with component materials, shall be based on allowable unit stresses and maximum deflections in accordance with the AISI *Specification for Design of Cold-Formed Steel Structural Members* and AISI *Specification for Design of Cold-Formed Stainless Steel Structural Members* listed in Appendix A. Metal building systems shall conform to the provisions of this code and the MBMA *Metal Building Systems Manual* listed in Appendix A.

**1202.2 Secondary structural systems:** Formed steel floor, wall and roof systems may be designed and constructed to resist all vertical and horizontal moments and shears resulting from lateral forces. Such members, when designed to transmit horizontal shears due to wind or other lateral forces, shall be connected to the supporting structure so as to adequately resist all primary and secondary stresses. When concrete topping or other approved decking is installed in a manner to insure composite action of the assembly, the strength of the composite member may be included in the calculations.

**1202.3 Protection:** Formed steel shall be protected in accordance with Sections 1202.3.1 through 1202.3.4.

**1202.3.1 Shop coat:** All individual structural members and assembled panels of light gage and formed steel construction, except where fabricated of approved corrosion resistive metallic steel or of steel having a corrosion resistive or other approved coating, shall be protected against corrosion with an approved shop coat of paint, enamel, or other approved protection.

**1202.3.2 Field coat:** After erection where directly exposed to the weather, except when encased in concrete made of noncorrosive aggregates, or where fabricated of approved corrosion resistive steel, or of galvanized or otherwise adequately protected steel, individual structural members and assembled panels of light gage and formed steel construction shall be given an additional coat of approved protection.

**1202.3.3 Siding:** Exposed siding or sheathing shall be fabricated of approved corrosion resistive steel or otherwise protected at the ground level for sufficient height above grade as determined by the depth of average snowfall in the locality, but not less than 8 inches (203 mm).

**1202.3.4 Protection at exterior walls:** Floor or roof construction which extends into an exterior wall shall be adequately waterproofed and protected from the weather to prevent corrosion.

**1202.4 Tests:** When not capable of design by approved engineering analysis, the building official shall require tests of the individual or assembled structural units and their connections as prescribed in Sections 1102.0 and 1103.0. At least three specimens truly representative of the construction to be used in practice shall be subjected to the prescribed test and the mean of the results shall determine the safe working value; provided that any individual test varying more than 10 percent from the mean value shall cause rejection of the series.

**1202.5 Welding:** Welding shall be performed in accordance with AWS D1.3 listed in Appendix A.

## SECTION 1203.0 STEEL JOIST CONSTRUCTION

**1203.1 General:** Steel joists may be used as secondary members in floor and roof construction other than around stairwells, shafts and other floor openings in accordance with the SJI/AISC *Standard Specification for Open Web Steel Joists, H-Series;* and SJI/AISC *Standard Specification for Longspan Steel Joists, LH-Series and Deep-span Steel Joists, DLH-Series* listed in Appendix A. The design and use of open web steel girders shall be in accordance with the SJI *Standard Specification for Joist Girders* listed in Appendix A.

**1203.2 Loads and stresses:** Connections of all members shall be designed with the minimum possible eccentricity and all secondary stresses shall be included with primary stresses in the design. In buildings subject to heavy concentrations or moving loads, the construction shall be designed to resist the vertical and lateral components of such loads in addition to the live and dead loads specified in Article 9.

**1203.3 Partitions:** The joists shall be designed to support the dead load of partitions, wherever they occur, in addition to all other imposed dead and live loads.

**1203.4 Protection:** Painting of steel joists shall be in accordance with the requirements of Section 1202.0 for formed steel construction; or the joist shall be dipped in an approved hot asphalt, or shall be protected by painting, dipping or spraying with approved cold asphalt at the place of manufacture.

**1203.5 Height and area limitations:** When the main structural frame is designed to resist all horizontal and vertical moments and shears due to lateral forces, and the secondary system consists of steel joists which are attached to the supporting beams and girders of the frame as specified in the standards listed in Section 1203.1, steel joist construction of the required fireresistance rating may be used in all buildings within the height limits of Table 505.

**1203.6 Tests:** When not subject to approved engineering analysis as regulated by Section 1203.1, the assembly shall meet the load test requirements specified in Sections 1102.0 and 1103.0.

## SECTION 1204.0 REINFORCING STEEL

**1204.1 General:** Metal reinforcement for reinforced concrete, reinforced gypsum concrete, and reinforced masonry shall comply with ACI 318, ACI 531, ANSI/NBS H74, NCMA TR75-B or BIA *Requirements for Engineered Brick Masonry* listed in Appendix A.

**1204.2 Tests:** When unidentified reinforcement is approved for use under ordinary material procedure, not less than three tension and three bending tests shall be made on representative specimens of the reinforcement from each shipment and grade of reinforcing steel proposed for use in the work.

## SECTION 1205.0 CAST STEEL CONSTRUCTION

**1205.1 Materials:** Carbon steel casting for building construction shall be cast from steel conforming to AISC S326 listed in Appendix A. All castings shall be free from injurious blow holes or other defects which would impair the structural strength.

**1205.2 Higher strength cast steel:** Higher strength cast steel may be used when approved under controlled material procedure.

**1205.3 Welding cast steel:** Cast steel designed for use in welding shall be of weldable grade.

## SECTION 1206.0 CAST IRON CONSTRUCTION

**1206.1 Materials:** Cast iron for building construction shall be a good foundry mixture providing clean, tough, gray iron, free from serious blow holes, cinder spots and cold shuts, and conforming to ASTM A48 and ASTM A256 listed in Appendix A for medium gray iron castings.

**1206.2 Limitations of use:** Cast iron columns shall not be used where subject to eccentric loads which produce a net tension in the section, nor in any part of a structural frame which is required to resist stress due to wind.

**1206.3 Multi-story columns:** Cores of superimposed columns shall be of the same dimensions above and below a splice. When a column of smaller diameter is superimposed over one of larger diameter, the larger column shall be tapered down to the smaller diameter over a length of not less than 6 inches (152 mm).

**1206.4 Thickness of metal:** The minimum thickness of cast iron shall be not less than specified in Sections 1206.4.1 through 1206.4.3.

**1206.4.1 Columns:** In columns, the metal shall be not less than $^1/_{12}$ the smallest dimension of the cross section and not less than ¾ inch (19 mm).

**1206.4.2 Bases and brackets:** In bases and flanges, the metal shall be not less than 1 inch (25 mm) thick reinforced with fillets and brackets.

**1206.4.3 Lintels:** In lintels, the metal shall be not less than ¾ inch (19 mm) thick and shall be limited to use on spans of not more than 6 feet (1829 mm).

**1206.5 Inspection:** A cast iron column shall not be erected in place before it has been inspected and approved by the building official. The use of any cast iron column in which blow holes or imperfections reduce the effective area of the cross section more than 10 percent shall be prohibited. Where required by the building official, ⅜ inch (10 mm) round inspection holes shall be drilled in the section to expose the thickness of metal for inspection purposes.

## SECTION 1207.0 SPECIAL STEEL AND STRUCTURAL STEEL CABLE SYSTEMS

**1207.1 Special steels:** Alloy, high carbon or other special high strength steels not covered in this article may be used in the design and construction of buildings and structures as controlled materials as prescribed in Section 919.0.

**1207.2 Structural steel cable systems:** The design, fabrication and erection of steel cables used as load carrying members in buildings and structures shall be in accordance with the AISI *Criteria for Structural Applications of Steel Cables for Buildings* listed in Appendix A.

## SECTION 1208.0 LIGHTWEIGHT METAL ALLOYS

**1208.1 General:** Aluminum and other approved lightweight metals and alloys used for structural purposes in buildings and structures shall comply with AA-ABS 32, AA-SAS 30 and AA-ASM 35 listed in Appendix A.

## SECTION 1209.0 MASONRY WALL CONSTRUCTION

**1209.1 Design:** All masonry construction shall comply with the provisions of this article governing quality of materials and manner of construction; and shall be of adequate strength and proportions to support all superimposed loads within working stresses prescribed in this code, ANSI/NBS 211, ANSI/NBS H74, BIA *Building Code Requirements for Engineered Brick Masonry*, NCMA TR75-B or ACI 531 listed in Appendix A.

**1209.2 Wetting of brick:** Brick (clay or shale) at the time of laying, shall require wetting if the unit's initial rate of water absorption exceeds 30 grams per 30 square inches per minute (30 g per 323 $mm^2/s$) or 0.035 ounces per square inch (0.0015 $g/mm^2$), as determined by ASTM C67 listed in Appendix A.

**1209.3 Cold weather construction:** Masonry laid in temperatures of the outside air below 40 degrees F. (4.44 degrees C.) shall be protected in accordance with the provisions of the IMIAWC *Recommended Practices and Guide Specifications for Cold Weather Masonry* listed in Appendix A. Frozen materials shall not be used, nor shall frozen masonry be built upon.

**1209.4 Incorporation of combustibles:** Lumber or other combustible materials, except nailing blocks and ornamental timber to an extent permitted by the chasing restrictions of Section 1212.0 and the provisions of Section 1400.3, shall not be incorporated in masonry walls, except as approved for combustible aggregates or component materials after fire test.

## SECTION 1210.0 BONDING OF WALLS

**1210.1 General:** Walls of solid, composite and hollow masonry and cavity and other hollow walls shall be bonded in accordance with this section, ACI 531, NCMA TR75-B or ANSI/NBS H74 listed in Appendix A.

**1210.2 Rubble stone walls:** All stones in rubble masonry shall be laid on their natural bed and the walls shall be bonded with not less than one through bond stone for each 9 superficial square feet (0.84 $m^2$) of area.

**1210.3 Buttresses and piers:** All buttresses shall be bonded into the wall by a masonry bond. The piers and buttresses shall have sufficient strength and stability with sufficient bonding or anchorage between the walls and the supports to resist wind pressure and suction.

**1210.4 Intersecting walls and partitions:** Where required by design or section 1211.0, masonry walls and partitions shall be securely anchored or bonded at points where they intersect by one of the following methods indicated in Sections 1210.4.1 through 1210.4.3.

**1210.4.1 True masonry bond or metal ties:** Walls may be bonded by laying at least 50 percent of the units at the intersection in true masonry bond with alternate units having a bearing of not less than 3 inches (76 mm) upon the unit below, or they may be anchored with not less than 3/16 inch (5 mm) corrosion resistant metal wire ties or joint reinforcement at vertical intervals not to exceed 2 feet (610 mm), or by other equivalent approved anchorage.

**1210.4.2 Offsets and anchors:** Where walls are carried up separately, the intersection shall be toothed or blocked with 8 inch (203 mm) maximum offsets and shall be provided with approved metal anchors at vertical intervals of not more than 4 feet (1219 mm) or, when approved, blocking may be eliminated and rigid steel anchors shall be provided, spaced not more than 2 feet (610 mm) apart vertically.

**1210.4.3 Interior nonloadbearing walls:** Interior nonloadbearing walls may be bonded or anchored as required by Sections 1210.4.1 or 1210.4.2 or they may be anchored at their intersection at vertical intervals of not more than 2 feet (610 mm) with at least No. 22 Galvanized Sheet Gage (0.034 in.) corrosion resistant corrugated metal ties 7/8 inch (22 mm) in width, or other equivalent approved method of anchorage.

**1210.5 Erecting precautions:** Where hollow walls decrease in thickness, a course of solid masonry or, concrete filled units, or a continuous bearing plate shall be interposed between the thicker and thinner sections. A wall shall not be built up more than 25 feet (7620 mm) in advance of other walls of the same building or structure unless supported independently at each floor, and all walls shall be temporarily braced during erection.

## SECTION 1211.0 LATERAL BRACING OF WALLS

**1211.1 General:** All masonry walls shall be laterally supported by horizontal

bracing of floor and roof framing, or vertical bracing of columns, buttresses or cross walls at vertical or horizontal intervals as specified in ANSI/NBS 211, ANSI/NBS H74, ACI 531, NCMA TR75-B or BIA *Building Code Requirements for Engineered Brick Masonry* listed in Appendix A. Provision shall be made in the structure to transfer wind pressures and other lateral forces to the foundation.

## SECTION 1212.0 CHASES AND RECESSES IN BEARING WALLS

**1212.1 Where permitted:** Chases and recesses shall be prohibited in any wall less than 12 inches thick or in the required area of piers and buttresses; except that 8 inch walls where permitted in residential buildings and the apron under window openings may have chases not more than 4 inches (102 mm) in depth.

**1212.2 Maximum size:** The maximum permitted depth of a chase in any wall shall be not more than one third the wall thickness, and the maximum length of a horizontal chase or the maximum horizontal projection of a diagonal chase shall not exceed 4 feet (1219 mm) except as provided in Section 1212.5; and except further that the length of the apron below window sills in all walls may equal the width of the window opening. Such aprons in 8 inch walls may have chases not more than 4 inches (102 mm) in depth when waterproofed. The aggregate area of recesses and chases in any wall shall be not more than one fourth of the area of the face of the wall in any one story.

**1212.3 Fireresistive limitations:** It shall be unlawful to have chases or recesses which reduce the thickness of material below the minimum specified in Article 14 for fire walls, fire separation walls or required fireresistive covering of structural members.

**1212.4 Hollow walls:** When chases and recesses are permitted in hollow walls and walls constructed of hollow blocks or tile, they shall be built in with the wall. It shall be unlawful to cut chases in such walls after erection.

**1212.5 Continuous chases:** Horizontal chases for the bearing of reinforced concrete floor and roof slabs may be continuous, provided anchors are installed above and below the floor construction to resist the bending and uplifts in the wall due to flexure of the slab.

## SECTION 1213.0 CORBELED AND PROJECTED MASONRY

**1213.1 Limitations:** In nonreinforced masonry the maximum horizontal projection of corbeling from the plane of the wall shall not exceed one half of the wall thickness of solid walls or one half of the wythe thickness for cavity walls. The maximum projection of one unit shall not exceed one half the height of the unit, nor one third of its bed depth.

**1213.2 Hollow walls:** Corbeling of hollow masonry or masonry built of hollow units shall be supported on at least one full course of solid masonry.

**1213.3 Molded cornices:** Unless structural support and anchorage is provided to resist the overturning moment, the center of gravity of all projecting

masonry or molded cornices shall lie within the middle third of the supporting wall. Terra cotta and metal cornices shall be provided with a structural frame of approved noncombustible material anchored in an approved manner.

## SECTION 1214.0 BEARING ON HOLLOW UNIT WALLS

**1214.1 Bearing area:** Beam, girder and other concentrated loads shall be provided with a bearing of solid masonry or filled cores of hollow unit masonry at least 4 inches (102 mm) in height, or with a bearing plate of adequate design and dimensions to distribute the load safely on the wall or pier.

**1214.2 Closure tile:** All open cells in tile or blocks at wall ends and at openings shall be filled solidly with grout for a length of not less than 12 inches (305 mm), or reversed closure tile shall be used.

## SECTION 1215.0 PLAIN CONCRETE

**1215.1 General:** For design, plain concrete is defined as either unreinforced or containing less reinforcement than the minimum amount specified for reinforced concrete in accordance with Section 1216.0.

**1215.2 Limitations:** Plain concrete shall not be used for structural members where special design considerations are required for earthquake or blast forces, unless specifically approved by the building official.

**1215.3 Minimum strength:** Specified compressive strength of plain concrete to be used for structural purposes shall not be less than 2500 psi (1.76 kg/ $mm^2$).

**1215.4 Design:** Plain concrete members shall be designed for adequate strength in accordance with ACI 322 listed in Appendix A.

## SECTION 1216.0 REINFORCED CONCRETE

**1216.1 Design:** All structures of reinforced concrete, including prestressed concrete, shall be designed and constructed in accordance with ACI 318 listed in Appendix A.

**1216.2 Special systems of design or construction:** Any system of design or construction not covered by, or conflicting with, the requirements of this code may be approved by the building official on the basis of satisfactory experience records and tests as prescribed by Sections 1102.0, 1103.0, 1402.0 and 1403.0.

**1216.3 Conduits and pipe embedded in concrete:** Plumbing and heating piping and electrical conduits may be embedded in reinforced concrete floor and wall construction and in column fireproofing as provided in Section 1411.0. Piping for radiant heating purposes may be embedded in the structural floor or wall slabs, or may be installed in a separate concrete layer placed in addition to the required fireproof covering, as approved by the building official. In any case, the required area of reinforcement shall be provided in

addition to such piping; and the conduits, pipes and other embedded mechanical facilities shall be so placed as to leave the strength and fireresistance rating of the construction undiminished.

**1216.4 Minimum concrete dimensions:** Protection of reinforced concrete structural elements in buildings and structures shall be adequate to meet the fire and strength tests of this code, but not less than the minimum dimensions established by ACI 318 listed in Appendix A. Any floor finish not placed monolithically with floor slabs shall not be included in the calculations for structural strength.

## SECTION 1217.0 CONCRETE FILLED PIPE COLUMNS

**1217.1 General:** Concrete filled pipe columns shall be manufactured from standard, extra strong, or double extra strong steel pipe and tubing, filled with concrete so placed and manipulated as to secure maximum density and to insure complete filling of the pipe without voids.

**1217.2 Design:** The safe supporting capacity of concrete filled pipe columns shall be computed in accordance with the approved rules or as determined by test.

**1217.3 Connections:** All caps, base plates and connections shall be of approved types and shall be positively attached to the shell and anchored to the concrete core. Welding of brackets without mechanical anchorage shall be prohibited. When the pipe is slotted to accommodate webs of brackets or other connections, the integrity of the shell shall be restored by welding to insure hooping action of the composite section.

**1217.4 Reinforcement:** To increase the safe load supporting capacity of concrete filled pipe columns, the steel reinforcement shall be in the form of rods, structural shapes or pipe embedded in the concrete core with sufficient clearance to insure the composite action of the section, but not nearer than 1 inch (25 mm) to the exterior steel shell. All structural shapes used as reinforcement shall be milled to insure bearing on cap and base plates.

**1217.5 Fireresistance rating protection:** Pipe columns shall be of such size or so protected as to develop the required fireresistance ratings specified in Table 401. When an outer steel shell is used to enclose the fireproof covering, it shall not be included in the calculations for strength of the column section. The minimum diameter of pipe columns shall be 4 inches (102 mm) except that in Type 4 structures not exceeding 3 stories or 40 feet (12192 mm) in height, 3 inch (76 mm) columns may be used in the basement and as secondary steel members.

**1217.6 Approvals:** All details of column connections and their splices shall be shop fabricated by approved methods and shall be approved only after tests in accordance with the approved rules. Shop fabricated concrete filled pipe columns shall be inspected by the building official or by an approved representative of the manufacturer at the plant.

## SECTION 1218.0 PNEUMATIC CONCRETE

**1218.1 Application:** Mortar or concrete deposited pneumatically shall be applied only with the approval of the building official, and shall be protected and cured to prevent the temperature from falling below 50 degrees F. (10 degrees C.) or from loss of moisture at the surface. Reinforcement for pneumatic mortar shall be adequate to meet structural requirements and shall consist of round bars or mesh not less than No. 12 Steel Wire Gage (0.016 in. diameter), spaced not less than 2 inches (51 mm) nor more than 4 inches (102 mm) either way, with a gross area of not less than 0.2 percent of the cross sectional area of the mortar layer.

**1218.2 General requirements:** Pneumatically placed concrete shall consist of a mixture of fine aggregate and cement pneumatically applied by suitable mechanism, and to which water is added immediately prior to discharge from the applicator. Except as specified in the following sections, pneumatically placed concrete shall conform to the requirements of this code for reinforced concrete.

**1218.2.1 Proportions:** The proportion of cement to aggregate, in loose dry volume, shall not be less than 1:4½.

**1218.2.2 Water:** The water content at the time of discharge, including moisture in the aggregate, shall not exceed 3½ gallons (0.013 $m^3$) per sack of cement.

**1218.2.3 Mixing:** The cement and aggregate shall be thoroughly mixed prior to the addition of water. At the time of mixing the aggregate shall contain not less than 3 percent moisture.

**1218.3 Rebound:** Any rebound or accumulated loose aggregate shall be removed from the surfaces to be covered prior to placing the initial or any succeeding layers of pneumatically placed concrete. Rebound may be reused if it conforms to the requirements for aggregate, provided the amount of rebound material used shall not exceed 25 percent of the total aggregate in any batch.

**1218.4 Joints:** Unfinished work shall not be allowed to stand for more than 30 minutes unless all edges are sloped to a thin edge. Before placing additional material adjacent to previously applied work, these sloping edges shall be cleaned and wetted.

**1218.5 Damage:** Any pneumatically placed concrete which subsides after placement shall be removed.

**1218.6 Test cylinders:** Test cylinders of pneumatically placed concrete shall be made in a manner that will permit the blast of air to firmly compact the materials and provide escapement of the air to eliminate possible back pressure. Such cylinders shall be cured and tested as required for reinforced concrete.

## SECTION 1219.0 REINFORCED GYPSUM CONCRETE

**1219.1 General:** Reinforced gypsum concrete for use in buildings and structures shall consist of a mixture of calcined gypsum and water, with or without the addition of wood chips, shavings, fiber or other approved aggregates. The wood aggregates and gypsum shall be premixed at the mill, requiring only the addition of water at the job or site. The manufacture, design and construction shall comply with the requirements of ASTM C317 listed in Appendix A.

**1219.2 Limitations of use:** Gypsum concrete shall not be used where exposed directly to the weather or where subject to frequent or continuous wetting. To prevent saturation or freezing, protection from the weather and from contact with moisture shall be furnished during shipment and storage of prefabricated units, and after erection or pouring at the site.

## SECTION 1220.0 ENGINEERED UNREINFORCED MASONRY

**1220.1 General:** This section shall govern wall thicknesses and lateral support requirements for unreinforced masonry determined by a structural analysis based upon standards referenced in this section.

**1220.2 Brick masonry:** Walls designed and constructed of brick masonry using solid clay shale units shall conform to the provisions of the BIA *Building Code Requirements for Engineered Brick Masonry* listed in Appendix A.

**1220.3 Concrete block masonry:** Walls designed and constructed of concrete block masonry units shall conform to the provisions of ACI 531 listed in Appendix A.

## SECTION 1221.0 REINFORCED MASONRY

**1221.1 General:** All reinforced masonry, except for engineered reinforced masonry, shall conform to the provisions of ANSI/NBS H74, NCMA TR75-B or ACI 531 listed in Appendix A. Engineered reinforced brick masonry shall conform to the BIA *Building Code Requirements for Engineered Brick Masonry* listed in Appendix A. Engineered reinforced concrete block masonry shall conform to the provisions of NCMA TR75-B or ACI 531, listed in Appendix A.

**1221.2 Tests:** When required, testing of masonry assemblies designed and constructed under this section for strength, material compatibility, and quality control shall be in accordance with ASTM E72, ASTM E447, ASTM E518 or ASTM E519 listed in Appendix A.

## SECTION 1222.0 UNREINFORCED MASONRY

**1222.1 General:** All unreinforced masonry except for engineered unreinforced masonry shall conform to ANSI/NBS 211 listed in Appendix A. Engineered unreinforced masonry shall conform to Section 1220.0 of this code.

**1222.2 Tests:** When required, testing of masonry assemblies designed and constructed under this section for strength, material compatibility, and quality control shall be in accordance with ASTM E72, ASTM E447, ASTM E518, and ASTM E519 listed in Appendix A.

## SECTION 1223.0 LUMBER AND TIMBER CONSTRUCTION

**1223.1 Design:** Structural lumber and timber and fastenings shall be adequately designed and assembled to safely sustain all imposed loads. When stress grade lumber is used and properly identified and controlled, working stresses may be in accordance with the NFoPA *National Design Specification for Wood Construction* listed in Appendix A. All lumber used for load supporting purposes shall be identified by the grade mark of a lumber grading inspection agency approved by the building official. Grading practices and identification shall be in accordance with rules published by an approved agency. In lieu of a grade mark on the material, a certificate of inspection as to species and grade issued by a lumber grading or inspection agency approved by the building official may be approved for precut, remanufactured, or rough sawn lumber, as well as for sizes larger than 3 inches nominal thickness.

**1223.2 Minimum dimensions:** Dimensions of lumber and timber construction shall comply with Sections 1223.2.1 and 1223.2.2.

**1223.2.1 Sizes of structural members:** All lumber sizes specified in this code are nominal sizes. Nominal sizes may be shown on the plans. Computations to determine the required size of members shall be based on the net dimensions (actual sizes).

**1223.2.2 Structural posts:** All isolated structural posts shall have a minimum dimension of 4 inches (102 mm).

**1223.3 Fabrication:** Fabrication of lumber and timber construction shall comply with Sections 1223.3.1 through 1223.3.3.

**1223.3.1 Connections:** All connections shall be fabricated with approved timber connectors, bolts, lag screws, spikes, nails or gluing or other approved connecting devices. Bolted connections shall be snugged up tightly without crushing wood fibers under the washers. All nailed connections shall meet the minimum requirements of Appendix E.

**1223.3.2 Cambering:** Trusses and long span girders shall be designed with sufficient camber, or other provision shall be made to counteract any possible deflection.

**1223.3.3 Cutting and notching:** It shall be unlawful to notch, cut or pierce wood beams, joists, rafters or studs in excess of the limitations herein specified, unless proven safe by structural analysis or suitably reinforced to transmit all calculated loads.

**1223.3.3.1 Notches:** Notch depth in the top or bottom of the joist, rafters and beams shall not exceed one sixth the depth of the members and shall not be located in the middle one third of the span. Notch depth at the ends of the

member shall not exceed one fourth the depth of the member. The tension side of beams, joists and rafters of 4 inch or greater nominal thickness shall not be notched, except at ends of members.

**1223.3.3.2 Holes:** Holes bored or cut into joists for piping or electrical cables shall not be closer than 2 inches (51 mm) to the top or bottom of the joist and the diameter of the hole shall not exceed one third the depth of the joist. In studs of bearing walls or partitions, notches or bored holes made to receive piping, electrical conduit, air conditioning or heating ductwork or for other fabricating purposes shall not be cut or bored more than one third the depth of the stud.

**1223.3.3.3 Reinforcement:** When the stud is cut or bored in excess of one third its depth it shall be reinforced to be equal in load carrying capacity to a stud notched not more than one third its depth.

**1223.4 Trimmer and header beams:** When determined necessary by stress analysis, trimmer and header beams shall be hung in approved metal or other approved noncombustible stirrups or hangers, unless supported on a masonry wall or girder. All such beams shall be spiked together.

**1223.5 Bearing and anchorage on girders:** All members framing into girders shall be anchored or tied to secure continuity. The ends of all wood beams or joists resting on girders shall bear not less than 4 inches (102 mm) or shall be supported in approved metal stirrups, hangers or on wood clips or ribbon strips. Beams framing from opposite sides shall lap at least 6 inches (152 mm) and be bolted or spiked together; and when framing end to end, they shall be secured together by metal ties, straps or dogs.

**1223.6 Maintenance:** All connections in the joints of timber trusses and structural frames shall be inspected periodically. Bolts and other connectors shall be maintained tight.

## SECTION 1224.0 HEAVY TIMBER TYPE CONSTRUCTION

**1224.1 Wood:** All structural wood members, sawn or glued laminated, used in Type 3A construction shall be stress grade timbers identified as to grade and strength by approved manufacturing, testing or inspection agencies or bureaus. All structural timber members shall have the minimum dimensions specified in Section 404.0 for Type 3A construction and shall be designed, fabricated and installed in accordance with AITC 102, AITC 108, AITC 112, AITC 117, AITC 119 and DOC PS 56 listed in Appendix A.

**1224.2 Other structural materials:** Structural steel or reinforced concrete members may be substituted for timber in any part of the structural frame, if protected to develop the required fireresistance rating specified in Table 401 but not less than one hour fireresistance rating. Structural members supporting walls shall be protected to afford the same fireresistance rating as the wall supported.

**1224.3 Columns:** Columns shall be continuous or superimposed throughout

all stories by means of reinforced concrete or metal caps with brackets, or shall be connected by properly designed steel or iron caps, with pintles and base plates, or by timber splice plates affixed to the columns by means of metal connectors housed within the contact faces, or by other approved methods. Girders or trusses supporting columns shall have at least one hour fireresistance rating.

**1224.4 Floors:** The planks shall be laid so that a continuous line of joints will not occur except at points of support and so that they are not spiked to supporting girders which are parallel to the lamination of the floor. Flooring shall not extend closer than ½ inch (13 mm) to walls to provide an expansion joint, but the joint shall be covered at top or bottom to avoid flue action.

**1224.5 Beams and girders:** Beam and girder supports and connections shall comply with Sections 1224.5.1 and 1224.5.2.

**1224.5.1 Wall and girder supports:** Wall plate boxes of self releasing type or approved hangers shall be provided where beams and girders enter masonry. An air space of ½ inch (13 mm) shall be provided at the top, end and sides of the member unless approved durable or treated wood is used. Where intermediate beams are used to support a floor, they shall rest on top of the girders, or shall be supported by ledgers or blocks securely fastened to the sides of the girders, or they may be supported by approved metal hangers into which the ends of the beams shall be closely fitted. Wood beams and girders supported by walls required to have a fireresistance rating of two hours or more shall have not less than 4 inches (102 mm) of solid masonry between their ends and the outside face of the wall and between adjacent beams. Adequate roof anchorage shall be provided.

**1224.5.2 Column connections:** Girders and beams shall be closely fitted around columns and adjoining ends shall be crosstied to each other, or intertied by caps or ties, to transfer horizontal loads across the joint. Wood bolsters may be placed on tops of columns which support roof loads only.

## SECTION 1225.0 WOOD CONSTRUCTION

**1225.1 General:** The exterior walls, interior partitions, floors and roofs of wood construction shall be designed and constructed to develop adequate strength to resist all vertical and lateral forces due to both dead and live loads. Standard balloon, braced, platform, and post and beam types of construction shall be acceptable framing methods.

**1225.2 Wood stud frame:** Wood stud framing shall comply with Sections 1225.2.1 through 1225.2.8.

**1225.2.1 Bearing walls:** Posts and studs in bearing walls and partitions shall be designed as columns, with due allowance for lateral support furnished by sheathing, intermediate bracing, horizontal bridging, wall coverings and the floor and roof assemblies. The walls shall be fabricated in such a manner as to provide adequate support for the material used to enclose the building and to

provide for transfer of all lateral loads to the foundation in accordance with Section 1103.4.

A single top plate may be used provided the plate is adequately tied at joints, corners, and intersecting walls by at least the equivalent of 3 inch by 6 inch by 0.036 inch (76 mm by 152 mm by 1 mm) thick galvanized steel that is nailed to each wall or segment of wall by three 8d nails or equivalent, provided the rafters, joists, or trusses are centered over the studs with a tolerance of not more than 1 inch (25 mm).

**1225.2.2 Nonbearing walls:** Studs in nonbearing walls and partitions shall not be spaced more than 48 inches (1219 mm) on centers, and may be erected with the long dimension parallel to the wall, unless otherwise approved after test as an integrated assembly. A single top plate may be installed in accordance with Section 1225.2.1.

**1225.2.3 Bracing:** In buildings more than one story in height and where necessary for strength in one story buildings, the corner posts shall be the equivalent of not less than two pieces of 2 inch by 4 inch studs, braced by not less than one piece of 1 inch by 4 inch continuous diagonal brace let into the studs. Bracing may be omitted when diagonal wood sheathing or plywood panels are used, or other sheathing specified in Section 1225.3 is applied vertically in panels of not less than 4 feet by 8 feet in area with approved fasteners complying with Appendix E. Other sheathing materials may be used when tested in accordance with ASTM E72 listed in Appendix A and meeting the following criteria.

Dry tests with load increments of 400 pounds (182 kg). Maximum load 5,200 pounds (2362 kg) or 650 pounds per foot (968 kg/m).

1. At load of 1,200 pounds (545 kg), average total deflection of 0.2 inch (5 mm) and residual deflection of 0.1 inch (2 mm).
2. At load of 2,400 pounds (1090 kg), average total deflection of 0.6 inch (15 mm) and residual deflection of 0.3 inch (8 mm).

Wet tests with load increments of 400 pounds (182 kg). Maximum load 4,000 pounds (1816 kg).

1. At load of 1,200 pounds (545 kg), average total deflection of 0.28 inch (7 mm) and residual deflection of 0.14 inch (4 mm).
2. At load of 2,400 pounds (1090 kg), average total deflection of 0.8 inch (20 mm) and residual deflection of 0.4 inch (10 mm).

**1225.2.4 Mortise and tenon framing:** Where mortise and tenon framing is used, the vertical members of the frame shall be not less than 4 inches by 6 inches in size and shall be designed as a column.

**1225.2.5 Multiple stories:** When the frame is more than one story in height and studs and posts are not continuous from sill to roof, the members shall be secured together with approved clips, splices or other connections to insure a continuous, well integrated structure. Sheet metal clamps, ties or clips shall be formed of galvanized steel or other approved corrosion resistive materials equivalent to No. 20 Galvanized Sheet Gage (0.040 in.) steel sheets for 2 inch

framing members and not less than No. 18 Galvanized Sheet Gage (0.052 in.) for 3 inch structural members. For 4 inch and larger members, column splices and beam and girder supports shall comply with Section 1224.0.

**1225.2.6 Framing over openings:** Headers, double joists, trusses or other approved assemblies of adequate size to transfer all superimposed loads to the vertical members shall be provided over all window and door openings in bearing walls and partitions.

**1225.2.7 Beam separation in Types 3B and 3C construction:** All wood and other combustible floor, roof and other structural members framing into masonry walls shall be cut to a bevel of 3 inches (76 mm) in the depth and shall project not more than 4 inches (102 mm) into the wall. The distance between embedded ends of adjacent beams or joists entering into the wall from opposite sides shall be not less than 4 inches (102 mm).

**1225.2.8 Framing around flues and chimneys:** Combustible framing shall be trimmed not less than 2 inches (51 mm) from all flues, chimneys and fireplaces, and 6 inches (152 mm) away from flue openings.

**1225.3 Wall sheathing:** Except as provided in Section 1225.4 for weather boarding or when stucco construction complying with Section 1119.6 is used, all enclosed buildings shall be sheathed with one of the materials of the nominal thickness specified in Table 1225.3 or any other material of equal strength and durability approved by the building official.

**Table 1225.3**
**MINIMUM THICKNESS OF WALL SHEATHING**

| Sheathing type | Minimum thickness |
|---|---|
| Reinforced cement mortar | 1 inch |
| Wood sheathing | 5/8 inch |
| Plywood | 5/16 inch |
| Gypsum sheathing | 1/2 inch |
| Fiber boards | 1/2 inch |
| Particle boards | 3/8 inch |

**1225.3.1 Paper backed lath sheathing:** In buildings of Use Group R-3 and one story commercial buildings with brick or similar veneers, the sheathing may consist of a layer of paper backed lath complying with Section 1119.5 and a 1 inch (25 mm) intermediate space which shall be mortar filled as each course of veneering is applied.

**1225.4 Exterior weather boarding, veneers and condensation:** To secure weather tightness in framed walls and other unoccupied spaces, the exterior walls shall be faced with an approved weather resisting covering properly attached to resist wind and rain. The cellular spaces shall be so ventilated as not to vitiate the firestopping at floor, attic and roof levels, or shall be provided with interior noncorrodible vapor type barriers complying with the approved rules, or other means shall be used to avoid condensation and leakage of moisture. The materials indicated in Table 1225.4 shall be accept-

able as approved weather coverings of the minimum nominal thickness specified.

**Table 1225.4**
**MINIMUM THICKNESS OF WEATHER COVERINGS**

| Covering type | Minimum thickness |
|---|---|
| Brick and concrete masonry veneers | 2 inches |
| Stone veneers | 2 inches |
| Clay tile veneers | 1/4 to 1 inch |
| Stucco or exterior plaster | 3/4 inch |
| Precast stone facing | 5/8 inch |
| Wood siding (without sheathing)[a] | 1/2 inch |
| Protected fiberboard siding | 1/2 inch |
| Wood shingles | 3/8 inch |
| Exterior plywood (without sheathing) | see Section 1123.2 |
| Exterior plywood (with sheathing) | 5/16 inch |
| Asbestos shingles | 5/32 inch |
| Asbestos cement boards | 1/8 inch |
| Aluminum siding[b] | 0.019 inch |
| Formed steel siding | 29 gauge (0.017 in.) |
| Hardboard siding | 1/4 inch |
| Particleboard (with sheathing) | 3/8 inch |
| Particleboard (without sheathing) | 5/8 inch |

**Note a.** Wood siding of less thickness may be used providing such wall covering is placed over sheathing which conforms to Section 1225.3.
**Note b.** See AAMA 1402.3 listed in Appendix A.

**1225.4.1 Masonry veneers:** Veneers of unit masonry shall be attached to the wood frame with at least No. 22 Galvanized Sheet Gage (0.034 in.) corrosion resistive, corrugated metal ties not less than 7/8 inch (22 mm) in width at vertical intervals of not more than 16 inches (406 mm) and horizontal intervals of not more than 32 inches (813 mm).

**1225.4.2 Metal veneers:** Veneers of metal shall be fabricated from approved corrosion resistive materials or shall be protected front and back with porcelain enamel or shall be otherwise treated to render the metal resistant to corrosion. Such veneers shall be not less than No. 29 Galvanized Sheet Gage (0.017 in.) in thickness mounted on wood or metal furring strips or approved sheathing on the wood construction.

**1225.4.3 Height of veneers:** The average height of 4 inch brick veneer shall be not more than 25 feet (7620 mm) above its supports on foundation wall or on corbels of masonry or steel; and not more than 18 feet (5486 mm) in height for 2 inch veneers.

**1225.4.4 Nailing:** All weatherboarding and wall and roof coverings shall be securely nailed with aluminum, copper, zinc, zinc coated or other approved corrosion resistive nails in accordance with the nailing schedule in Appendix E or the approved manufacturer's recommendations. Shingles and other weather coverings shall be attached with appropriate standard shingle nails to furring strips securely nailed to studs, or with approved mechancially bonding nails, except when sheathing is wood not less than 1 inch nominal

thickness or plywood not less than 5/16 inch thick. Wood shingles or shakes attached with approved corrosion resistive annular grooved nails may be applied over fiberboard shingle backer and fiberboard sheathing when the installation is in accordance with the approved manufacturer's recommendations. Wood shingles or shakes and asbestos shingles or siding may be nailed directly to nail base fiberboard sheathing not less than ½ inch nominal thickness with approved corrosion resistive annular grooved nails when the installation is in accordance with the approved manufacturer's recommendations.

**1225.5 Foundation anchorage:** Wall sill plates, minimum of 2 inch by 4 inch members shall be sized and anchored to foundation walls or piers and at intermediate intervals as required to resist wind uplift. Anchor bolts shall be a minimum of ½ inch diameter. The bolts shall be embedded in foundations to a depth of not less than 8 inches (203 mm) of poured in place concrete, and not less than 15 inches (381 mm) in grouted unit masonry. There shall be a minimum of two anchor bolts per section of plate and anchor bolts shall be placed 12 inches (305 mm) from the end of each section of plate with intermediate bolts spaced a maximum of 8 feet (2438 mm) on center.

**1225.6 At grade protection:** Wood framing and metal siding shall be protected at grade in accordance with Sections 1225.6.1 and 1225.6.2.

**1225.6.1 Wood framing:** All exterior wood framework of buildings, whether structural or nonloadbearing, shall be supported on approved foundation walls at least 8 inches (203 mm) above the finished grade, and higher when necessitated by greater average snowfall. Where climatic conditions or the geographical location require additional control measures to protect buildings and structures against decay and termite attack, the provisions of Section 1317.0 shall be complied with.

**1225.6.2 Metal siding:** Exposed metal siding or sheathing shall be protected from corrosion at the ground level by supporting the foundation channel at sufficient height above grade on the concrete apron or other approved water resisting foundation.

**1225.7 Floors:** Wood floor construction shall comply with Sections 1225.7.1 through 1225.7.3.

**1225.7.1 Bridging:** Except as hereinafter noted, in all floor, attic and roof framing, there shall be not less than one line of bridging for each 8 feet (2438 mm) of span. The bridging shall consist of not less than 1 inch by 3 inch lumber, double nailed at each end, or of equivalent metal bracing of equal rigidity. A line of bridging shall also be required at supports where adequate lateral support is not otherwise provided. Midspan bridging is not required for floor, attic or roof framing in buildings of Use Groups R-2 and R-3, except when the joist depth exceeds 12 inches nominal or when the minimum uniformly distributed live load exceeds 40 psf (195.28 kg/m$^2$).

**1225.7.2 Flooring:** The flooring of wood frame construction shall be of adequate strength and stiffness to support required loads and, where neces-

sary for strength and for lateral support of the building, subflooring shall be provided.

**1225.7.3 Joist spans:** Except when otherwise substantiated by approved structural design methods, floor joist spans shall comply with the NFoPA *Span Tables for Joists and Rafters* listed in Appendix A. Design stresses shall be those indicated in the NFoPA *Design Values for Joists and Rafters* listed in Appendix A.

**1225.8 Roofs:** Wood roof construction shall comply with Sections 1225.8.1 through 1225.8.4.

**1225.8.1 Types of decking and sheathing:** Roof deck sheathing shall consist of not less than ⅝ inch boards or plywood of the thickness specified in Section 1123.3, or other approved materials of equivalent strength and rigidity. When open deck sheathing is used on pitched roofs, it shall consist of not less than 1 by 4 inch roofers spaced not more than 6 inches (152 mm) on centers or material of equivalent strength and rigidity.

**1225.8.2 Wood shingles:** Wood shingles and handsplit shakes complying with the RCSHSB *Grading Rules for CertiGrade Red Cedar Shingles* listed in Appendix A may be used for roof covering where permitted in Section 1427.0, and may be installed on tight decking or on spaced roof boards.

**1225.8.3 Asphalt shingles:** Asphalt shingle roofs with a slope of 4 units vertical in 12 units horizontal (4:12) or more shall have an underlay consisting of one layer of Type 15 asphalt saturated felt, adequately attached. Where January daily average temperature is 25 degrees F. (-4 degrees C.) or less, or where there is possibility of ice forming along the eaves and causing a backup of water, an eaves flashing strip of mineral surfaced roll roofing shall be applied to extend to a point 12 inches (305 mm) minimum inside the interior wall line of the building. Asphalt shingles laid with double coverage may be installed on slopes below 4:12 to as low as 2:12, provided the shingles are approved self sealing shingles or are hand sealed and are installed with an underlayment consisting of two layers of Type 15 felt, applied shingle fashion. In areas where the January daily average temperature is 25 degrees F. (-4 degrees C.) or less, or where there is a possibility of ice forming along the eaves and causing a backup of water, the two layers of felt shall be cemented together from the eaves up the roof to overlie a point 24 inches (610 mm) inside the interior wall line of the building.

**1225.8.4 Rafter spans:** Except when otherwise substantiated by approved structural design methods, rafter spans shall comply with the NFoPA *Span Tables for Joists and Rafters* listed in Appendix A. Design stresses shall be those indicated in the NFoPA *Design Values for Joists and Rafters* listed in Appendix A. Trusses shall be designed in accordance with the TPI *Design Specifications for Light Metal Plate Connected Wood Trusses* and the NFoPA *National Design Specifications for Wood Construction* listed in Appendix A.

**1225.9 Reroofing:** Reroofing of wood roof construction shall comply with Sections 1225.9.1 through 1225.9.3.

**1225.9.1 Asphalt shingle application:** Not more than two overlays of asphalt shingles shall be applied over an existing asphalt shingle roof. Not more than two overlays of asphalt shingles shall be applied over wood shingles. Asphalt shingles applied over wood shingles shall have an underlay of not less than Type 30 nonperforated felt.

**1225.9.2 Wood shingle application:** Not more than one overlay of wood shakes shall be applied over an existing asphalt shingle or wood shingle roof. One layer of 18 inch (457 mm) Type 30 felt shall be interlaced between each layer of shakes.

**1225.9.3 Application over shakes:** New roof covering shall not be applied over an existing shake roof.

**1225.10 Flashings:** Approved corrosion resistive flashing shall be provided at top and sides of all exterior window and door openings in such manner as to be leakproof. Similar flashings shall be installed at the intersection of chimneys or other masonry construction with frame or stucco walls, with projecting lips on both sides under stucco copings; under and at the ends of masonry, wood or metal copings and sills; continuously above all projecting wood trim; at wall and roof intersections; built in gutters; at junctions of chimneys and roofs; and in all roof valleys and around all roof openings.

> **Exception:** When approved by the building official, flashing is not required when an approved water resistant sheathing is used and an approved water resistant caulking is used at the top and sides of all window and door openings in such a manner to be leakproof.

**1225.11 Building paper:** When veneers of brick, clay tile, concrete, or natural or artificial stone are used, 14 pound felt or paper shall be attached to the sheathing with flashing wherever necessary to prevent moisture penetration behind the veneer.

## SECTION 1226.0 STRESS SKIN PANELS

**1226.1 Integrated assemblies:** Approved panels or other integrated assemblies fabricated of dimension lumber with wood stress coverings glued thereto, or consisting of structural units of metal covered or molded plywood or other approved plastics formed and molded into prefabricated loadbearing members, shall be permitted for use in floors, roofs, walls, partitions and ceilings when designed in accordance with APA D860 listed in Appendix A or meeting the test requirements of Sections 1102.0, 1103.0 and 1104.0.

**1226.2 Splices:** Splices and connections between panels shall be weather tight and of sufficient strength to resist two and one half times the design live load to which they will be subjected in normal use. The fastenings of covering assemblies to structural studs, ribs or joists shall provide rigidity equivalent to approved gluing. Nailing shall not be acceptable for that purpose.

**1226.3 Molded plywood units:** Structural units of plywood or other approved plastics of similar combustible characteristics formed and molded into prefabricated loadbearing members shall conform to the approved rules and shall be identified by the approved label. The design shall be based on approved engineering analysis, confirmed by the tests prescribed in Sections 1102.0 and 1103.0.

## SECTION 1227.0 STRUCTURAL GLUED LAMINATED TIMBER AND BUILT UP WOOD CONSTRUCTION

**1227.1 General:** Buildings and structures may be designed and erected of glued laminated structural members or of composite members of plywood and dimension lumber.

**1227.2 Exposed structural glued laminated timber:** Those portions of glued laminated timbers which form the structural supports of a building or other structure and are exposed to weather and not properly protected by a roof, eave overhangs, or similar coverings shall be treated in accordance with AITC 109 listed in Appendix A or be manufactured from approved durable woods.

**1227.3 Glued laminated members and plywood components:** Built up beam and column sections consisting of one or more webs with glued lumber flanges and stiffeners shall be designed in accordance with APA D860 listed in Appendix A. Plywood components consisting of plywood alone or plywood in combination with sawn or glued laminated lumber and bonded together with adhesives shall be designed, fabricated and identified in accordance with APA D860 listed in Appendix A.

**1227.3.1 Gluing surfaces:** In glued lumber constructions, the surfaces to be glued shall be worked to a smooth, flat surface without sanding and free from wax, grease or oil to insure a complete glue bond over the entire contact. Factory sanded plywood shall be permitted.

# ARTICLE 13

## BUILDING ENCLOSURES, WALLS AND WALL THICKNESS

### SECTION 1300.0 GENERAL

**1300.1 Scope:** The provisions of this article shall govern the minimum specifications for enclosure walls and wall thickness hereafter used in the construction of buildings and structures. All materials and methods of construction shall conform to the applicable standards listed in this code.

### SECTION 1301.0 ENCLOSURE WALLS

**1301.1 General:** All buildings, except as may be provided for buildings of Use Group T designed for special uses, shall be enclosed on all sides with independent or party walls of frame, masonry or other approved construction. Such walls shall be constructed to afford the fireresistance rating specified in Table 401 and as required in this code for location, use and type of construction.

**1301.2 Projections:** Exterior enclosure walls shall be constructed entirely within property lines or building lines when established by law, except for authorized projections beyond the street lot line in accordance with the provisions of Section 509.0.

**1301.3 Exterior wall pockets:** In exterior walls of all buildings and structures, wall pockets or crevices in which moisture may accumulate shall be avoided or protected with adequate caps or drips, or other approved means shall be provided to prevent water damage.

**1301.4 Exceptions:** The provisions of this article shall not be deemed to prohibit the omission of exterior walls for all or part of a story of a building in accordance with the provisions of Section 1406.1.1.

**1301.5 Glass in walls:** Glass used in enclosure walls shall comply with Sections 1301.5.1 through 1301.5.6.

**1301.5.1 Labeling:** Each light shall bear the manufacturer's label designating the type and thickness of glass. When approved by the building official, labels may be omitted from other than safety glazing materials provided an affidavit

is furnished by the glazing contractor certifying that each light is glazed in accordance with approved plans and specifications.

To qualify as glass with special performance characteristics, each unit of laminated, heat strengthened, fully tempered, and insulating glass shall be permanently identified by the manufacturer. The identification shall be etched or ceramic fired on the glass and be visible when the unit is glazed. Heat strengthened and tempered spandrel glasses are exempted from permanent labeling. This type of glass shall be labeled with a removable paper label by the manufacturer.

**1301.5.2 Glass supports:** Where one or more sides of any light of glass is not firmly supported, or is subjected to unusual load conditions, detailed shop drawings, specifications and analysis or test data assuring safe performance for the specific installation shall be prepared by engineers experienced in this work and approved by the building official. Analysis shall be based on the wind loads specified in Section 913.4 for secondary framing members. The elevation of the glazed openings shall be computed by adding the distances from grade to the head and sill, respectively, and dividing the sum by two.

**1301.5.3 Glass dimensional tolerance:** Glass thickness tolerances shall comply with those established in the Table 1301.5.3. Where thickness is to be controlled, nominal values are stated subject to the tolerances shown in the following Table 1301.5.3.

**Table 1301.5.3**
**MINIMUM GLASS THICKNESS**

| Nominal thickness | Plate glass minimum thickness (inches) | Sheet glass minimum thickness (inches) |
|---|---|---|
| SS | .... | 0.085 |
| DS | .... | 0.115 |
| 1/8 | 0.094 | .... |
| 3/16 | 0.156 | 0.182 |
| 13/64 | 0.172 | .... |
| 7/32 | .... | 0.205 |
| 1/4 | 0.218 | 0.236 |
| 5/16 | 0.281 | .... |
| 3/8 | 0.343 | 0.357 |
| 1/2 | 0.468 | 0.478 |
| 5/8 | 0.562 | .... |
| 3/4 | 0.689 | .... |
| 7/8 | 0.750 | .... |
| 1 | 0.875 | .... |
| 1 1/4 | 1.125 | .... |

**Note a.** 1 inch = 25.4 mm.

**1301.5.4 Wind loads:** Glass exposed to wind pressure shall be capable of withstanding the design criteria of Section 913.4 for secondary framing members, but shall not be less than the thickness prescribed in Table 1301.5.4.2. The wind load used to enter Table 1301.5.4.2 shall be modified by dividing the load prescribed in Section 913.4 by the value shown in Table 1301.5.4.1.

**1301.5.5 Louvered windows or jalousies:** Regular plate, sheet or patterned glass in jalousies and louvered windows shall not be thinner than nominal 7/32 inch and not longer than 48 inches (1219 mm). When other glass types are used, design shall be submitted to the building official for approval. Exposed glass edges shall be smooth.

Wired glass with wire exposed on longitudinal edges shall not be used in jalousies or louvered windows.

**Table 1301.5.4.1**
**RELATIVE RESISTANCE TO WIND LOAD**
**(Assuming equal thickness)**

| Glass type | Approximate relationship[a] |
|---|---|
| Laminated | 0.6 |
| Wired glass | 0.5 |
| Heat strengthened | 2.0 |
| Fully tempered | 4.0 |
| Factory fabricated double glazing[b] | 1.5 |
| Rough rolled plate | 1.0 |
| Sandblasted | 0.4 |
| Regular plate or sheet | 1.0 |

**Note a.** Before using Table 1301.5.4.2, divide the design wind load from Section 913.0 by the value shown here for the glass type involved (see Section 1301.5.4).
**Note b.** Use thickness of the thinner of the two lights, not thickness of unit.

**1301.5.6 Human impact loads:** Individual glazed areas in hazardous locations such as those indicated in Section 1301.5.6.1 shall pass the test requirements of CPSC 16-CFR, Part 1201, listed in Appendix A, or by comparative test shall be proven to produce at least equivalent performance. Annealed glass shall not be used.

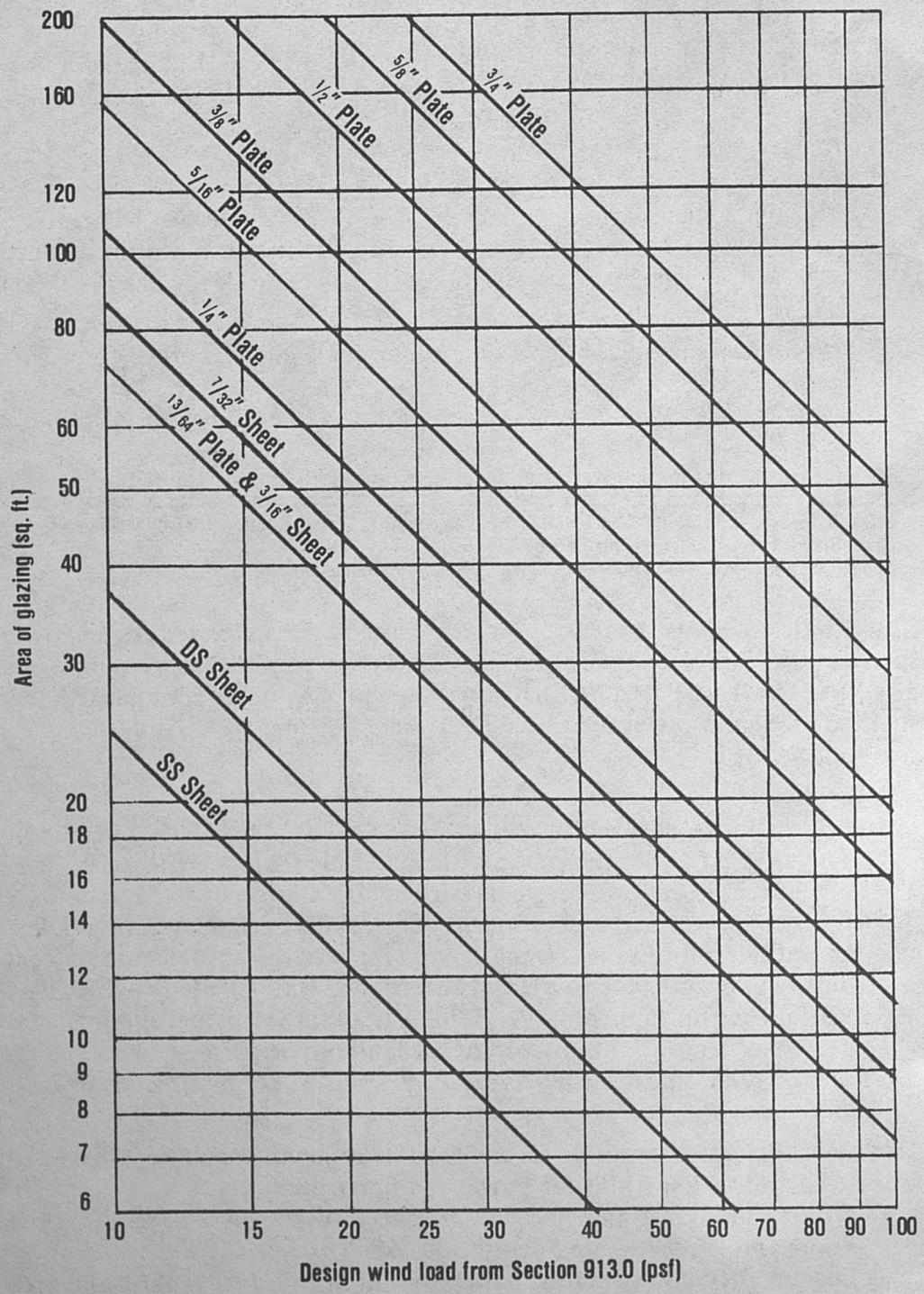
**Exceptions**

1. Polished wire glass shall comply with ANSI Z97.1 listed in Appendix A.
2. The unbacked specimens of plastic materials shall be exposed in Arizona and Florida for three years with an orientation of 45 degrees (0.79 rad.) to the vertical facing south. Approved plastic materials shall be acceptable if the impact strength is not reduced by more than 25 percent during exposure when tested in accordance with CPSC 16-CFR, Part 1201, listed in Appendix A. Some discoloration is permissible, but defects other than this discoloration shall not be permissible. No bubbles or other noticable decomposition shall be permissible in the irradiated portion.

**1301.5.6.1 Specific hazardous locations:** The following shall be considered specific hazardous locations for purposes of glazing.

1. Glazing in ingress and egress doors except wired glass in required fire doors and jalousies (see Section 1301.5.5).
2. Glazing in fixed and sliding panels of sliding type doors (patio and mall type).

**Table 1301.5.4.2**
**REQUIRED NOMINAL THICKNESS OF REGULAR PLATE OR SHEET GLASS**
**(Based on minimum thicknesses allowed in Federal Specifications DD-G-451b)**
**Design Factor = 2.5**




**Note a.** 1 square foot = 0.093 m²; 1 pound per square foot = 4.882 kg/m².

3. Glazing in storm doors.
4. Glazing in all unframed swinging doors.
5. Glazing in shower and bathtub doors and enclosures.
6. Glazing, operable or nonoperable, whose nearest vertical edge is within 48 inches (1219 mm) of a door in all buildings except buildings of Use Group R or within 12 inches (305 mm) of a door in buildings of Use Group R and whose bottom edge is below the top of the door, unless an intervening interior permanent wall is between the door and the glazing.
7. Glazing in fixed panels having a glazed area in excess of 9 square feet (0.84 $m^2$) with the lowest edge less than 18 inches (457 mm) above the finish floor level or walking surface within 36 inches (914 mm) of such glazing. In lieu of safety glazing, such glazed panels may be protected with a horizontal member not less than 1½ inches (38 mm) in width when located between 24 inches (610 mm) and 36 inches (914 mm) above the walking surface.

**Exceptions:** The following products, materials and uses are exempt from the above hazardous locations.

1. Openings in doors through which a 3 inch (76 mm) sphere is unable to pass.
2. Leaded glass panels where no individual piece of glass has an area greater than 30 square inches (0.019$m^2$).
3. Glazing materials used as curved glazed panels in revolving doors.
4. Commercial refrigerated cabinet glazed doors.
5. Faceted and decorated glass.

## SECTION 1302.0 PROTECTION OF WALL OPENINGS

**1302.1 Fireresistance rated openings:** Openings in exterior walls, when required to be fireresistance rated, shall comply with the provisions of Article 14.

**1302.2 Area of openings:** All openings facing on a street, yard, court or public space which are required for light and ventilation shall comply with the provisions of Article 7.

**1302.3 Structural strength against wind forces:** In all buildings required to resist wind pressure under the provisions of Article 9, exterior window openings shall be designed to resist the specified wind load when such protectives are more than 100 square feet (9.30 $m^2$) in area in the first story or more than 50 square feet (4.65 $m^2$) in the upper stories.

**1302.4 Structural strength of sash or frames:** The glass or other approved glazing material shall be of adequate thickness or shall be provided with steel frames or otherwise reinforced to resist the wind loads specified in Article 9, blowing both inwardly and outwardly.

## SECTION 1303.0 STRUCTURAL GLASS BLOCK WALLS

**1303.1 Exterior wall panels:** The maximum dimensions of glass block wall

panels in exterior walls, when used singly or in multiples forming continuous bands of structural glass blocks between structural supports, shall be 25 feet (7260 mm) in length and 20 feet (6096 mm) in height between structural supports and expansion joints; and the area of each individual panel shall be not more than 250 square feet (23.25 $m^2$). Intermediate structural supports shall be provided to support the dead load of the wall and all other superimposed loads. When individual panels are more than 144 square feet (13.39 $m^2$) in area, a supplementary stiffener shall be provided behind the panels, anchored thereto and to the structural supports.

**1303.2 Joint materials:** Glass blocks shall be laid up in Type S or N mortar with approved galvanized or other noncorrosive metal wall ties in the horizontal mortar joints of exterior panels. The sills of glass block panels shall be coated with approved asphaltic emulsion, or other elastic waterproofing material, previous to laying the first mortar course, and the perimeter of the panels shall be caulked to a depth of not less than ½ inch (13 mm) with nonhardening caulking compound on both faces, or other approved expansion joints shall be provided. When laid up in joint materials other than mortars herein defined, a single panel shall not be more than 100 square feet (9.30 $m^2$) in area, nor more than 10 feet (3048 mm) in either length or height.

**1303.3 Wind and earthquake loads:** Exterior wall panels shall be held in place in the wall opening to resist both the internal and external pressures due to wind and earthquake loads specified in Sections 912.0, 913.0 and 916.0.

**1303.4 Interior wall panels:** Structural glass blocks shall not be used in fire walls, party walls or fire separation walls, or for loadbearing construction. Such blocks shall be erected with mortar in metal frames or reinforcement as provided in this section for exterior walls, or other approved joint materials. Wood strip framing may be used in partitions not required to be fireresistance rated.

**1303.5 Access panels:** Access panels shall be provided for fire department use in exterior glass block walls to comply with Section 1406.4.

## SECTION 1304.0 WALL FACINGS AND VENEERS

**1304.1 Backing surfaces for veneers:** Veneers for other than buildings of Type 4 construction shall be attached only to substantial, rigid and noncombustible surfaces which are plumb, straight and of true plane. Wood backing surfaces shall not be used, except in buildings of Type 4 construction. The backing shall provide sufficient rigidity, stability and weather resistance, and the veneer shall be installed and anchored as required in this code for the specific material.

**1304.2 Veneer thickness:** Materials used for nonbearing veneers on masonry walls shall not have less than the thickness indicated in Table 1304.

**1304.2.1 Nonstructural:** Masonry or other approved noncombustible materials used as facing on bearing walls or partitions shall not be considered to

have structural value, and shall be excluded in the determination of required wall thickness.

**Table 1304**
**MINIMUM THICKNESS OF NONBEARING VENEERS ON MASONRY WALLS**

| | |
|---|---|
| Ceramic veneer (architectural terra cotta, anchored type) | 1 inch |
| Brick and concrete masonry | 2 inches |
| Stone (natural) | 2 inches |
| Stone (cast artificial) | 1½ inches |
| Clay tile (structural) | 1¾ inches |
| Clay tile (flat slab) | ¼ to 1 inch |
| Marble slabs | 1 inch |
| Precast stone facing | ⅝ inch |
| Structural glass | 11/32 inch |
| Aluminum siding[a] | 0.019 inch |
| Metal (approved corrosion resistive) | No. 28 Galvanized Sheet Gage (0.019 in.) |

**Note a.** See AAMA 1402.3 listed in Appendix A.

## SECTION 1305.0 STRUCTURAL GLASS VENEERS

**1305.1 Dimensions:** The minimum thickness of glass veneer shall be 11/32 inch and the area of individual panels shall not exceed 10 square feet (0.93 m²), with a maximum length of 4 feet (1219 mm). The edge of each unit shall be ground square with a slight arris. All exposed, external corners and angles shall be rounded to a radius of not more than 3/16 inch (5 mm).

**1305.2 Construction:** Structural glass veneer construction shall comply with Sections 1305.2.1 and 1305.2.2.

**1305.2.1 Backing surface:** The glass veneer shall be set in mastic cement on a float coat of 1 inch (25 mm) thick cement mortar reinforced with wire lath attached to noncombustible furring spaced not more than 12 inches (305 mm) on center.

**1305.2.2 Support of veneer:** The base course of glass units shall be supported on a corrosion resistive metal frame anchored to the backing and caulked with a waterproof compound at grade.

**1305.3 Reinforcement:** Metal reinforcing of cold formed corrosion resistive angles of not less than No. 16 Galvanized Sheet Gage (0.064 in.) or other approved reinforcement shall be provided in all horizontal joints anchored into the masonry wall with expansion or toggle bolts.

**1305.4 Expansion joints:** Expansion joints shall be provided at ends and intermediate sections caulked with an approved waterproofing compound as required by the approved rules. Where necessary for water tightness, exposed edges shall be protected with corrosion resistive metal or other approved noncombustible flashing.

**1305.5 Other loads:** Signs, awning brackets or other loads shall not be hung directly from glass veneers, but shall be supported on framing anchored to or otherwise supported by the masonry wall, free from contact with the glass.

## SECTION 1306.0 THIN STONE AND TILE VENEERS

**1306.1 Size of units:** In localities subject to frost and freezing temperatures, tile and terra cotta units shall be frostproof and shall not be more than 288 square inches (0.19 $m^2$) in area. Where not subject to frost action, the size of the tile may be increased not more than 50 percent in area.

**1306.2 Construction:** One inch thick marble, granite, terra cotta and similar materials, or ceramic tile facing ¼ to 1 inch in thickness shall be installed in an approved manner.

## SECTION 1307.0 METAL VENEERS

**1307.1 Materials:** Veneers of metal shall be fabricated from approved corrosion resistive alloys, or shall be covered front and back with approved porcelain enamel, or otherwise treated to render the metal resistant to corrosion.

**1307.2 Construction:** The metal veneer shall be securely attached to the masonry; or supported on approved metal framing protected by painting, galvanizing or other approved protection; or supported on wood studs and furring strips, treated with an approved preservative process complying with Section 1317.2.

**1307.3 Waterproofing:** All joints and edges exposed to the weather shall be caulked with approved durable waterproofing material or by other approved means to prevent penetration of moisture.

**1307.4 Grounding metal veneers:** Grounding of metal veneers on all buildings shall comply with the requirements of Article 20 and NFiPA 70 listed in Appendix A.

## SECTION 1308.0 PLASTIC VENEERS

**1308.1 General:** Veneers of weather resisting plastics shall comply with the definition of approved plastics in Section 2400.2.1 and shall be erected and anchored on a foundation coat, waterproofed or otherwise protected from moisture absorption and sealed with a coat of mastic or other approved waterproof coating in accordance with the approved rules.

**1308.2 Height limitation:** Plastic veneer shall not be attached to any exterior wall to a height greater than 35 feet (10668 mm) above grade. Within the fire limits, as provided in Section 501.0, exterior veneer shall be limited to the first story.

**1308.3 Area limitation:** Sections of plastic veneer shall not exceed 200 square feet (18.6 $m^2$) in area. Outside the fire limits the area may be increased by 50 percent.

**1308.4 Separation:** Sections of plastic veneer shall be separated vertically by a minimum of 4 feet (1219 mm).

## SECTION 1309.0 THICKNESS OF SOLID MASONRY WALLS

**1309.1 General:** All masonry walls shall be of the minimum thickness specified in ANSI/NBS 211 listed in Appendix A. The combined stress due to all loads shall not exceed the allowable working stresses specified in this code for the materials of construction.

## SECTION 1310.0 THICKNESS OF PANEL WALLS

**1310.1 Solid panel walls:** Panel, apron or spandrel walls, as defined in this code and supported at vertical intervals not exceeding 13 feet (3962 mm) in height, shall not be limited in thickness, provided they meet the fireresistance rating requirements of Article 14 and Table 401, and are constructed of approved noncombustible weather resisting materials of adequate strength to resist the wind loads specified in Sections 912.0 and 913.0.

**1310.2 Hollow panel walls:** Unless constructed of the materials and thickness specified by ANSI/NBS H74, BIA *Building Code Requirements for Engineered Brick Masonry*, NCMA TR75-B or ACI 531 listed in Appendix A, hollow panel walls shall be tested and approved in the assembled unit as constructed in normal practice to develop the required fireresistance ratings specified in Table 401 for exposure on both faces.

**1310.3 Weather resistance:** When the construction as tested and approved for a fireresistance rating does not possess the required weather resistance, it shall be covered on the exterior with approved corrosion resistive metal facings or other approved noncombustible weather resisting veneers.

**1310.4 Anchorage:** All panel walls shall be anchored to the structural frame to insure adequate lateral support and resistance to wind and to earthquake forces where subject to seismic loads.

## SECTION 1311.0 PARAPET WALLS

**1311.1 Required:** Exterior walls required to have a fireresistance rating of one hour or more shall be constructed with parapet walls having the same fireresistance rating as the wall upon which they are erected. The height of the parapet shall not be less than 30 inches (762 mm) above the point where the roof surface and the wall intersect.

**1311.2 Not required:** Parapets are not required on:

1. Exterior walls and fire walls connecting with roofs of Type 1 construction.
2. An exterior wall of a building, the roof of which is at least 3 feet (914 mm) lower than the roof of, or any opening in, an adjacent building.
3. Exterior walls facing on an unoccupied open space having a width of 30 feet (9144 mm) or more.
4. Exterior walls in buildings of Use Group R-3 or buildings not exceeding 1,000 square feet (93 $m^2$) in area.
5. Exterior walls of a building where the roof has an angle of more than 20 degrees (0.35 rad.) with the horizontal.

6. Exterior walls connecting with roofs of noncombustible construction when the exterior wall is carried up tightly against the underside of the roof deck.

**1311.3 Construction:** Parapets shall be properly coped and flashed with noncombustible, weatherproof material. All corners of masonry parapet walls shall be reinforced with at least one ¼ inch bar in every third joint, continuous around the corner and extending into the masonry at least 3 feet (914 mm) from the corner.

## SECTION 1312.0 FOUNDATION WALLS

**1312.1 Design:** Foundation walls shall be designed to resist frost action and to support safely all vertical and lateral loads as provided in Article 9. The maximum stresses due to combined load shall be within the values specified for the materials used in the construction. Unless properly reinforced, tensile stresses shall not exceed those permitted in plain masonry.

**1312.2 Minimum thickness:** The thickness of foundation walls shall be not less than the thickness of the wall supported, and the minimum thickness shall be limited for the various materials of construction as herein specified. Eight inch foundation walls shall be permitted under brick veneered frame and under ten inch cavity walls when the total height of the wall supported, including gables, is not more than 20 feet (6096 mm).

**1312.2.1 Reinforced concrete:** When reinforced concrete is required to resist all stresses, foundation walls shall be not less than eight inches thick.

**1312.2.2 Hollow and solid unreinforced masonry and plain concrete:** The thickness of unreinforced masonry foundation walls shall not be less than shown in Table 1312.2.2 for the type of foundation and superstructure construction used. The combined height of an eight inch foundation wall and the wall supported shall not exceed 35 feet (10668 mm).

**1312.2.3 Hollow unit walls:** Foundation walls of approved hollow masonry units shall be provided with not less than 4 inches (102 mm) of solid masonry at girder bearings, or shall be strengthened with buttresses.

**1312.2.4 Rubble stone:** Foundation walls of rough or random rubble stone shall be not less than 16 inches (406 mm) thick.

**1312.2.5 Bonding:** All foundation walls shall be bonded as required for superstructure walls in Section 1210.0.

**1312.3 Increased thickness with depth:** When any foundation wall, other than a wall that is designed as a retaining wall, extends more than 12 feet (3658 mm) below the top of the first floor beams, the thickness of the wall shall be increased four inches for each additional 12 feet (3658 mm) or fraction thereof in depth.

**1312.4 Corbels on 8 inch walls:** Where an 8 inch wall is corbeled, the top corbel shall be a full course of headers at least 6 inches in length, extending not

**Table 1312.2.2**
**THICKNESS OF FOUNDATION WALLS**

| Foundation wall construction | | Maximum depth below grade (feet)[a, b, c] Supported wall construction | | |
|---|---|---|---|---|
| Type | Thickness (inches) | Frame | Masonry veneer | Masonry |
| Hollow masonry (unreinforced) | 8 | 4 (6) | 4.5 (6) | 5 (7) |
| | 10 | 5 (7) | 5.5 (7) | 6 (7) |
| | 12 | 7 | 7 | 7 |
| Solid masonry (unreinforced) | 8 | 5 (7) | 5.5 (7) | 6 (7) |
| | 10 | 6 (7) | 6 (7) | 6.5 (7) |
| | 12 | 7 | 7 | 7 |
| Plain concrete | 8 | 7 | 7 | 7 |

**Note a.** Depth below grade may be increased up to that indicated in parentheses where such increase is warranted by soil conditions and local experience and is approved by the building official.

**Note b.** Where height of unbalanced fill (height of finish grade above basement floor or inside grade) exceeds seven feet, foundation wall thickness shall be determined by structural analysis as required in Section 1313.2.

**Note c.** 1 foot = 304.8 mm.

higher than the bottom of the floor framing. The maximum projection of one unit shall exceed neither one half the depth of the unit nor one third its width at right angles to the face which is offset.

**1312.5 Lateral stability:** Foundation walls of buildings and structures which serve as retaining walls shall conform to the applicable requirements of Section 1313.0, and shall be strengthened with buttresses or additional wall thickness to resist lateral soil and hydrostatic pressure when subjected thereto.

## SECTION 1313.0 RETAINING WALLS

**1313.1 General:** Walls built to retain or support the lateral pressure of earth or water or other superimposed loads shall be designed and constructed of approved masonry, reinforced concrete, steel sheet piling or other approved materials within the allowable stresses specified in this code (see Section 1317.3.3).

**1313.2 Design:** Retaining walls shall be designed to resist the pressure of the retained material, including both dead and live load surcharges to which they may be subjected, and to insure stability against overturning, sliding, excessive foundation pressure and water uplift.

**1313.3 Hydrostatic pressure:** Unless drainage is provided, the hydrostatic head of water pressure shall be assumed equal to the height of the wall.

**1313.4 Coping:** All masonry retaining walls other than reinforced concrete walls shall be protected with an approved coping.

**1313.5 Guardrails:** When retaining walls with a difference in grade level on either side of the wall in excess of four feet (1219 mm) are located closer than two feet (610 mm) to a walk, path, parking lot or driveway on the high side,

such retaining walls shall be provided with a 42 inch (1067 mm) high guardrail or other approved protective measure.

## SECTION 1314.0 ISOLATED PIERS

**1314.1 General:** Isolated masonry piers shall be bonded as required for solid walls of the same thickness and shall be provided with adequate means for distributing the load at the top of the pier.

## SECTION 1315.0 WATERPROOFING AND FLOODPROOFING

**1315.1 General:** The exterior structural elements of all buildings herein specified shall be waterproofed in accordance with the approved rules.

**1315.2 Steel frame:** Exterior steel columns and girders, before embedment in masonry of the required fireresistance rating specified in Table 401, shall be protected from moisture by approved waterproofing material, a parging coat of cement mortar or by a minimum of eight inches of weather tight masonry.

**1315.3 Chases:** The backs and sides of all chases in exterior walls with less than eight inches of approved masonry to the exterior surface shall be insulated and waterproofed.

**1315.4 Foundations:** Foundation walls below grade, and basement and cellar floors of all buildings of Use Groups I and R enclosing habitable or occupiable rooms or spaces below grade, shall be made watertight and when necessary shall be reinforced to withstand water pressure as prescribed in Sections 909.0 and 1313.0. All other foundation walls below grade in all use groups enclosing occupiable rooms or spaces shall be dampproofed with not less than one coat application of approved dampproofing paint, or a one half inch (13 mm) parging coat of portland cement mortar or other approved method.

**1315.4.1 Subsoil drains:** Subsoil drains shall be provided around foundations enclosing habitable or usable spaces located below grade and which are subjected to ground water conditions. Drains shall be installed at or below the area to be protected and shall discharge by gravity or by mechanical means into an approved drainage system complying with the plumbing code listed in Appendix A.

**1315.5 Types of waterproofing:** The processes and methods used to render buildings, structures or parts thereof watertight as herein required shall be of approved types.

**1315.6 Floodproofing:** Where a structure is located within a flood plain as determined by the building official or the governmental body having jurisdiction, such a structure must be designed to resist or overcome the anticipated flood conditions.

## SECTION 1316.0 RATPROOFING

**1316.1 General:** All buildings and structures and the walls enclosing habitable

or occupiable rooms and spaces in which persons live, sleep or work, or in which feed, food or foodstuffs are stored, prepared, processed, served or sold, shall be constructed rat and vermin proof in accordance with the provisions of this section.

**1316.2 Grade protection:** Protection at grade shall be provided in accordance with Sections 1316.2.1 and 1316.2.2.

**1316.2.1 Apron:** When required for protection against rats, all exterior walls at and near grade shall be constructed or assembled of component materials, or chemically or otherwise treated to render the construction rat or vermin-proof. When not provided with a continuous masonry foundation wall, a masonry or reinforced concrete apron not less than four inches (102 mm) in thickness, or other approved nondecayable, water resisting and ratproofing material of required strength, shall be installed around the entire perimeter of the building.

**1316.2.2 Height of apron:** The apron shall extend sufficiently above grade to provide for the average snow fall in the locality, but not less than eight inches (203 mm) above, nor less than 24 inches (610 mm) below grade level; and, if serving as a foundation bearing wall, to sufficiently greater depth to assure protection from frost action as required in Section 1005.0. When the superstructure walls are not constructed of masonry, the spaces between studs shall be filled to a height of 24 inches (610 mm) above grade with concrete or other material indestructible by rats.

**1316.3 Grade floors:** Where continuous concrete grade floor slabs are provided, open spaces shall not be left between slab and walls, and all openings in the slab shall be protected.

**1316.4 Opening protection:** Openings shall be protected in accordance with Sections 1316.4.1 through 1316.4.3.

**1316.4.1 Wall openings:** Openings in the apron required for ventilation or other purposes shall be guarded with corrosion resistive ratproof shields of not less than No. 22 Galvanized Sheet Gage (0.034 in.) perforated steel sheets, or No. 20 B&S Gage aluminum (0.032 in.) or No. 16 Galvanized Sheet Gage (0.064 in.) expanded metal or wire mesh screens, with not more than ½ inch (13 mm) mesh openings.

**1316.4.2 Slab openings:** Access openings in grade floor slabs shall be protected with concrete, masonry, metal or other corrosion resistive noncombustible covers of adequate strength to support the floor loads.

**1316.4.3 Pipe and conduit openings:** All openings for pipe, conduit, cable and similar purposes at or near grade shall have snugly fitted collars to eliminate all open spaces.

## SECTION 1317.0 PROTECTION AGAINST DECAY AND TERMITES

**1317.1 General:** Wood construction shall conform to provisions of this section in order to prevent decay and termite attack.

**1317.2 Protection:** Where protection of wood members is required by this section, protection shall be provided by using naturally durable or pressure treated wood.

**1317.2.1 Naturally durable wood:** The term "naturally durable wood" refers to the heartwood of the following species with the exception that an occasional piece with corner sapwood may be included if 90 percent or more of the width of each side on which it occurs is heartwood.

| | |
|---|---|
| Decay resistant: | Redwood, cedars, black locust, bald cypress (tidewater red), and black walnut. |
| Termite resistant: | Redwood, bald cypress, (tidewater red), and Eastern red cedar. |

**1317.2.2 Pressure treated wood:** The term "pressure treated wood" refers to wood, including plywood, meeting the retention, penetration and other requirements applicable to the species, product, treatment and conditions of use in AWPA C1, C2, C9, and AWPB LP2, LP22, LP33, LP44, LP55 and LP77 listed in Appendix A. Preservatives shall conform to the AWPA P1, P2, P5, P8, and P9 listed in Appendix A.

**1317.2.3 Identification:** All lumber and plywood required to be pressure treated shall bear the AWPB quality mark, or that of an approved inspection agency which maintains continuing supervision, testing and inspection over the quality of the product.

**1317.2.4 Moisture content:** When wood pressure treated with a water borne preservative is used in enclosed locations where drying in service cannot readily occur, such wood shall be at a moisture content of 19 percent or less before being covered with insulation, interior wall finish, floor coverings or other material.

**1317.3 Conditions favorable to decay:** Where conditions are favorable to decay, wood shall comply with Sections 1317.3.1 through 1317.3.3.

**1317.3.1 Wood used above ground:** Wood used above ground in the locations specified in Sections 1317.3.1.1 through 1317.3.1.5 shall be of naturally durable or pressure treated wood using water borne preservatives treated in accordance with AWPB LP 2 listed in Appendix A.

**1317.3.1.1 Joists and girders:** When wood joists or the bottom of a wood structural floor without joists are closer than 18 inches (457 mm), or wood girders are closer than 12 inches (305 mm) to the exposed ground in crawl spaces or unexcavated areas located within the periphery of the building foundation, the floor assembly, including posts, girders, joists and subfloor shall be of approved naturally durable or pressure treated wood.

**1317.3.1.2 Sills:** All sills which rest on concrete or masonry exterior walls and are less than 8 inches (203 mm) from exposed earth shall be of approved naturally durable or pressure treated wood.

**1317.3.1.3 Sleepers and sills:** Sleepers and sills on a concrete or masonry slab

which is in direct contact with earth shall be of approved naturally durable or pressure treated wood.

**1317.3.1.4 Girder ends:** The ends of wood girders entering exterior masonry or concrete walls shall be provided with a ½ inch (13 mm) air space on top, sides and end, unless approved naturally durable or pressure treated wood is used.

**1317.3.1.5 Clearance:** Clearance between wood siding and earth on the exterior of a building shall be not less than 6 inches (152 mm) except where siding, sheathing and wall framing are of approved pressure treated wood.

**1317.3.2 Wood in contact with the ground:** All wood in contact with the ground (exposed earth) and which supports permanent structures intended for human occupancy shall be of approved pressure treated wood using water borne preservatives treated in accordance with AWPB LP22 listed in Appendix A when used in the locations specified in Sections 1317.3.2.1 through 1317.3.2.4.

**Exception:** Untreated wood may be used where entirely below ground water level or continuously submerged in fresh water.

**1317.3.2.1 Columns embedded in concrete:** Sawn posts and columns supporting permanent structures intended for human occupancy which are embedded in concrete in direct contact with earth or embedded in concrete exposed to the weather shall be of approved pressure treated wood having a retention of 0.60 lbs. per cubic foot (9.61 kg/ $m^3$).

**1317.3.2.2 Other columns:** Posts or columns exposed to the weather or in basements and cellars, and which support permanent structures, shall be supported by concrete piers or metal pedestals projecting at least 1 inch (25 mm) above concrete or masonry floors or decks and 6 inches (152 mm) above exposed earth and separated therefrom by an impervious moisture barrier, except when approved naturally durable or pressure treated wood is used.

**1317.3.2.3 Columns in crawl spaces:** Posts or columns supporting permanent structures which are closer than 8 inches (203 mm) to exposed ground in enclosed crawl spaces or unexcavated areas located within the periphery of the building shall be of approved naturally durable or pressure treated wood.

**1317.3.2.4 Wood structural members:** Wood structural members supporting moisture permeable floors or roofs which are exposed to the weather, such as concrete or masonry slabs, shall be of approved naturally durable or pressure treated wood unless separated from such floors or roofs by an impervious moisture barrier.

**1317.3.3 Wood used in retaining walls:** Wood used in retaining or crib walls shall be of approved pressure treated wood, treated in accordance with AWPB LP22, LP33, LP44, LP55 or LP77 listed in Appendix A, except as indicated in Sections 1317.3.3.1 through 1317.3.3.3.

**1317.3.3.1 Untreated wood:** When the wall is not more than 2 feet (610 mm) in height and is separated from the property line or a permanent building by a

minimum distance equal to the height of the wall, it may be of untreated wood.

**1317.3.3.2 Naturally durable wood on the property line:** When the wall is not more than 2 feet (610 mm) in height and is located on the property line, it may be of naturally durable wood.

**1317.3.3.3 Naturally durable wood separated:** When the wall is not more than 4 feet (1219 mm) in height and is separated from the property line or a permanent building by a minimum distance equal to the height of the wall, it may be of approved naturally durable wood.

**1317.4 Geographical areas:** In geographical areas where experience has demonstrated a specific need, approved naturally durable or pressure treated wood shall be used for those portions of wood members which form the structural supports of buildings, balconies, porches or similar permanent building appurtances when such members are exposed to the weather without adequate protection from a roof, eave, overhang or other covering to prevent moisture or water accumulation on the surface or at joints between members. Depending on local experience, such members may include the following:

1. Horizontal members such as girders, joists and decking;
2. Vertical members such as posts, poles and columns; or
3. Both horizontal and vertical members.

## SECTION 1318.0 THERMAL AND SOUND INSULATING MATERIALS

**1318.1 General:** Insulating batts, blankets, fills or similar types of materials incorporated in construction elements including vapor barriers and breather papers or other coverings which are a part of the insulation, shall be installed and used in a manner that will not increase the fire hazard characteristics of the building or any part thereof.

**1318.2 Installation in Type 1 and Type 2 construction:** Such materials, when exposed as installed in buildings of Types 1 or 2 construction, shall comply with the requirements of Section 1421.5.3 for Class I materials.

**1318.3 Installation in Type 3 and Type 4 construction:** Such materials, when exposed as installed in attic spaces in buildings of Types 3 and 4 construction, shall comply with the requirements of Section 1421.5.3 for Class III materials.

**1318.4 Facings and coverings:** Vapor barriers, breather papers or other coverings of insulation materials, when installed adjacent to or not more than 1½ inches (38 mm) from the unexposed surface of ceiling or sidewall interior finish, or when installed in completely enclosed wall spaces and firestopped as required in Section 1420.0, are not required to have a flame spread rating. Vapor barriers, breather papers and similar coverings of insulation materials left exposed when installed between ceiling joists or rafter spaces shall have a flame spread rating of 25 or less.

**1318.5 Cellulosic insulation:** Cellulosic insulation shall meet the requirements of CPSC Standard 16 CFR, Parts 1209 and 1404, listed in Appendix A.

## SECTION 1319.0 FOAM PLASTICS

**1319.1 General:** Unless otherwise indicated herein, all foam plastics or foam plastic cores of manufactured assemblies shall have a smoke developed rating of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E84 listed in Appendix A.

**1319.2 Diversified tests:** Except for prescriptive installations indicated in Section 1319.3, foam plastics may be used when specifically approved based on diversified tests such as the Factory Mutual building corner test procedure, or the enclosed room test procedures using a 30 pound crib as described on pages 22 and 25 in the Underwriters Laboratories, Inc. publication, *Flammability Studies,* Subject 723, listed in Appendix A. Such approvals shall also be based on tests conducted in accordance with ASTM E84 and ASTM D1929 listed in Appendix A. Such testing shall be performed on the finished manufactured foam plastic assemblies, and on the maximum thickness intended for use. Foam plastics which are used as interior finish on the basis of diversified tests shall also meet the flame spread requirements of Section 1421.0.

**1319.3 Prescriptive installations:** Unless otherwise excepted in the following sections, all foam plastic or foam plastic cores of manufactured assemblies shall have a flame spread of 75 or less when tested in the maximum thickness intended for use in accordance with ASTM E84 listed in Appendix A. For all such installations, the foam plastic shall be separated from habitable or occupiable spaces by an approved thermal barrier of one half inch gypsum wallboard or equivalent thermal barrier material which will limit the average temperature rise of the unexposed surface to not more than 250 degrees F. (121 degrees C.) after 15 minutes of fire exposure complying with the ASTM E119 standard time/temperature curve. Thermal barriers shall be installed in a manner that assures they will stay in place for a minimum of 15 minutes under the same test conditions.

**1319.3.1 Masonry or concrete construction:** Foam plastics may be used without the thermal barrier described above when the foam plastic is protected by a minimum of one inch (25 mm) thickness of masonry or concrete.

**1319.3.2 Cold storage construction:** Foam plastic, when tested in a thickness of 4 inches (102 mm), may be used in a thickness up to 10 inches (254 mm) when the building is equipped with an approved automatic fire suppression system. For use in rooms within buildings, this requirement shall apply to both the room and that part of the building in which the room is located.

**1319.3.3 Walk in coolers:** Foam plastics having a maximum flame spread of 75 may be used in thickness up to 4 inches (102 mm) in freestanding walk in coolers or freezer units less than 400 square feet (37.2 $m^2$) in floor area without a thermal barrier and without an automatic fire suppression system when the foam plastic is covered by a metal facing not less than No. 20 B&S Gage (0.032 inch) aluminum or No. 26 B&S Gage (0.022 inch) steel. When protected by a

thermal barrier, the foam plastic may be used in thickness up to 10 inches (254 mm).

**1319.3.4 Types 2C, 3 or 4 construction:** In buildings of Types 2C, 3 or 4 construction when an automatic fire suppression system is not required by Section 1702.0, foam plastic insulation having a flame spread of 25 or less may be used in a thickness of not more than 4 inches (102 mm) without the thermal barrier when the foam plastic is covered by a metal facing not less than No. 20 B&S Gage (0.032 inch) aluminum or No. 26 B&S Gage (0.022 inch) steel and the building is provided with an automatic fire suppression system. Where an automatic fire suppression system is required by Section 1702.0, the thermal barrier is required.

**1319.3.5 Roofing:** Foam plastic may be used in a roof covering assembly without the thermal barrier when the foam is separated from the interior of the building by plywood sheathing not less than one half inch in thickness bonded with exterior glue, with edges supported by blocking, tongue and groove joints or other approved type of edge support, or an equivalent material. Foam plastic roof insulation which complies with FM 4450 or UL Subject 1256 listed in Appendix A need not meet the requirements of Section 1319.3. For roofing applications, the smoke developed rating shall not be limited.

**1319.3.6 Doors:** Foam plastic having a flame spread rating of 75 or less may be used as a core material without a thermal barrier when the door is covered by a metal facing of not less than No. 20 B&S Gage (0.032 inch) aluminum or No. 26 B&S Gage (0.022 inch) steel.

> **Exception:** Exterior entrance doors not requiring a fireresistance rating in buildings of Use Group R-3 may be covered by a wood facing having a minimum thickness of 0.083 inches (2 mm).

**1319.3.7 Siding backer board:** Foam plastic may be used as siding backer board with a maximum thickness of ½ inch (13 mm) without the thermal barrier provided it is separated from the interior of the building by 2 inches (51 mm) of mineral fiber insulation or equivalent, or when applied as re-siding over existing wall construction.

**1319.3.8 Attics and crawl spaces:** Within an attic or crawl space where entry is made only for service of utilities, foam plastics may be installed without the thermal barrier but shall be protected against ignition by 1½ inch (38 mm) thick mineral fiber insulation, one quarter inch thick plywood, particleboard, hardboard or gypsum wallboard, No. 26 B&S Gage (0.022 inch) steel, or other approved material installed in such a manner that the foam plastic is not exposed.

**1319.4 Exterior walls:** Foam plastics used on the exterior side of exterior walls in Types 1, 2 or 3 construction shall comply with the requirements of Sections 1319.4.1 through 1319.4.4.

**1319.4.1 Thickness:** The foam plastic shall be limited to a maximum thickness of 4 inches (102 mm).

**1319.4.2 Flame spread:** The foam plastic core, coatings and facings shall have a flame spread rating of 25 or less when tested in accordance with ASTM E84 listed in Appendix A.

**1319.4.3 Fastening:** Facing, coating and core materials shall be structurally fastened to the building frame to prohibit failure in bond as a result of temperatures which may be experienced in a building fire, from wind load or other conditions.

**1319.4.4 Full scale tests:** Results of diversified or full scale fire tests reflecting an end use configuration shall be submitted to the building official demonstrating that the assembly in its final form does not show any tendency to spread flame.

# ARTICLE 14

## FIRERESISTIVE CONSTRUCTION REQUIREMENTS

### SECTION 1400.0 GENERAL

**1400.1 Scope:** The provisions of this article shall govern the use and design of all materials and methods of construction in respect to required fireresistance rating and flameresistance, as determined by the potential fire hazard of the use and occupancy of the building or structure and the location and function of all integral structural and other fireresistive elements of the building; and the installation of safeguards against the spread of fire to and from adjoining structures.

**1400.2 Performance standards:** The requirements of this article shall constitute the minimum functional performance standards for fire protection purposes; and shall not be deemed to decrease or waive any strength provisions or in any other manner decrease the requirements of this code in respect to structural safety.

**1400.3 Use of combustibles:** All materials and forms of construction that develop the fireresistance rating required by this code shall be acceptable for fireproofing and structural purposes; except that the use of combustible component materials in structural units or structural assemblies shall be limited in types of construction specified in Sections 402.0, 403.0 and 404.0 and in the following Section 1400.3.1.

**1400.3.1 Combustible components:** Combustible aggregates may be incorporated in concrete mixtures approved for fireresistance rated construction as provided in Sections 1110.0 and 1219.0 for gypsum concrete, in Section 1216.0 for cinder concrete, and any other approved component material or admixture may be used in assemblies that meet the fireresistive test requirements of this code; and wood nailing strips or any other materials of similar combustible characteristics may be embedded in concrete and masonry construction for securing trim and finish.

### SECTION 1401.0 PLANS AND SPECIFICATIONS

**1401.1 General:** Plans for all buildings shall designate the type of construction

and the fireresistance rating of all structural elements as required by this code. The plans and specifications shall include documentation or supporting data substantiating all required fireresistance ratings.

## SECTION 1402.0 FIRE HAZARD CLASSIFICATION

**1402.1 General:** The degree of fire hazard of buildings and structures for each specific use group as defined by the fire grading in Table 1402 shall determine the requirements for fire walls, fire separation walls and the segregation of mixed uses as prescribed in Section 312.0 and all structural members supporting such elements unless otherwise provided for in this code.

**1402.2 Unclassified uses:** The building official shall determine the fire hazard classification of a building or structure designed for a use not specifically provided in Table 1402 in accordance with the fire characteristics and potential fire hazard of the use group which it most nearly resembles; or its designation shall be fixed by the approved rules.

Table 1402
FIRE GRADING OF USE GROUPS

| Use group | | Fire grading in hours |
|---|---|---|
| A-1 | Assembly, theaters | 3 |
| A-2 | Assembly, night clubs | 3 |
| A-3 | Assembly, recreation centers, lecture halls, terminals, restaurants | 2 |
| A-4 | Assembly, churches, schools | 1½ |
| B | Business | 2 |
| F | Factory and industrial | 3 |
| H | High hazard | 4 |
| I-1 | Institutional, restrained | 3 |
| I-2 | Institutional, incapacitated | 2 |
| M | Mercantile | 3 |
| R-1 | Residential, hotels | 2 |
| R-2 | Residential, multifamily dwellings | 1½ |
| R-3 | Residential, 1 and 2 family dwellings | 1 |
| S-1 | Storage, moderate hazard | 3 |
| S-2 | Storage, low hazard | 2 |

## SECTION 1403.0 FIRERESISTANCE TESTS

**1403.1 Structural building assemblies:** Built up masonry units and composite assemblies of structural materials including walls, partitions, columns, girders, beams, slabs and assemblies of slabs and beams or other combinations of structural units for use in floor and roof construction shall be regulated by the fireresistance ratings of Table 401. Floor assemblies which are required to be fireresistance rated shall extend to and be tight against exterior walls or other provisions shall be made for maintaining the fireresistance rating of the assembly at such locations.

**1403.1.1 Fireresistance ratings:** The fireresistance ratings of building assem-

blies and structural elements shall be determined in accordance with the test procedures set forth in ASTM E119 listed in Appendix A.

**1403.2 Alternate protection:** When it can be shown to the building official that the structural integrity of structural framing elements will not be reduced below a safe level by a fire within the building or in an adjacent building having a severity corresponding to the fireresistance rating required for the elements through the use of heat shields, separations or other approved means of protection, fireresistive coverings or insulating enclosing materials need not be provided for such elements.

**1403.3 Opening protectives:** Opening protectives shall comply with Sections 1403.3.1 through 1403.3.5.

**1403.3.1 Fire assembly:** A fire assembly shall include the fire door, fire shutter, fire window, or fire damper and all required hardware, anchorage, frames and sills necessary for the assembly.

**1403.3.2 Fire doors and shutters:** Opening protective assemblies including the frames, hardware and operation which comply with ASTM E152 and UL 63 listed in Appendix A shall be deemed to meet the requirements of this code for their recommended and approved locations and use as listed in Sections 1415.0, 1416.0 and 2118.3.

**1403.3.3 Door openings more than 120 square feet:** Fire doors for openings which are more than 120 square feet (11.16 $m^2$) in area shall be deemed to meet the requirements of this code for their recommended locations and use as listed in Section 1415.0 if the building official is supplied with a certificate from an approved inspection agency stating that the door conforms to all the standard construction requirements of tested and labeled fire door assemblies except as to size. (see Section 1408.2.1)

**1403.3.4 Fire windows:** Fire window assemblies which comply with Section 1416.0 and ASTM E163 listed in Appendix A shall be deemed to meet the requirements of their recommended and required locations under this code.

**1403.3.5 Fire dampers:** Only fire dampers which comply with the installation requirements of the SMACNA *Fire Damper Guide* and the conditions of acceptance of UL 555 listed in Appendix A shall be deemed to meet the requirements of this code.

**1403.4 Combustibility tests:** Where the behavior of materials under exposure to fire is specified in this code, the characteristics of materials shall be determined by the following tests and criteria.

**1403.4.1 Tests:** The tests indicated in Sections 1403.4.1.1 and 1403.4.1.2 shall serve as criteria for acceptance of building materials as set forth in Sections 402.0, 403.0 and 404.0 governing the combustibility of building materials for use in Types 1, 2 and 3 construction. The term noncombustible does not apply to the flame spread characteristics of interior finish or trim materials. A material shall not be classed as a noncombustible building construction material which is subject to increase in combustible or flame spread rating

beyond the limits herein established through the effects of age, moisture or other atmospheric conditions.

**1403.4.1.1 Elementary materials:** Materials which pass the test for defining noncombustibility of elementary materials set forth in ASTM E 136 listed in Appendix A shall be acceptable as noncombustible materials.

**1403.4.1.2 Composite materials:** Materials having a structural base of noncombustible material as defined in Section 1403.4.1.1. with a surfacing not more than 1/8 inch thick which has a flame spread rating not greater than 50 when tested in accordance with ASTM E 84 listed in Appendix A shall be acceptable as noncombustible materials.

**1403.5 Fire-retardant treated wood:** Fire-retardant treated wood shall comply with Sections 1403.5.1 and 1403.5.2.

**1403.5.1 General:** Where permitted for use as a structural element, fire-retardant treated wood shall be defined as any wood product which when impregnated with chemicals by a pressure process, or other means during manufacture, shall have, when tested in accordance with ASTM E84 listed in Appendix A, a flame spread rating not greater than 25 when the test is continued for a period of 30 minutes, without evidence of significant progressive combustion. The material shall bear the identification of an approved testing or inspection agency showing the performance rating thereof. Fire-retardant treated wood shall be dried to a moisture content of 19 percent or less for lumber and 15 percent or less for plywood before use.

**1403.5.2 Use limitations:** Wood that has been pressure treated with fire-retardant chemicals in accordance with AWPA C20 and AWPA C27 listed in Appendix A, or treated by other approved means during manufacture, may be used in Types 1 and 2 construction for partitions, structural elements and roof framing and sheathing as indicated by Note e in Table 401, provided that the assembly in which such material is used shall produce the required fireresistance rating when tested in accordance with ASTM E119 listed in Appendix A. When the material is to be subjected to sustained high humidity or exposed to the weather, it shall be further identified to indicate that there is not an increase in the listed flame spread classification after being weathered in accordance with ASTM D2898 listed in Appendix A.

## SECTION 1404.0 FLAME SPREAD AND FLAMERESISTANCE TESTS

**1404.1 General:** All materials which are required to restrict the spread of flame or to be flameresistant under the provisions of this code, including but not limited to interior finish materials, fire-retardant treated wood, tents and tarpaulins, and interior hangings and decorations, shall meet the requirements for their respective use and classifications as determined by the applicable test procedures listed in this section.

**1404.2 Interior finish and trim materials:** All materials used for interior finish and trim shall be classified in accordance with ASTM E84 listed in Appendix A.

**1404.3 Interior floor finish materials:** Interior floor finish materials which are judged by the building official to represent an unusual hazard and are to be installed in exits, passageways and corridors shall be classified in accordance with ASTM E648 listed in Appendix A.

**1404.3.1 Class I interior floor finish:** Class I interior floor finish shall be materials having a minimum critical radiant flux of 0.45 watts per square centimeter.

**1404.3.2 Class II interior floor finish:** Class II interior floor finish shall be materials having a minimum critical radiant flux of 0.22 watts per square centimeter.

**1404.4 Interior hangings and decorations:** Interior hangings and decorations shall comply with Sections 1404.4.1 through 1401.4.4.

**1404.4.1 Acceptance criteria:** Where required to be flameresistant under the provisions of this code, all materials used for artistic enhancement, decorations, draperies, curtains, scenery and hangings shall comply with this section. If treated to be flameresistant, these materials shall not generate smoke more dense than that given off by untreated wood or paper burning under comparable conditions when tested in the vertical flame test in accordance with NFiPA 701 listed in Appendix A.

**1404.4.2 Limitation of approval:** All approvals of organic decorative material shall be limited to one year. The owner or the owner's authorized agent shall file an affidavit with the building official certifying that the process and materials used comply with this code and stating the date of treatment and the warranted period of effectiveness of the process.

**1404.4.3 Field test for decorative materials:** The building official shall subject decorative materials, where required to be flameresistant, to a field test in accordance with Chapter 6 of NFiPA 701 listed in Appendix A.

**1404.4.4 Replacement of defective materials:** All treated hangings, draperies, canvas and other decorative and tent materials that fail to meet the field test requirements shall be retreated or replaced by an approved installation.

## SECTION 1405.0 SPECIAL FIRERESISTIVE REQUIREMENTS

**1405.1 General:** In buildings or parts thereof of the uses and types of construction herein specified, the general fireresistive requirements of Table 401 and the height and area limitations of Table 505 shall be subject to the exceptions and modifications described in Sections 1405.2 through 1405.9.

**1405.2 Public garages:** All existing buildings and structures altered or converted for use as a garage, motor vehicle repair shop or gasoline service station and more than one story in height, unless of Type 1 or Type 3A construction, shall have the partitions, columns and girders and all floor and roof construction protected and insulated with noncombustible materials or assemblies of component materials having a fireresistance rating of not less

than one hour. Existing roof trusses shall be exempt from all fireresistive requirements.

**1405.3 Petroleum bulk storage buildings:** Warehouses for the bulk storage of not more than 50,000 gallons (189 $m^3$) of lubricating oils with a flash point of not less than 300 degrees F. (149 degrees C.) according to ASTM D56 listed in Appendix A in approved sealed containers may be erected outside the fire limits of Type 3 construction not more than 5,000 square feet (465 $m^2$) in area and not more than one story or 20 feet (6096 mm) in height; or to proportionate areas in other types of construction as regulated by Table 505. Not more than one motor vehicle may be stored in such buildings unless separately enclosed with a fire separation wall of two hour fireresistance rating.

**1405.4 Packing and shipping rooms:** Every packing or shipping room located on or below a floor occupied for Use Group M shall be separated therefrom by fire separation walls or floor/ceiling assemblies of not less than the fireresistance rating of the type of construction as set forth in Table 401 but not less than one hour.

**1405.5 Truck loading and shipping areas:** Truck loading and shipping areas shall be permitted within any building of Use Group B, provided such areas are enclosed in construction of not less than the fireresistance rating of the type of construction as set forth in Table 401, but not less than one hour, and direct access is provided therefrom to the street.

**1405.6 Use Groups B, M and R:** Buildings of Use Groups B, M and R shall comply with the special fireresistive requirements of Sections 1405.6.1 through 1405.6.3.

**1405.6.1 Type 3B construction:** Buildings of Use Group R-2 of Type 3B construction may be increased to six stories or 75 feet (22860 mm) in height when the first floor construction above the basement or cellar has a fireresistance rating of not less than three hours and the floor area is subdivided by two hour fire walls into fire areas of not more than 3,000 square feet (279 $m^2$).

**1405.6.2 Type 2B construction:** When of Type 2B construction, buildings of Use Group R-2 may be increased to nine stories or 100 feet (30480 mm) in height when separated by not less than 50 feet (15240 mm) from any other building on the lot and from interior lot lines, the exits are segregated in a fire area enclosed in a fire wall of two hour fireresistance rating and the first floor construction has a fireresistance rating of not less than one and one half hours.

**1405.6.3 Use Groups B and M:** The first floor of buildings of Type 2C, 3C or 4B construction may be occupied for Use Groups B and M, provided the floor/ceiling assembly and enclosure walls are protected to afford one hour fireresistance rating and the exits from the residential floors are separately enclosed in accordance with the requirements of Article 8.

**1405.7 Grade floor protection:** In all buildings other than buildings of Use Group R-3 and in all types of construction other than Type 1, with habitable

or occupiable stories or basements below grade, the floor/ceiling assemblies and supports below the grade floor shall be protected by providing a fireresistance rating of not less than one hour, Type 3A construction, or an automatic fire suppression system. The fireresistance rating provided shall not be less than the rating required by Table 401 for the type of construction.

**1405.8 Noncombustible construction exemptions:** One story buildings of Type 2C construction outside the fire limits which do not exceed 3,000 square feet (279 $m^2$) in area in all use groups except Use Groups H, A and I shall be exempt from all protected exterior wall requirements.

**1405.9 Interior partitions:** In buildings and structures of other than Use Groups I and R of Types 1, 2A and 2B construction, partitions of a single thickness of wood or approved composite panels, and glass or other approved materials of similar combustible characteristics, may be used to subdivide rooms or spaces into offices, entries, or other similar compartments, provided they do not establish a corridor serving an occupant load of 30 or more in areas occupied by a single tenant and do not exceed 5,000 square feet (465 $m^2$) between fire separation assemblies or fire walls. An area not exceeding 7,500 square feet (697.5 $m^2$) may be subdivided with fire-retardant treated wood when complying with Section 1403.5.

**1405.10 Plenums:** Air plenums shall comply with Sections 1405.10.1 and 1405.10.2.

**1405.10.1 General:** The use of uninhabited basements or cellars, cavity walls, areas above ceilings or attic spaces as supply, make up, exhaust air or return air plenums or ducts is prohibited.

> **Exception:** Air ceiling plenums may be installed as supply or return air plenums in all occupancies except buildings of Use Group R-3, provided such air plenums meet the requirements of other applicable articles of this code and of the mechanical code listed in Appendix A, and provided fuel fired equipment or exposed combustible materials are not located therein. The use of air ceiling plenums shall be confined to one fire area. The floor or roof assembly above an unlisted air ceiling plenum shall not depend upon the air ceiling for a portion of its fireresistance rating. Insulated cold water, hot water, steam, fire protection piping, building sanitary and storm drains, and vent systems may be installed in air ceiling plenums. Electrical wiring and equipment in air ceiling plenums shall conform to the requirements of NFiPA 70 listed in Appendix A.* The use of air ceiling plenums in evaporative cooling systems is prohibited. Panning of the joist or stud space for return air is permitted in buildings of Use Group R-3 only.

**1405.10.2 Crawl spaces:** An underfloor space may be used as a supply plenum when the provisions of Sections 1405.10.2.1 through 1405.10.2.13 are met.

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*KY BLDG. CODE INTERP. NO. 4 Wiring may be installed in an air plenum space providing it bears the label of an approved testing agency indicating that it meets the provisions of the *National Electrical Code*, Section 800-3(d).

**1405.10.2.1 General:** The use of such space shall be limited to buildings of Use Group R-3 not more than two stories in height, or fire areas not exceeding 25,000 cubic feet (700 $m^3$) in volume in any other use group. Except for the floor immediately above the underfloor plenum, supply ducts shall be provided extending from the plenum to registers on other floor levels.

**1405.10.2.2 Storage:** Such spaces shall not be used for storage, shall be cleaned of all loose scrap material and shall be tightly and substantially enclosed.

**1405.10.2.3 Enclosure:** The enclosing material of the underfloor space including the side wall insulation shall not be more flammable than one inch (nominal) wood boards (flame spread classification of 200).

**1405.10.2.4 Access:** Access shall be through an opening in the floor which shall be 18 inches by 24 inches (457 mm by 610 mm).

**1405.10.2.5 Bonnet temperature control:** The furnace supplying warm air to such space shall be equipped with an automatic control which will start the air circulating fan when the air in the furnace bonnet reaches a temperature not higher than 150 degrees F. (66 degrees C.). Such control shall be one that cannot be set higher than 150 degrees F. (66 degrees C.).

**1405.10.2.6 Outlet temperature control:** The furnace supplying warm air to such space shall be equipped with an approved temperature limit control that will limit outlet air temperature to 200 degrees F. (93 degrees C.).

**1405.10.2.7 Receptacle:** A noncombustible receptacle shall be placed below each floor opening into the air chamber. Such receptacle shall be securely suspended from the floor members and shall be not more than 18 inches (457 mm) below the floor opening. The area of the receptacle shall extend 3 inches (76 mm) beyond the opening on all sides. The perimeter of the receptacle shall have a vertical lip at least 1 inch (25 mm) high at the open sides if it is at the level of the bottom of the joist, or 3 inches (76 mm) high if the receptacle is suspended.

**1405.10.2.8 Registers:** Floor registers shall be designed for easy removal in order to give access for cleaning the receptacles.

**1405.10.2.9 Firestopping:** Exterior walls and interior stud partitions shall be firestopped at the floor.

**1405.10.2.10 Register box:** Each wall register shall be connected to the air chamber by a register box or boot.

**1405.10.2.11 Duct extension:** A duct conforming with the mechanical code listed in Appendix A shall extend from the furnace supply outlet at least 6 inches (152 mm) below combustible framing.

**1405.10.2.12 Ground cover:** The entire ground surface of the underfloor space shall be covered with a vapor barrier having a vapor permeability rating of one perm or less and a flame spread rating of 200 or less.

**1405.10.2.13 Piping:** Fuel gas lines and plumbing waste cleanouts shall not be located within the space.

## SECTION 1406.0 EXTERIOR WALLS

**1406.1 General:** All exterior walls shall comply with the structural provisions of Articles 9, 10, 11, 12 and 13, and with the fireresistance rating requirements of Table 401. Exterior walls shall be rated for exposure to fire from inside the building.

**1406.1.1 Omission of exterior walls:** The provisions of this code shall not be deemed to prohibit the omission of exterior walls for all or part of a story when required for special uses and occupancies. When so omitted, the open areas shall be separated from the rest of the area and from the upper and lower stories of the building by wall and floor construction of the fireresistance rating required in Table 401; and except as otherwise specifically permitted in this code, the piers, columns and other structural supports within the open portion shall be constructed with the fireresistance rating required for exterior bearing walls in Table 401.

**1406.2 Vertical separation of windows:** Windows shall be separated vertically in accordance with Sections 1406.2.1 and 1406.2.2.

**1406.2.1 Where required:** In all buildings and structures of Use Groups B, F, H, M or S, exceeding three stories or 40 feet (12192 mm) in height, openings located vertically above one another in exterior walls which are required to have a fireresistance rating of more than one hour shall be separated by apron or spandrel walls not less than 3 feet (914 mm) in height, extending between the top of any opening and the bottom of the opening next above.

**1406.2.2 Fireresistance rating:** The apron or spandrel walls shall be constructed with the same fireresistance rating required for the exterior wall in which it is located as specified in Table 401; except when such required rating exceeds one hour, approved wired glass construction in fixed noncombustible sash and frames not exceeding one third of the area of such apron or spandrel may be located therein. In exterior nonbearing enclosure walls which are not required to be of more than one hour fireresistance rating, the provisions of this section in respect to apron or spandrel walls shall not apply.

**1406.3 Fire limit restriction:** In buildings of Types 2C, 3C or 4A construction inside the fire limits, the exterior walls or barriers shall extend to the height of the building and shall be so constructed that they will remain structurally in place for the duration of time indicated by the required fireresistance rating. When the exterior wall or barrier is adjacent to a flat roof, it shall be constructed with a parapet (see Section 502.2).

**1406.4 Fire access panels required:** Completely enclosed buildings, without exterior openings in the enclosure walls or without ready access for the purpose of fighting fire, shall be provided with access panels as required herein.

**1406.4.1 Multi-story buildings:** In all exterior walls of the building required to have 30 foot (9144 mm) wide open space adjacent thereto (see Section 505.2

and 506.2), each floor below the thirteenth floor shall be provided with access panels as follows.

If such access panels are not less than 32 inches by 48 inches (813 mm by 1219 mm) in size, they shall be spaced not more than 100 feet (30480 mm) apart in each story, or if such access panels are not less than 22 inches by 42 inches (559 mm by 1067 mm) in size, they shall be spaced not more than 30 feet (9144 mm) apart in each story.

**1406.4.2 Single story buildings:** In one story buildings not more than 85 feet (25908 mm) in height, roof vents shall be provided and shall be spaced not more than 125 feet (38100 mm) apart, and grade level doors or fire access panels shall be provided spaced not more than 125 feet (38100 mm) apart in all exterior walls of the building required to have 30 foot (9144 mm) wide open space adjacent thereto (see Sections 505.2 and 506.2).

**1406.4.3 Construction of access panels:** Access panels shall have a sill height of not more than 36 inches (914 mm); shall be readily identifiable from the outside; and shall be readily openable from the outside, or shall be glazed with plain flat glass. When required to be fireresistance rated, access panels shall be equipped with approved opening protectives, complying with this article which are readily openable from both the outside and inside. Access panels shall be not less than 32 inches by 48 inches (813 mm by 1219 mm) in size, except in buildings of moderate fire hazard such as schools and offices, wherein the sizes may be reduced to a minimum of 22 inches by 42 inches (559 mm by 1067 mm).

## SECTION 1407.0 FIRE WALLS AND PARTY WALLS

**1407.1 General:** Walls shall have sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall, and shall be constructed of any approved noncombustible materials providing the required strength and fireresistance rating specified in Table 401 for the type of construction, but not less than the fire grading of the use group specified in Table 1402. Strength and stability shall comply with the structural provisions of Articles 9, 10, 11 12 and 13.

**1407.2 Cutting walls:** A wall 8 inches or less in thickness shall not be cut for chases or socketed for insertion of structural members subsequent to erection (see Section 1212.0).

**1407.3 Hollow walls:** When combustible members frame into hollow walls or walls of hollow units, all hollow spaces shall be solidly filled for the full thickness of the wall and for a distance not less than 4 inches (102 mm) above, below and between the structural members with noncombustible materials approved for firestopping in Section 1420.0. The wall shall be not less than the minimum thickness specified in ANSI/NBS 211 for nonreinforced masonry, ANSI/NBS H74 for reinforced masonry, BIA *Building Code Requirements for Engineered Brick Masonry*, NCMA TR75-B or ACI 531 listed in Appendix A.

**1407.4 Combustible insulation:** The building official may permit the application of cork, fiber board or other combustible insulation if laid up without intervening air spaces and attached directly to the face of the wall, and protected on the exposed surface as provided in Sections 1122.0 and 1318.0.

**1407.5 Continuity of walls:** In all buildings and structures, walls shall be continuous from foundation to 2 feet 8 inches (813 mm) above the roof surface, except as provided in Sections 1407.5.1 through 1407.5.3.

**1407.5.1 Noncombustible roofs:** The wall may terminate at the underside of the roof deck where the roof is of noncombustible construction and is properly firestopped at the wall.

**1407.5.2 Combustible roofs:** The wall may terminate at the underside of the roof deck in Types 3 and 4 construction if properly firestopped, and if the roof sheathing or deck is constructed of approved noncombustible materials or fire-retardant treated wood for a distance of 4 feet (1219 mm) on either side of the wall, and combustible material does not extend through the wall.

**1407.5.3 Noncombustible frame:** The wall may be supported on the structural frame in buildings of noncombustible construction, provided such supporting frame has a fireresistance rating at least equal to that required for the wall.

**1407.6 Offset fire walls:** If fire walls are offset at intermediate floor levels in protected skeleton frame construction, the offset floor construction and the intermediate wall supports shall be constructed of noncombustible materials with a fireresistance rating not less than that required for the fire wall.

## SECTION 1408.0 FIRE WALL OPENINGS

**1408.1 General:** Openings in fire walls shall not exceed the limits in size and area herein prescribed, and the opening protectives shall conform to the provisions of Sections 1403.0 and 1414.0.

**1408.2 Size of opening:** Except in sprinklered buildings, an opening through a fire wall shall not exceed 120 square feet (11.16 $m^2$) in area, and the aggregate width of all openings at any floor level shall not exceed 25 percent of the length of the wall.

**1408.2.1 First story exception:** When the entire areas on both sides of a fire wall are provided with an approved automatic fire suppression system complying with the requirements of Article 17, openings designed for the passage of trucks may be constructed not more than 240 square feet (22.32 $m^2$) in area with a minimum distance of 3 feet (914 mm) between adjoining openings. Such openings shall be protected with approved automatic opening protectives of three hour fireresistance rating, and provided with an approved water curtain in addition to all other requirements.

**1408.3 Opening protectives:** Every opening in a fire wall shall be protected with an approved automatic opening protective assembly as herein required or the approved labeled equivalent in accordance with Section 1415.2, except horizontal exit openings.

**1408.3.1 Hold open devices:** Heat actuated hold open devices shall be installed on both sides of the wall, interconnected so that the operation of any single device will permit the door to close. Heat detectors or fusible links shall be installed at the door opening and at the ceiling in conformance with NFiPA 80 listed in Appendix A for the particular type of door to be installed. Swinging fire doors, where the ceiling is less than 3 feet (914 mm) above each side of the opening, may be actuated by a single fusible link incorporated in the hold open arm of a listed automatic door closer. Doors opening in a means of egress shall be closed by an approved door closer, or may be closed by actuation of a smoke detector located in conformance with NFiPA 80 listed in Appendix A.

## SECTION 1409.0 FIRE SEPARATION WALLS

**1409.1 Uses:** Fire separation walls shall comply with Sections 1409.1.1 through 1409.1.4 for the indicated uses.

**1409.1.1 Mixed uses:** When a building contains more than one occupancy, and each part of the building is separately classified as to use, the mixed uses shall be completely separated with fire separation walls as specified in Section 312.0.

***1409.1.2 Multiple single family dwellings:** Single family dwelling units (Use Group R-3) may be located above or adjacent to other single family dwelling units (Use Group R-3) provided each dwelling unit is completely separated from the adjacent dwelling unit(s) by fire separation wall(s) and floor/ceiling assemblies of not less than one hour fireresistance rated construction. Single family dwelling units having independent means of egress, when attached in this manner, shall be considered as one building classified as Use Group R-3 for the purpose of determining the applicable provisions of this code.

**1409.1.3 Exits:** Fire separation walls required for the enclosure of exits and areas of refuge shall be constructed of masonry, reinforced concrete or any other approved noncombustible materials having the minimum fireresistance rating prescribed by Table 401. Such walls may be constructed of combustible materials as regulated by Sections 816.9 and 1409.3.

**1409.1.4 Other uses:** Fire separation walls used for subdividing purposes, other than exits and areas of refuge, shall be constructed of the types of materials and have the minimum fireresistance rating as prescribed by Table 401 for the type of construction.

**1409.2 Openings:** Openings in fire separation walls shall comply with Sections 1409.2.1 and 1409.2.2.

**1409.2.1 Size:** Exit doors located in fire separation walls shall be limited to a maximum aggregate width of 25 percent of the length of the wall and the

*KY. BLDG. CODE INTERP. NO. 2 In residential buildings constructed in a townhouse or rowhouse design, and where a common wall sets on a property line, the wall will not be classified as a party wall. This will be the case regardless of whether the building is a newly constructed condominium or an apartment complex being converted to condominiums. The common walls may be fire separation walls except when area limits are exceeded and a firewall is required by the *Kentucky Building Code.*

maximum area of any single opening shall not exceed 48 square feet (4.46 m²).

**1409.2.2 Protectives:** All opening protectives in fire separation walls shall comply with the provisions of Section 1403.0 and shall have the minimum fireresistance rating as set forth in Section 1415.0.

**1409.3 Combustible stair enclosures:** Where permitted by Section 816.9, combustible stair enclosures shall be constructed in accordance with Sections 1409.3.1 and 1409.3.2.

**1409.3.1 Construction:** Stair enclosures constructed of approved combustible assemblies protected with component materials to afford the required fireresistance ratings shall be continuous through combustible floor construction and provide an unbroken fire barrier in combination with protected floors, ceilings and fire doors, separating the exits from the unprotected areas of the building. Such enclosures shall be firestopped to comply with Section 1420.0.

**1409.3.2 Openings for lighting:** Openings for the purpose of providing light in such enclosures may be protected with wired glass with single panes not more than 360 square inches (0.23 m²) in area and a total area in one story of not more than 720 square inches (0.46 m²). Such light panels shall comply with the provisions of Section 1418.0, and shall be contained in stationary sash and frames of steel or other approved noncombustible materials.

**1409.4 Continuity:** All fire separation walls shall extend from the top of the fireresistance rated floor/ceiling assembly below to the fireresistance rated floor/ceiling or roof/ceiling assembly above, unless otherwise provided for in this code, and shall be securely attached thereto. Where these walls enclose required exits, areas of refuge and shafts, or where these walls separate mixed uses, they shall be continuous through all concealed spaces such as the space above a suspended ceiling, and they shall be constructed tight to the underside of the floor slab or roof deck above. The supporting construction shall be protected to afford the required fireresistance rating of the wall supported. All hollow vertical spaces shall be firestopped at every floor level as required in Section 1420.0.

**1409.5 Exterior walls:** Where exterior walls serve as a part of a required fireresistance rated enclosure, such walls shall comply with the requirements of Table 401 for exterior walls and the fire enclosure requirements shall not apply.

## SECTION 1410.0 VERTICAL SHAFTS

**1410.1 General:** The provisions of this section shall apply to all vertical shaft enclosures, except as provided for stairway enclosures in Sections 816.9 and 1409.0, refuse chutes in Section 1607.0, and elevator and dumbwaiter hoistways in Section 2108.0.

**1410.2 Open shaft enclosures:** The enclosing walls of shafts that are open to the outer air at the top shall be constructed of materials specified in Article 13 for exterior walls of buildings and structures of the required fireresistance rating specified in Table 401.

**1410.3 Covered shaft enclosures:** The enclosing walls of interior covered shafts shall be constructed of approved materials with the fireresistance rating specified in Table 401. The tops of covered shafts shall comply with Section 1410.5.

**Exception:** Shafts in buildings of Use Group R-3 and serving a single dwelling unit are not required to be enclosed.

**1410.4 Duct and pipe shafts:** In all buildings other than buildings of Use Group R-3, vertical pipes arranged in groups of two or more which penetrate two or more floors and occupy an area of more than 1 square foot (0.093 $m^2$), and vertical ducts which penetrate two or more floors, shall be enclosed by construction of not less than one hour fireresistance rating to comply with this section. All combustible pipes and ducts connecting two or more stories shall be enclosed as indicated herein.

**Exceptions**

1. In all buildings of Use Group R-2, vertical noncombustible ducts shall not be required to have a one hour enclosure provided:
   a. the cross sectional area does not exceed 35 square inches;
   b. the duct does not penetrate more than three floors;
   c. the duct serves no more than one dwelling unit and shall not join other ducts except above the top level for the purpose of utilizing a single roof penetration; and
   d. these ducts are restricted for use as a bathroom or kitchen exhaust, combustion air supply and relief, and flues for gas equipment.
2. In R-2 occupancies, combustible pipe shall be permitted where approved by Article 22 of this code. Noncombustible fittings shall be required where branch lines enter on exit rated walls, with no requirement for one hour enclosure.

**1410.5 Top enclosure:** The tops of shafts shall be enclosed as indicated in Sections 1410.5.1 through 1410.5.3.

**1410.5.1 Not extending to roof:** A shaft that does not extend into the top story of the building shall be enclosed with top construction of the same strength and fireresistance rating as the floors of the building or structure in which it occurs, but not less than that of the fireresistance rating of the shaft enclosure. Such shafts shall be provided with noncombustible vents for the relief of smoke and gases in the event of fire, not less than 10 percent of the shaft in area.

**1410.5.2 Extending to roof:** All shafts that extend to the roof of the building shall be covered at the top with a thermostatically controlled skylight of not less than 10 percent of the area of the shaftway, constructed in accordance with the requirements of Section 1426.0. The automatic operation of the skylight may be controlled by fusible links designed to operate at a fixed temperature of not more than 160 degrees F. (71 degrees C.), or by electric or pneumatic operation under a rapid rise in temperature at a rate of 15 to 20 degrees F. per minute (.14 to .19 degrees C. per second), or by other approved methods.

**1410.5.3 Alternate shaft ventilation:** The skylight herein required may be replaced by a window of equivalent area in the side of the shaft, provided the sill of such window is not less than 2 feet (610 mm) above the adjoining roof, is equipped with an automatic vent opening, does not face on an interior lot line or within 10 feet (3048 mm) thereof, and is not located within 20 feet (6096 mm) of an opening in adjacent walls.

**1410.6 Bottom enclosure:** All shafts that do not extend to the bottom of the building or structure shall be enclosed at the lowest level with construction of the same strength and fireresistance rating as the lowest floor through which it passes, but not with a fireresistance rating less than that of the shaft enclosure.

**1410.7 Shaft openings:** Openings other than necessary for the purpose of the shaftway shall not be constructed in shaft enclosures. All openings shall be protected with approved fire doors, fire windows or fire dampers complying with the provisions of Sections 1414.0, 1415.0, 1416.0, and 1417.0.

## SECTION 1411.0 FIRERESISTANCE OF STRUCTURAL MEMBERS

**1411.1 Requirements:** The fireresistance rating of construction assemblies and structural members shall comply with the requirements of Table 401 and Section 1403.0.

**1411.2 Protection of structural members:** Columns, girders, trusses, beams, lintels, or other structural members that are required to have a fireresistance rating and that support more than two floors or one floor and roof, or support a bearing wall or a nonbearing wall more than two stories high, shall be individually protected on all sides for their length or height with materials having the required fireresistance rating. All other structural members required to have a fireresistance rating may be protected by individual encasement, by a membrane or ceiling protection as specified in Section 1412.0, or by a combination of both.

**1411.3 Embedments and enclosures:** Pipes, wires, conduits, ducts or other service facilities shall not be embedded in the required fire protective covering of a structural member that is required to be individually encased.

**1411.4 Impact protection:** Where the fire protective covering of a structural member is subject to impact damage from moving vehicles, the handling of merchandise, or other activity, the fire protective covering shall be protected by corner guards or by a substantial jacket of metal or other noncombustible material to a height adequate to provide full protection, but not less than 5 feet (1524 mm) from the finished floor.

**1411.5 Exterior structural members:** Structural members located in exterior walls or along the outer lines of a building or structure shall be protected as required by Table 401 for exterior bearing walls for the type of construction involved and shall be protected against corrosion by an approved method complying with Section 1315.0. The interior faces of exterior structural members shall be protected with coverings of the required fireresistance rating specified for interior structural members in Table 401.

**1411.6 Wall beams:** Beams and girders which support walls required to have a fireresistance rating shall be protected to afford not less than the fireresistance rating of the wall supported, and the fireresistance rating shall not be less than one hour for members supporting masonry walls.

**1411.7 Wall lintels:** Unless supported or suspended from structural wall girders protected with insulating materials of the required fireresistance rating, or when the opening is spanned by a masonry arch of the required strength, all lintels over openings in masonry walls 8 feet (2438 mm) or more in length shall be protected as required for structural members supporting walls for the type of construction, but the fireresistance rating shall not be less than one hour.

**1411.7.1 Stone lintels:** The use of stone lintels on spans exceeding 4 feet (1219 mm) shall not be permitted, unless supplemented by fireresistance rated structural members or masonry arches of the required strength to support the superimposed loads.

## SECTION 1412.0 FIRERESISTANCE RATED FLOOR/ROOF/CEILING ASSEMBLIES

**1412.1 Installation of ceiling fixtures:** Fireresistive ceilings which constitute an integral part of a floor or roof assembly to meet a required fireresistance rating may have openings to accommodate noncombustible piping, ducts or electric outlets. The aggregate area of such openings in the ceiling shall be not greater than 100 square inches (0.065 $m^2$) in any 100 square feet (9.30 $m^2$) of ceiling area. The fixtures and attachments shall be installed so as not to decrease the fireresistance rating of the assembly. All duct openings shall be protected with approved noncombustible fire dampers in compliance with Section 1417.0.

**1412.2 Ceiling panels:** Where the weight of lay-in ceiling panels, used as part of fireresistive floor/ceiling or roof/ceiling assemblies, is not adequate to resist an upward force of 1 psf (4.88 kg/$m^2$), wire or other approved devices shall be installed above the panels to prevent vertical displacement under such upward force.

**1412.3 Unusable space:** In an assembly required to have one hour fireresistance rating, the ceiling membrane may be omitted over unusable space, or the flooring may be omitted where unusable space occurs above.

**1412.4 Openings in fireresistance rated floors:** The required fireresistance rating of floor or floor/ceiling assemblies shall be maintained where a penetration is made for electrical, mechanical, plumbing and communication conduits, pipes and systems.

## SECTION 1413.0 ROOF CONSTRUCTION

**1413.1 General:** Roof construction shall be protected with noncombustible materials or assemblies of noncombustible materials to afford the fireresistance rating required by Table 401 as herein modified.

**1413.2 Roofs 20 feet or higher:** When every part of the structural framework of roofs in buildings of Type 1 or Type 2 construction is 20 feet (6096 mm) or more above the floor immediately below, all fire protection of the structural members may be omitted, including the protection of trusses, roof framing and decking. Heavy timber members may be used in accordance with Section 404.0 for such unprotected members in one story buildings.

**1413.3 Roof slabs, arches and decking:** Where the omission of fire protection from roof trusses, roof framing and decking is permitted, horizontal or sloping roofs in buildings of Type 1 and Type 2 construction immediately above such members shall be constructed of noncombustible materials of the required strength without a specified fireresistance rating, or in buildings of Type 3A construction not over five stories or 65 feet (19812 mm) in height.

**1413.4 Firestopping:** Firestopping of ceiling and attic spaces shall be provided as required by Section 1420.0.

## SECTION 1414.0 EXTERIOR OPENING PROTECTIVES

**1414.1 Where required:** Where specified herein, the exterior openings of all buildings and structures except storefronts and window and door openings in buildings of Use Group R-3 shall have approved opening protectives meeting the requirements of this code and the provisions of Article 6 for special uses and occupancies. Buildings of Type 2C, 3C or 4A construction located within the fire limits shall have opening protectives in accordance with Section 502.2.

**1414.2 Horizontal exposure:** Approved protectives shall be provided in every opening where the fire separation is less than 15 feet (4572 mm), except that in buildings of Types 2C and 4B construction approved opening protectives shall be provided in every opening where the fire separation is less than 6 feet (1829 mm).

**1414.3 Vertical exposure:** Approved protectives shall be provided in every opening which is less than 50 feet (15240 mm) vertically above the roof of an adjoining building or adjacent structure that is within a horizontal distance of 30 feet (9144 mm) of the wall in which the opening is located, unless such roof construction affords a fireresistance rating of not less than one and one half hours.

**1414.4 Protected openings:** Required protective assemblies in exterior openings shall be fixed, or they may be self closing, or provided with approved automatic closing devices.

**1414.5 Unprotected openings:** Where a fireresistance rating is not required by this section for openings in exterior walls, windows and doors may be of unprotected wood. Glazing shall conform to the requirements of Articles 13 and 24.

## SECTION 1415.0 FIRE DOORS

**1415.1 Fire door assemblies:** Approved fire door assemblies as defined in this

code shall be constructed of any material or an assembly of component materials which meets the test requirements of Section 1403.0 and the fireresistance rating herein required, unless otherwise specifically provided for in this code.

**Table 1415**
**FIRE DOOR FIRERESISTANCE RATINGS**

| Location | Fireresistance rating in hours |
|---|---|
| Fire walls and fire separation walls of three or more hour construction | 3 |
| Fire walls, fire separation walls and exit enclosures of one and one-half or two hour construction | 1½ |
| Shaft enclosures and elevator hoistways of two hour construction | 1½ |
| Shaft and exit enclosures of one hour construction | 1 |
| Exit access corridor enclosures of one hour construction | ⅓ |
| Other fire separation walls of one hour construction | ¾ |

**1415.2 Labeled protective assemblies:** All fire door assemblies shall be labeled by an approved agency in accordance with Section 2303.0. Labeled protective assemblies meeting the requirements of Sections 1403.3.2 or UL 10A, 14B and 14C for tin clad fire door assemblies and NFiPA 80 listed in Appendix A, shall be approved for use as provided for in this code.

**1415.3 Multiple doors:** The use of multiple fire doors shall comply with Sections 1415.3.1 and 1415.3.2.

**1415.3.1 Fire walls:** Two doors, each with a fireresistance rating of one and one half hours, installed on opposite sides of the same opening, shall be deemed equivalent in fireresistance rating to one three hour fire door.

**1415.3.2 Fire separation walls:** Two doors, each with a fireresistance rating of three quarter hour installed on opposite sides of the same opening shall be deemed equivalent in fireresistance rating to a one and one half hour fire door, except when used in a required exit.

**1415.4 Glass panels:** Wired glass panels shall be permitted in fire doors within the limitations of Section 1418.0 and as herein specifically prescribed.

**1415.5 Closing devices:** Except as may be otherwise provided for openings in fire walls and fire separation walls, all fire doors shall be self closing and shall be closed during occupancy of the building or part thereof. The building official may approve the use of rate of rise heat actuated devices, or smoke detection devices, meeting the requirements of the approved rules on doors that are normally required to be open for ventilation or other specified purposes when the safety of the occupants is not endangered thereby.

## SECTION 1416.0 FIRE WINDOWS AND SHUTTERS

**1416.1 Fireresistance rating:** Approved assemblies of fire windows and fire shutters shall meet the test requirements of Section 1403.0, or shall be approved labeled assemblies meeting the requirements of Section 1403.3.4.

**1416.1.1 Exception:** Steel window frame assemblies of ⅛ inch (3 mm) minimum solid section or of not less than No. 18 Manufacturers Standard Gage (0.048 in.) formed sheet steel members fabricated by pressing, mitering, riveting, interlocking or welding and having provision for glazing with ¼ inch wired glass as required in Section 1418.0 when securely installed in the building construction and glazed with ¼ inch labeled wired glass, shall be deemed to meet the requirements for a three quarter hour fire window assembly.

**1416.2 Window mullions:** All metal mullions which exceed a nominal height of 12 feet shall be protected with materials to afford the same fireresistance rating as required for the wall construction in which the protective is located.

**1416.3 Swinging fire shutters:** When fire shutters of the swinging type are used in exterior openings, not less than one row in every three vertical rows shall be arranged to be readily opened from the outside, and shall be identified by distinguishing marks or letters not less than 6 inches (152 mm) high.

**1416.4 Rolling fire shutters:** When fire shutters of the rolling type are used, they shall be of approved counterbalanced construction that can be readily opened from the outside.

## SECTION 1417.0 FIRE DAMPERS

**1417.1 Labeling:** Fire dampers shall be labeled by an approved agency.

**1417.2 Where required:** Except when proper fire tests have shown that fire dampers are not necessary to maintain the integrity of the fireresistance rated assembly, fire dampers shall be installed in the locations specified in Sections 1417.2.1 through 1417.2.5.

**1417.2.1 Fire walls:** Ducts penetrating a fire wall. When a fire wall is of three hour or greater fireresistance rating, a fire door is required.

**1417.2.2 Fire separation walls:** Ducts passing through a fire separation wall.

**1417.2.3 Shafts:** Ducts penetrating a fireresistance rated shaft wall. Subducts extending 22 inches (559 mm) vertically upward may be used in lieu of fire dampers for exhaust ducts.

**1417.2.4 Ceilings:** Ducts penetrating the ceiling of a fireresistance rated floor/ceiling or roof/ceiling assembly.

**1417.2.5 Corridors:** Ducts penetrating fireresistance rated corridor walls.

**Exceptions**

1. When a complete automatic fire suppression system is provided.
2. When the ducts are constructed of steel and are part of an engineered smoke removal system.
3. When the ducts are constructed of steel and do not have openings which communicate the corridor with adjacent spaces or rooms.

## SECTION 1418.0 WIRED GLASS

**1418.1 Maximum size:** One quarter inch wired glass, which has been labeled for use in approved labeled opening protectives, may be used within the size limitations set forth in Table 1418.

**Table 1418**
**LIMITING SIZE OF WIRED GLASS PANELS**

| Rating, opening | Max. area sq. in. | Max. height inches | Max. width inches |
|---|---|---|---|
| 3 hour, Class A door | 0 | 0 | 0 |
| 1 and 1½ hour, Class B doors | 100 | 33 | 10 |
| ¾ hour, Class C door | 1,296 | 54 | 54 |
| 1½ hour, Class D door | 0 | 0 | 0 |
| ¾ hour, Class E door | 1,296 | 54 | 54 |
| Fire windows | 1,296 | 54 | 54 |

**Note a.** 1 inch = 25.4 mm; 1 square inch = 0.0006452 $m^2$.

**1418.1.1 Fire walls:** Wired glass in fire doors located in fire walls shall be prohibited except that when serving as a horizontal exit, a self closing swinging door may be provided with a vision panel of not more than 100 square inches (0.065 $m^2$) without a dimension exceeding 10 inches (254 mm).

**1418.1.2 Fire separation walls:** Wired glass vision panels may be used in fire doors of one and one half hour fireresistance rating intended for use in fire separation walls, but the glass panels shall not be more than 100 square inches (0.065 $m^2$).

**1418.2 Exit and elevator protectives:** Unless specifically required by Article 6 to be solid in such locations where unusually hazardous conditions prevail, fire doors in elevator and stairway shaft enclosures may be equipped with approved wired glass vision panels which shall be so located as to furnish clear vision of the passageway or approach to the elevator or stairway. Such vision panels shall not exceed the size limitations specified for Class B doors.

**1418.3 Fire separation walls:** One quarter inch wired glass panels may be used in fire separation walls used for subdividing purposes as set forth in Section 1409.1.4, provided the required fireresistance rating of the wall does not exceed one hour. The maximum size of such panels shall not exceed the limitations for a three quarter hour Class C door.

## SECTION 1419.0 FIRERESISTIVE REQUIREMENTS FOR PLASTER

**1419.1 Thickness of plaster:** The required thickness of fireresistance rated plaster protection shall be determined by the prescribed fire tests for the specified use and type of construction and in accordance with Sections 1118.0 and 1119.0 for interior and exterior plastering. The thickness in all cases shall be measured from the face of the lath when applied to fiber board, wood or gypsum lath, and from the back of metal lath.

**1419.2 Plaster equivalents:** For fireresistive purposes, ½ inch (13 mm) of unsanded gypsum plaster shall be deemed equivalent to ¾ inches (19 mm) of one to three sanded gypsum or one inch (25 mm) portland cement sand plaster.

**1419.3 Noncombustible furring:** In Types 1 and 2 construction, plaster shall be applied directly on masonry or on approved noncombustible plastering base and furring.

**1419.4 Double reinforcement:** Except in solid plaster partitions, or when otherwise determined by the prescribed fire tests, plaster protection more than 1 inch (25 mm) in thickness shall be reinforced with an additional layer of approved lath embedded at least ¾ inch (19 mm) from the outer surface and fixed securely in place.

**1419.5 Plaster alternates for concrete:** In reinforced concrete construction, gyspum or portland cement plaster may be substituted for ½ inch (13 mm) of the required poured concrete protection, except that a minimum thickness of ⅜ inch (10 mm) of poured concrete shall be provided in all reinforced concrete floors and 1 inch (25 mm) in reinforced concrete columns in addition to the plaster finish. The concrete base shall be prepared in accordance with Section 1119.7.

## SECTION 1420.0 FIRESTOPPING AND DRAFTSTOPPING

**1420.1 General:** To prevent the free passage of flame and products of combustion through concealed spaces or openings in the event of fire, provisions shall be made to provide effective firestops or draftstops as herein specified.

**1420.2 Firestopping materials:** All firestopping shall consist of approved noncombustible materials securely fastened in place. Firestops of two thicknesses of 1 inch lumber with broken lap joint, or one thickness of ¾ inch plywood with joints backed by ¾ inch plywood, or of 2 inch lumber installed with tight joints, shall be permitted in open spaces of wood framing.

**1420.3 Draftstopping materials:** Draftstopping materials shall be not less than ½ inch gypsum board, ⅜ inch plywood or other approved materials adequately supported.

**1420.4 Integrity:** The integrity of all firestopping and draftstopping shall be continuously maintained.

**1420.5 Required inspection:** Firestopping and draftstopping shall not be concealed from view until inspected and approved by the building official.

**1420.6 Firestopping required:** Firestopping shall be provided in the locations specified in Sections 1420.6.1 through 1420.6.7.

**1420.6.1 Concealed wall spaces:** In concealed spaces of stud walls and partitions, including furred or studded off spaces of masonry or concrete walls, at the ceiling and floor or roof levels.

**1420.6.2 Connections between horizontal and vertical spaces:** At all intercon-

nections between vertical and horizontal spaces such as occur at soffits over cabinets, drop ceilings, cove ceilings, etc.

**1420.6.3 Stairs:** In concealed spaces between stair stringers at the top and bottom of the run.

**1420.6.4 Ceiling and floor openings:** At openings around vents, pipes, ducts, chimneys, and fireplaces at ceiling and floor levels, with noncombustible materials.

**1420.6.5 Architectural trim:** In exterior cornices and other exterior architectural elements where permitted of combustible construction in Section 1425.0, or when erected with combustible frames, at maximum intervals of 20 feet (6096 mm). If noncontinuous, they shall have closed ends, with at least 4 inches (102 mm) separation between sections.

**1420.6.6 Combustible finish and trim:** In the space behind combustible trim and finish where permitted under this code and all other hollow spaces where permitted in fireresistance rated construction at 10 foot (3048 mm) intervals or the space shall be solidly filled with noncombustible materials.

**1420.6.7 Concealed sleeper spaces:** In concealed spaces formed by floor sleepers in areas of not more than 100 square feet (9.30 $m^2$); or the space shall be solidly filled with noncombustible materials.

**1420.7 Draftstopping required:** Draftstopping shall be provided in Types 3 and 4 construction in the locations specified by Sections 1420.7.1 and 1420.7.2.

**1420.7.1 Floors:** Where ceilings are suspended below solid wood joists or suspended or attached directly to the bottom of open web wood floor trusses, the space between the ceiling and the floor above shall be divided by providing draftstopping as specified in Sections 1420.7.1.1 through 1420.7.1.3.

**1420.7.1.1 Use Groups R-1 and R-2:** In buildings of Use Groups R-1 and R-2, draftstopping shall be in line with the tenant separation walls when the walls do not extend to the floor sheathing above.

**1420.7.1.2 Use Group R-3:** In buildings of Use Group R-3 the space shall be divided into approximately equal areas not greater than 500 square feet (93 $m^2$). The draftstopping shall be provided parallel to the main framing members.

**1420.7.1.3 Other use groups:** In all other use groups, draftstopping shall be provided so that horizontal areas do not exceed 1,000 square feet (93 $m^2$).

> **Exception:** Where the space above a ceiling is of combustible construction and the building is sprinklered above and below the ceiling, the draftstopping may be omitted.

**1420.7.2 Attics and concealed spaces:** Attics and concealed spaces shall be provided with draftstopping as specified in Sections 1420.7.2.1 through 1420.7.2.3.

**1420.7.2.1 Use Groups R-1 and R-2:** In the attic, mansard, overhang or other concealed roof space, above and in line with the tenant separation walls which do not extend to the roof sheathing above.

**Exceptions**

1. Where corridor walls provide a tenant separation, draftstopping shall only be required above one of the corridor walls.
2. Where flat roofs with solid joist construction are used, draftstopping over tenant separation walls is not required.
3. Where the space above a ceiling is of combustible construction and the building is sprinklered above and below the ceiling, the draftstopping may be omitted.

**1420.7.2.2 Use Group R-3:** Draftstopping is not required in the attic space.

**1420.7.2.3 Other use groups:** In attics and concealed roof spaces, so that any horizontal area does not exceed 3,000 square feet (279 $m^2$).

**Exceptions**

1. Where flat roofs with solid joist construction are used, draftstopping over tenant separation walls is not required.
2. Where the space above a ceiling is of combustible construction and the building is sprinklered above and below the ceiling, the draftstopping may be omitted.

**1420.8 Ventilation:** Ventilation of concealed roof spaces shall be maintained in accordance with Section 707.0.

**1420.9 Access to attics:** A readily accessible access opening not less than 22 inches by 30 inches (559 mm by 762 mm) shall be provided to any attic area having a clear height of over 30 inches (762 mm). When doors or other openings are provided in the draftstopping, they shall be self closing and of approved materials specified in this section, and the construction shall be tightly fitted around all pipes, ducts or other assemblies piercing the draftstopping.

## SECTION 1421.0 INTERIOR FINISH AND TRIM

**1421.1 General:** Interior finish and trim of buildings shall conform to the requirements of this section. Interior finish shall include all wainscoting and paneling or other finish applied structurally or for acoustical treatment, insulation, decoration or similar purposes. The use of a surface finish of paper or of material of not greater fire hazard than paper shall not be prohibited provided such finish does not exceed $^1/_{28}$ inch (1 mm) in thickness and is applied directly to a noncombustible base or substrate meeting the requirements of Section 1403.5.2. Show windows in the first story of buildings may be of wood or unprotected metal framing.

**1421.2 Exposed construction:** These requirements shall not be considered as requiring the installation of interior finish, but where construction or fire protection materials are exposed in rooms or spaces used for the occupancies

specified in Section 1421.5, the hazard from rate of flame spread of such exposed materials shall be not greater than that of the interior finish permitted for such occupancy or use. Exposed portions of structural members complying with the requirements for Type 3A construction in Sections 404.0 and 1224.0 shall not be subject to interior finish regulations.

**1421.3 Smoke or gases:** Interior finish materials shall not be permitted that have a smoke developed rating greater than 450 when tested in accordance with ASTM E84 listed in Appendix A. When restrictions are not otherwise established in this code, interior finish is not controlled, except that pyroxylin or similar finishes shall not be applied which, as dry films, produce excessive smoke or toxic fumes when exposed to fire.

**1421.4 Materials:** Materials may be used for interior finish and trim only as specifically provided in this code for the occupancy or use of the space in which it is installed. Use of any material for floor finish, interior finish, and trim in a building of Type 1 or 2 construction within the scope permitted in this section or Section 1423.0 shall not declassify the building with respect to its type of construction.

**1421.4.1 Foam plastics:** Foam plastics shall not be used as interior finish except as provided in this section and Section 1319.0. Interior trim shall be permitted as provided in Section 1421.6. Thermal barriers and smoke developed ratings are not required for trim.

**1421.5 Interior finish:** Interior finish of walls and ceilings shall have a flame spread rating not greater than that designated by the class prescribed for the various occupancy groups listed in Table 1421.5, when tested in accordance with the requirements of Section 1404.2.

**1421.5.1 Basements:** In buildings other than buildings of Use Group R-3, Class I or II interior finish shall be used in all basements or other underground spaces from which there is not direct exit to the outside of the building, if subject to occupancy for any purpose other than storage or service facilities.

**1421.5.2 Maximum flame spread:** Interior finish materials with flame spread classifications in excess of 200 shall not be used in any room or space subject to human occupancy, except to such extent as may be specifically permitted by the building official on the basis of a finding that such use does not significantly increase the life hazard.

**1421.5.3 Flame spread classifications:** The classifications of interior finishes referred to herein correspond to flame spread ratings determined by ASTM E84 listed in Appendix A as follows. Class I flame spread, 0 - 25; Class II flame spread, 26 - 75; Class III flame spread, 76 - 200.

**1421.6 Interior trim:** Baseboards, chairrails, mouldings, trim around openings and other interior trim, not in excess of 10 percent of the aggregate wall and ceiling areas of any room or space, may be of Class I, II or III materials, except that trim around fire windows and fire doors shall comply with the requirements of Sections 1415.0 and 1416.0.

**Table 1421.5**
**INTERIOR FINISH REQUIREMENTS[h]**

| Use groups | Required vertical exits and passageways[d] | Corridors providing exit access | Rooms or enclosed spaces[a] |
|---|---|---|---|
| A-1 Assembly, theaters | I | I[f] | II[b] |
| A-2 Assembly, night clubs | I | I[f] | II[b] |
| A-3 Assembly halls, terminals, restaurants | I | I[f] | II[b] |
| A-4 Assembly, churches, schools | I | II | III |
| B Business | I | II | III |
| F Factory and industrial | I | II | III |
| H High hazard | I | II | III[g] |
| I-1 Institutional, restrained | I | I | I[c] |
| I-2 Institutional, incapacitated | I | II | I[c] |
| M Mercantile walls, ceilings | I | II | III |
| R-1 Residential, hotels | I | II | II[e] |
| R-2 Residential, multi-family dwellings | I | II | III |
| R-3 Residential, 1 and 2 family dwellings | III | III | III |
| S-1 Storage, moderate hazard | II | II | III |
| S-2 Storage, low hazard | II | II | III |

**Note a.** Requirements for rooms or enclosed spaces are based upon spaces enclosed in partitions of the building or structure, and where fireresistance rating is required for the structural elements, the enclosing partitions shall extend from the floor to the ceiling. Partitions which do not comply with this shall be considered as enclosing spaces and the rooms or spaces on both sides thereof shall be counted as one. In determining the applicable requirements for rooms or enclosed spaces, the specific use or occupancy thereof shall be the governing factor, regardless of the use group classification of the building or structure. When an approved automatic fire suppression system is provided, the interior finish of Class II or III materials may be used in place of Class I or II materials respectively, where required in the table.

**Note b.** Class III interior finish materials may be used in places of assembly with a capacity of 300 persons or less.

**Note c.** Class III interior finish material may be used in administrative areas. Class II interior finish materials may be used in individual rooms of not over 4 persons capacity. Provisions in Note a allowing a change in interior finish classes when fire suppression protection is provided shall not apply.

**Note d.** Class III interior finish materials may be used for wainscoting or paneling for not more than 1,000 square feet of applied surface area in the grade lobby when applied directly to a noncombustible base or over furring strips applied to a noncombustible base and firestopped as required by Section 1422.0.

**Note e.** Class III interior finish materials may be used in mercantile occupancies of 3,000 square feet or less gross area used for sales purposes on the street floor only. (Balcony permitted).

**Note f.** Lobby areas may be Class II.

**Note g.** Where building height is over two stories, shall be Class II.

**Note h.** The classifications of interior finishes referred to herein correspond to flame spread ratings determined by ASTM E84 listed in Appendix A as follows. Class I flame spread, 0 - 25; Class II flame spread, 26 - 75; Class III flame spread, 76 - 200 (see Section 1421.5.3).

**Note i.** 1 square foot = 0.093 $m^2$.

**1421.7 Interior floor finish:** Finished floors or floor covering materials of a traditional type, such as wood, vinyl, linoleum, terrazzo and other resilient floor covering materials are exempt from the requirements of this section. Floor coverings judged by the building official to represent an unusual hazard shall meet the classification prescribed for the various occupancy groups

listed in Table 1421.7 when tested in accordance with the requirements of Section 1404.3.

**Table 1421.7**
**INTERIOR FLOOR FINISH REQUIREMENTS[c]**

| Use groups | Required vertical exits and passageways | Corridors providing exit access | Rooms or enclosed spaces[a] |
|---|---|---|---|
| A-1 Assembly, theaters | II | II | DOC FF-1[b] |
| A-2 Assembly, night clubs | II | II | DOC FF-1[b] |
| A-3 Assembly halls, terminals restaurants | II | II | DOC FF-1[b] |
| A-4 Assembly, churches, schools | II | II | DOC FF-1[b] |
| B Business | II | II | DOC FF-1[b] |
| F Factory and Industrial | DOC FF-1[b] | DOC FF-1[b] | DOC FF-1[b] |
| H High hazard | DOC FF-1[b] | DOC FF-1[b] | DOC FF-1[b] |
| I-1 Institutional, restrained | II | II | DOC FF-1[b] |
| I-2 Institutional, incapacitated | I | I | DOC FF-1[b] |
| M Mercantile | II | II | DOC FF-1[b] |
| R-1 Residential, hotels | II | II | DOC FF-1[b] |
| R-2 Residential, multi-family dwellings | II | II | DOC FF-1[b] |
| R-3 Residential, 1 and 2 family dwellings | DOC FF-1[b] | DOC FF-1[b] | DOC FF-1[b] |
| S-1 Storage, moderate hazard | DOC FF-1[b] | DOC FF-1[b] | DOC FF-1[b] |
| S-2 Storage, low hazard | DOC FF-1[b] | DOC FF-1[b] | DOC FF-1[b] |

**Note a.** Requirements for rooms or enclosed spaces are based upon the spaces being enclosed with partitions extending from the floor to the ceiling. Where partitions do not satisfy this criteria, the room or space is considered part of the corridor.

**Note b.** All carpet manufactured for sale in the United States is required by Federal regulations to pass the DOC FF-1 "pill test" (16 CFR, Part 1630) listed in Appendix A. If a material other than carpet is used, the material should be shown to be at least as resistant to flame propagation as a material which passes DOC FF-1 (minimum critical radiant flux of 0.04 watts/cm$^2$).

**Note c.** The classifications correspond to that determined by ASTM E648 listed in Appendix A as follows: Class I, 0.45 watts/cm$^2$; Class II, 0.22 watts/cm$^2$ (see Section 1404.3).

**1421.7.1 Suppression system exception:** When an approved automatic fire suppression system is provided, Class II materials may be used in any area where Class I materials are required and materials complying with the DOC FF-1 "pill test" listed in Appendix A may be used in any area where Class II materials are required.

**1421.7.2 Test report:** All carpet required by this section to meet critical radiant flux limits in accordance with Section 1404.3 shall be tested by an approved laboratory. A copy of the test report identifying and representing the style to be installed shall be provided to the building official upon request. The test report shall identify the carpet by manufacturer (or supplier) and style name, and shall be representative of the current construction of the carpet.

The carpet shall be identified as to manufacturer (or supplier) and style by a hang tag or other suitable method, which shall indicate the classification of the material based upon the limits specified in Section 1404.3.

## SECTION 1422.0 APPLICATION OF INTERIOR FINISH

**1422.1 Attachment:** Where interior finish is regulated by the requirements of this code, interior finish materials shall be applied or otherwise fastened in such a manner that they will not readily become detached when subjected to room temperatures of 200 degrees F. (93 degrees C.) or less for 30 minutes, or otherwise become loose through changes in the setting medium from the effects of time or conditions of occupancy.

**1422.2 Application to structural elements:** Interior finish materials applied to walls, ceilings or structural elements of a building or structure which are required to be fireresistance rated or to be constructed of noncombustible component materials shall be applied directly against the exposed surface of such structural elements or to furring strips attached to such surfaces with all concealed spaces created thereby firestopped where in excess of 10 feet (3048 mm) in any dimension (see Section 1420.6.6).

**1422.3 Furred construction:** Where walls, ceilings or other structural elements are required to be fireresistance rated or to be constructed of noncombustible component materials and interior finish is set out or dropped distances greater than 1¾ inches (44 mm) from the surface of such elements, only material of which both faces qualify as Class I shall be used, unless the finish material is protected on both sides by an approved automatic fire suppression system in which case Class I or II materials shall be used, or is attached to a noncombustible backing complying with Section 1422.6 or to furring strips applied directly to such backing as provided in Section 1422.2.

**1422.4 Type 3A construction:** Interior finish materials may be applied directly to the wood members and decking of Type 3A construction, or to furring strips applied to such members or wood decking as provided in Section 1422.2.

**1422.5 Class II and III materials:** Interior finish materials, other than Class I materials which are less than ¼ inch in thickness, shall be applied directly against a noncombustible backing or a backing complying with the requirements of Section 1403.5.2 unless the tests under which such material has been classed were made with the materials suspended from the noncombustible backing.

**1422.6 Backing material:** Backing for interior finish materials shall be a continuous surface with permanently tight joints, equal in area to the area of the finish, and extending completely behind such finish in all directions; and may be of fire-retardant treated wood or any materials meeting the requirements of this code for noncombustible classification of material under Section 1403.4.1. When the backing does not constitute an integral part of the structural elements or system, it shall be attached directly to the structural elements or to furring strips as required for the application of finish according to Section 1422.2, or may be suspended from the structural members at any distance provided concealed spaces created thereby shall be firestopped in accordance with Section 1420.0.

## SECTION 1423.0 COMBUSTIBLE MATERIALS PERMITTED IN FLOORS OF TYPE 1 AND TYPE 2 CONSTRUCTION

**1423.1 General:** Except as provided in Section 816.0 for stairs and Section 617.0 for buildings of Use Groups A-1 and A-2, the use of combustible materials in or on floors of buildings of Type 1 and Type 2 construction shall be as herein specified.

**1423.2 Sleepers, bucks, and grounds:** Floor sleepers, bucks, nailing blocks and grounds may be constructed of combustible materials, provided the space between the fireresistance rated floor construction and the flooring is either solidly filled with noncombustible materials or firestopped in accordance with Section 1420.6.7, and provided such open spaces shall not extend under or through permanent partitions or walls.

**1423.3 Flooring:** Wood finish flooring may be attached directly to the embedded or firestopped wood sleepers, and shall be permitted when cemented directly to the top surface of approved fireresistance rated construction or directly to a wood subfloor attached to sleepers as provided in Section 1423.2. Combustible insulating boards not more than ½ inch thick and covered with approved finished flooring may be used for sound deadening or heat insulating when attached directly to a noncombustible floor assembly or to wood subflooring attached to sleepers as provided in Section 1423.2.

## SECTION 1424.0 DECORATIVE MATERIAL RESTRICTIONS

**1424.1 General:** In buildings of Use Group A, all draperies, hangings and other decorative materials suspended from walls or ceilings shall be noncombustible or flameresistant meeting the requirements of Section 1404.0 as herein specified.

**1424.2 Noncombustible:** The permissible amount of noncombustible decorative hangings shall not be limited.

**1424.3 Flameresistant:** The permissible amount of flameresistant decorative hangings shall not exceed 10 percent of the total wall and ceiling area.

## SECTION 1425.0 EXTERIOR TRIM RESTRICTIONS

**1425.1 Gutters and leaders:** All gutters and leaders hereafter placed on buildings and structures other than buildings of Type 4 construction, buildings of Use Group R-3 and private garages and similar accessory buildings shall be constructed of noncombustible materials.

**1425.2 Architectural trim:** Architectural trim shall be constructed and installed in accordance with Sections 1425.2.1 through 1425.2.3.

**1425.2.1 Construction requirements:** All architectural trim, such as cornices, veneers and other exterior architectural elements attached to the exterior walls of buildings of Types 1 and 2 construction, shall be constructed of approved noncombustible materials and shall be secured to the wall with

metal or other approved noncombustible brackets. Outside the fire limits, such trim may be of combustible material when the architectural trim does not exceed three stories or 40 feet (12192 mm) in height above grade. Combustible trim may be used on all buildings of Types 3 and 4 construction. Inside the fire limits, wood veneers are permitted in accordance with Section 502.0.

**1425.2.2 Location:** When combustible architectural trim is located along the top of exterior walls, it shall be completely backed up by the exterior wall and shall not extend over or above the top of exterior walls.

**1425.2.3 Firestopping:** Continuous exterior architectural trim constructed of combustible materials shall be firestopped as required in Section 1420.0.

**1425.3 Combustible half timbering:** In buildings of Type 3 construction that do not exceed three stories or 40 feet (12192 mm) in height above grade, exterior half timbering and similar architectural decorations may be constructed of wood or other equivalent combustible materials, provided such trim is backed up solidly with approved noncombustible materials.

**1425.4 Balconies:** All balconies attached to or supported by buildings of Types 1 and 2 construction shall be constructed of noncombustible materials. Balconies attached to or supported by buildings of Types 3 and 4 construction may be of unprotected noncombustible materials or combustible construction. Balconies of combustible construction shall afford the fireresistance rating required by Table 401 for floor construction, or shall be of Type 3A construction as described in Section 404.2, and the aggregate length shall not exceed 50 percent of the building perimeter on each floor.

**1425.5 Bay and oriel windows:** All bay and oriel windows attached to or supported by walls other than Type 4 construction shall be of noncombustible construction, framed with brackets of steel, concrete or other approved noncombustible materials.

## SECTION 1426.0 ROOF STRUCTURES

**1426.1 General:** All construction, other than aerial supports, clothes dryers and similar structures less than 12 feet (3658 mm) high, water tanks and cooling towers as hereinafter provided and flag poles erected above the roof of any part of any building or structure located within the fire limits or of any building or structure more than 40 feet (12192 mm) in height outside the fire limits, shall be constructed of noncombustible materials.

**1426.2 Scuttles:** Trap doors and scuttles as required by Section 817.0 shall be not less than 2 feet by 3 feet (610 mm by 914 mm) in size. In Types 1 and 2 construction, trap doors and scuttles shall be of approved noncombustible materials.

**1426.3 Skylights:** Skylights shall be constructed and installed in accordance with Section 1426.3.1 through 1426.3.6.

**1426.3.1 Sash and frames:** Sash and frames of all skylights on buildings of

Types 1 and 2 construction shall be constructed of steel or other approved noncombustible materials. In foundries or buildings where acid fumes deleterious to metal are incidental to the use of the building, treated wood or other approved noncorrosive materials shall be permitted.

**1426.3.2 Structural requirements:** When part of the roof system, skylights shall be designed to meet all structural requirements for roofs specified in Article 9. Design of glazing shall be in accordance with glazing industry design methods.

**1426.3.3 Mounting:** All skylights having their glazing set at an angle of less than 45 degrees (0.79 rad), measured from the horizontal, shall be mounted at least 4 inches (102 mm) above the plane of the roof on a curb constructed as required for the frame.

**1426.3.4 Glazing materials:** Skylights may be glazed with any of the following materials, subject to the noted limitations: laminated glass, wired glass, annealed glass, heat strengthened glass, tempered glass, glass block and light transmitting plastic. Annealed, heat strengthened and tempered glass shall be protected by screens as specified in Section 1426.3.5. Light transmitting plastic skylights shall meet the requirements of Section 2405.0. Glass block construction shall conform to the requirements of Sections 1111.0 and 1303.0.

**1426.3.5 Screens:** Annealed glass skylights shall be protected from falling objects by screens above the skylight. Annealed, heat strengthened and tempered glass skylights shall be equipped with screens below the skylight to protect building occupants from falling glazing should breakage occur. Screens shall be of noncombustible materials and shall have a mesh not larger than 1 inch by 1 inch (25 mm by 25 mm). The screen shall be constructed of not lighter than No. 12 B&S Gage (0.0808 inches) material. When utilized in a corrosive atmosphere, structurally equivalent noncorrosive materials shall be used. Screens above the skylight shall be at least 4 inches (102 mm) above the skylight and shall project on all sides for a distance of not less than the height of the screen above the glass. When multiple layer glazing systems are used and the layer facing the interior is laminated glass, the protective screen below the skylight is not required.

**1426.3.6 Venting skylights:** Where required over shafts and stairs by Sections 712.1.2 or 1410.5, venting skylights shall be glazed with a readily broken glazing material.

**1426.4 Penthouses:** Penthouses shall be considered a part of the next lower story, and the enclosure shall conform to the requirements for exterior walls of the building type as regulated by Table 401 and Article 13 except as modified herein.

**1426.4.1 Recessed walls:** When the exterior wall of a penthouse is recessed 5 feet (1524 mm) or more from the exterior wall of the next lower story and the exterior wall of the next lower story is required to have a fireresistance rating of greater than one and one half hours, the penthouse exterior wall shall be

constructed with a fireresistance rating of not less than one and one half hours, covered on the outside with noncombustible, weatherproof material and supported on protected steel or reinforced concrete construction.

**1426.4.2 Doors, frames, and sash:** Doors, frames and window sash, except where otherwise specifically required to be fireresistance rated under this code, shall be constructed the same as other similar elements in the building or structure.

**1426.5 Other enclosed roof structures:** Enclosed roof structures, other than penthouses as defined in Article 2, shall be considered a story of the building and the enclosure shall conform to the requirements for exterior walls of the building type as regulated by Table 401 and Article 13, and to the provisions described in the following Sections 1426.5.1 and 1426.5.2.

**1426.5.1 Noncombustible materials:** Unless constructed of masonry or reinforced concrete in accordance with Article 12, roof structures erected on buildings and structures of Types 1 or 2 construction shall be enclosed in walls of noncombustible materials having a fireresistance rating of not less than one hour and protected with approved roof coverings or with material permitted for covering the exterior walls of the building.

**1426.5.2 Combustible materials:** Roof structures erected on buildings of Types 3 and 4A construction may be constructed of combustible materials protected to afford one hour fireresistance rating and covered with approved roof coverings or with material permitted for covering the exterior walls of the building.

**1426.6 Mansards and other sloping roofs:** Mansards and other sloping roofs shall comply with Sections 1426.6.1 and 1426.6.2.

**1426.6.1 High slope roofs:** Every mansard roof or other sloping roof having a pitch of more than 60 degrees (1.05 rad) to the horizontal hereafter erected on any building or structure of other than Type 4 construction more than three stories or 40 feet (12192 mm) in height shall be constructed of noncombustible materials with a fireresistance rating of not less than one hour. When the building is more than seven stories or 85 feet (25908 mm) in height, such roofs shall afford the same fireresistance rating required for the exterior walls of the building, but need not exceed one and one half hour fireresistance rating.

**1426.6.2 Low slope roofs:** When the pitch is 60 degrees (1.05 rad) or less to the horizontal, the mansard or other sloping roof located on any building may be constructed of the same materials as required for the roof of the building.

**1426.7 Dormers:** The sides and roofs of dormers shall be of the same type of construction as the main roof, except that where a side of the dormer is merely a vertical extension of an exterior wall it shall be subject to the same fireresistance rating requirements as apply to the wall of the building. The roofs of dormers shall be protected with approved roof coverings complying with Section 1427.0. The sides of dormers shall be protected with approved roof coverings or with material permitted for covering the exterior walls of the building.

**1426.8 Water tanks:** Water tanks shall be constructed and installed in accordance with Sections 1426.8.1 through 1426.8.5.

**1426.8.1 Supports:** Water tanks having a capacity of more than 500 gallons (1.90 $m^3$) placed in or on a building shall be supported on masonry, reinforced concrete, steel or other approved noncombustible framing or on timber conforming to Type 3A construction; provided that, when such supports are located in the building above the lowest story, they shall be fireresistance rated as required for Type 1A construction.

**1426.8.2 Emergency discharge:** A pipe or outlet shall be located in the bottom or in the side close to the bottom, or the tank shall be fitted with a quick opening valve, to enable the contents to be discharged in an emergency to a suitable drain complying with the plumbing code listed in Appendix A.

**1426.8.3 Location:** A tank shall not be located over or near a stairway or elevator shaft unless a solid roof or floor deck is constructed underneath the tank.

**1426.8.4 Tank cover:** All roof tanks exposed to the weather shall have approved covers sloping towards the outer edges.

**1426.8.5 Hoop and strap protection:** When metal hoops are used in the construction of wood tanks, they shall be protected with approved corrosion resistive coatings or manufactured from approved corrosion resistive alloys.

**1426.9 Cooling towers:** Cooling towers shall be constructed and installed in accordance with Section 1426.9.1 and 1426.9.2.

**1426.9.1 Located in fire limits:** Within the fire limits, cooling towers erected on the roofs of buildings shall be constructed of noncombustible materials, except that drip bars may be of wood. Cooling towers may be constructed entirely of fire-retardant treated wood, including drip bars.

**1426.9.2 Located outside fire limits:** Outside the fire limits, cooling towers may be constructed of wood or other approved materials of similar combustible characteristics; except that when the base of the tower is more than 55 feet (16764 mm) above grade and the tower is located on a building, the drip bars only may be fabricated of combustible materials as herein provided.

**1426.10 Miscellaneous roof structures:** Except as herein specifically provided, all towers, spires, dormers or cupolas shall be erected of the type of construction and fireresistance rating required for the building to which they are accessory as regulated by Tables 401 and 505. When the height of such appurtenant structures exceeds 85 feet (25908 mm) above grade or when the area at any horizontal section of the tower, spire, dormer or cupola exceeds 200 square feet (18.6 $m^2$), or when it is used for any purpose other than as a belfry or architectural embellishment, the structure and its supports shall be of Type 1 or 2 construction, or of fire-retardant treated wood complying with Section 1403.5. Radio and television towers and antennae shall be constructed to comply with Sections 625.0 and 626.0.

## SECTION 1427.0 ROOF COVERINGS

**1427.1 Classification:** Roof covering materials shall be classified in accordance with Section 1427.3 when tested in accordance with ASTM E108 listed in Appendix A.

**1427.2 Existing roofs:** The repair of existing roofs shall comply with the provisions of Article 1, but more than 25 percent of the roof covering of any building shall not be replaced in a period of 12 months unless the entire roof covering is made to conform to the requirements for new roofing.

**1427.3 Classification of use:** Roof coverings shall be classified according to Sections 1427.3.1 through 1427.3.4.

**1427.3.1 Class A roof coverings:** Class A roof coverings are those which are effective against severe fire test exposure. Class A roof coverings shall include the following: masonry, concrete, slate, tile, cement asbestos or assemblies listed and identifed as Class A by an approved testing agency. Class A roof coverings shall be permitted for use in buildings and structures of all types of construction.

**1427.3.2 Class B roof coverings:** Class B roof coverings are those which are effective against moderate fire test exposure. Class B roof coverings shall include metal sheets and shingles or assemblies listed and identified as Class B by an approved testing agency. Class B roof coverings shall be permitted as the minimum for use in buildings and structures of Type 1 construction.

**1427.3.3 Class C roof coverings:** Class C roof coverings are those which are effective against light fire test exposure. Class C roof coverings shall include assemblies listed and identified as Class C by an approved testing agency. Class C roof coverings shall be permitted as the minimum for use in buildings and structures of Types 2, 3 and 4A construction.

**1427.3.4 Nonclassified roof coverings:** Nonclassified roof coverings shall be permitted on the buildings and structures indicated in Sections 1427.3.4.1 through 1427.3.4.3. Fire walls may be used to obtain the required fire separation.

**1427.3.4.1 Type 4B construction:** Buildings and structures of Type 4B construction when the distance from any other building is not less than 12 feet (3658 mm).

**1427.3.4.2 Accessory structures:** Private garages, airplane hangars and similar accessory structures, not exceeding one story or 20 feet (6096 mm) in height and 2,500 square feet (232.5 $m^2$) in area, when outside the fire limits, located on the same lot with a dwelling and with a fire separation of not less than 12 feet (3658 mm).

**1427.3.4.3 Use Groups S-1 and S-2:** Buildings of use Group S-1 and S-2 not exceeding one story or 20 feet (6096 mm) in height and 6,000 square feet (558 $m^2$) in area with a fire separation of not less than 12 feet (3658 mm).

**1427.4 Roof insulation:** The use of cork, fiber board and other combustible roof insulation shall be permitted, provided it is covered with approved roof coverings directly applied thereto (see Section 1319.3.5).

**1427.5 Grounding of metal roofs:** Whenever, because of hazard resulting from electrical equipment or apparatus located thereon, or because of proximity to power lines, or for any other reason, it is deemed necessary by the building official, metal roofs shall be grounded by bonding together each course or strip. The bonding conductor or conductors shall be extended to and attached in an approved manner to the grounding electrode used to ground the electrical system within the building on which such metal roofing is applied. The conductors used to bond courses or strips of metal roofing together, or any conductor extended for grounding to the grounding electrode, shall not have greater resistance than the conductor used to ground the electrical system within the building.

**1427.5.1 Alternative methods of grounding metal roofing:** Alternative methods of grounding metal roofing may be used, provided they are at least equal in performance to the methods described herein, and provided further that such desired method is first submitted to and approved by the building official.

# ARTICLE 15

## CHIMNEYS, FLUES AND VENT PIPES

### SECTION 1500.0 GENERAL

**1500.1 Scope:** The provisions of this article shall control the design, installation, maintenance, repair and approval of all chimneys, vents and connectors hereafter erected or altered in all buildings and structures.

**1500.2 Other standards:** Unless otherwise specifically provided herein, conformity to the applicable requirements for chimney construction and vents contained in the mechanical code listed in Appendix A shall be deemed to meet the requirements of this code.

**1500.3 Minor repairs:** Minor repairs for the purpose of maintenance and upkeep which do not increase the capacity of the heating apparatus or appliances, or which do not involve structural changes in the permanent chimney and vents of a building, may be made without a permit.

### SECTION 1501.0 PLANS AND SPECIFICATIONS

**1501.1 General:** The structural plans and specifications shall describe in sufficient detail the location, size and construction of all chimneys, vents and ducts and their connections to boilers, furnaces, appliances and fireplaces. The thickness and character of all insulation materials, clearances from walls, partitions and ceilings and proximity of heating devices and equipment to wall openings and exits shall be clearly shown and described.

### SECTION 1502.0 PERFORMANCE TEST AND ACCEPTANCE CRITERIA

**1502.1 Tests:** The building official may require a test or tests of any chimney or vent to insure fire safety and the removal of smoke and products of combustion.

**1502.2 Acceptance criteria:** The system shall be accepted if the requirements of Sections 1502.2.1 through 1502.2.4 are met.

**1502.2.1 Spillage:** There shall not be spillage at the draft hood when any one or combination of appliances connected to the system is in operation.

**1502.2.2 Temperatures:** The temperature on adjacent combustible surfaces

shall not be raised more than the limits determined by approved testing or inspection agencies.

**1502.2.3 Condensation:** Condensation shall not be developed in a way that would cause deterioration of the vent or chimney or drip from joints or bottom end of the vent or chimney.

**1502.2.4 Draft reading:** The draft reading taken at the place recommended in the installation instructions shall be within the range specified by the appliance manufacturer.

**1502.3 Approved installations:** Factory built chimneys and gas vents which have been tested and labeled by an approved testing or inspection agency shall be accepted as complying with the requirements of Section 1502.2.2 when installed in accordance with the clearances specified in the manufacturer's instructions.

## SECTION 1503.0 CHIMNEYS

**1503.1 Classification:** Chimneys as used in this article shall be classified as factory built chimneys, masonry chimneys and metal chimneys (smokestacks).

## SECTION 1504.0 APPLIANCES REQUIRING CHIMNEYS

**1504.1 General:** All heating appliances, except those appliances specifically exempted by the provisions of Section 1506.3, shall be connected to chimneys as specified in the chimney selection chart contained in the mechanical code listed in Appendix A.

## SECTION 1505.0 EXISTING BUILDINGS

**1505.1 Raising existing chimneys:** Whenever a building is hereafter erected, enlarged or increased in height so that a wall along an interior lot line, or within 3 feet (914 mm) thereof, extends above the top of an existing chimney or vent of an adjoining existing building, the owner of the building so erected, enlarged or increased in height shall carry up at his own expense, with the consent of the adjoining property owner, all chimneys connected to fuel burning appliances. Vents within 6 feet (1829 mm) of any portion of the wall of such adjoining building shall be extended 2 feet (610 mm) above the roof or parapet of the adjoining building.

**1505.2 Size of extended chimneys:** The construction of an extended chimney shall conform to the requirements of this article for new chimneys, but the internal area of such extension shall not be less than that of the existing chimney.

**1505.3 Notice to adjoining owner:** It shall be the duty of the owner of the building which is erected, enlarged or increased in height to notify in writing and to secure the consent of the owner of existing chimneys affected at least ten days before starting such work.

**1505.4 Existing chimneys:** An existing chimney, except one which does not

endanger the fire safety of a building or structure and is acceptable to the building official, shall not be continued in use unless it conforms to all requirements of this article for new chimneys.

**1505.5 Cleanouts and maintenance:** Whenever a new chimney is completed or an existing chimney is altered, it shall be cleaned and left smooth on the inside. If the chimney is constructed of masonry or tile, the interior mortar joints must be left smooth and flush. Cleanouts or other approved devices shall be provided at the base of all chimneys to enable the passageways to be maintained and cleaned.

## SECTION 1506.0 VENT SYSTEMS

**1506.1 Labeled appliances:** For the purpose of determining vent requirements, gas fired and oil fired appliances shall be classified as "labeled" or "unlabeled". A labeled appliance is one that is shown in a list published by an approved testing agency, qualified and equipped for testing of such appliances and maintaining an adequate periodic inspection of current production of labeled models and whose label states either that the appliance or accessory complies with nationally recognized safety requirements or that it has been tested and found safe for use in a specific manner. Compliance may be determined by the presence on the appliance or accessory of a label of the testing agency stating that the appliance or accessory complies with nationally recognized safety requirements.

An unlabeled appliance or accessory is one that is not shown on such a list or does not bear such a label. In cases where an applicable standard has not been developed for a given class of appliance or accessory, approval of the authority having jurisdiction shall be obtained before the appliance or accessory is installed.

**1506.2 Appliances required to be vented:** Appliances shall be connected to a labeled venting system or provided with other means for exhausting the flue gases to the outside atmosphere in accordance with the venting system selection chart contained in the mechanical code listed in Appendix A.

**1506.3 Exemption:** Connections to vent systems shall not be required for appliances of such size or character that the absence of such connection does not constitute a hazard to the fire safety of the building or its occupants. The following appliances are not required to be vented unless so required by their listing:

1. Labeled gas ranges;
2. Built in domestic cooking units labeled as unvented units;
3. Labeled hot plates and labeled laundry stoves;
4. Labeled domestic clothes dryers;
5. Labeled gas refrigerators;
6. Counter appliances;
7. Space (room) heaters labeled for unvented use, only upon prior approval by the building official;

8. Specialized equipment of limited input such as laboratory burners or gas lights; and
9. Electric appliances.

When any or all of the appliances listed in items 5, 6 and 7 above are installed so that the aggregate input rating exceeds 30 Btu per hour per cubic foot (314 W/ $m^3$) of room or space in which they are installed, one or more of them shall be vent connected or provided with approved means for exhausting the vent gases to the outside atmosphere so that the aggregate input rating of the remaining unvented appliance does not exceed 30 Btu per hour per cubic foot (314 W/ $m^3$) of room or space in which they are installed. Where the room or space in which they are installed is directly connected to another room or space by a doorway, arch, or other opening of comparable size which cannot be closed, the volume of such adjacent room or space may be included in the calculations.

## SECTION 1507.0 FIREPLACES

**1507.1 General:** Fireplaces, woodburning stoves, barbecues, and smoke chambers and chimneys for fireplaces and woodburning stoves shall be of solid masonry or reinforced concrete or other approved materials, and shall conform to requirements of this section.

**1507.2 Construction:** Structural walls of fireplaces shall be at least 8 inches (203 mm) thick. Where a lining of low duty refractory brick (ASTM C64) or the equivalent, at least 2 inches (51 mm) thick laid in fire clay mortar (ASTM C105, medium duty) or the equivalent, or other approved lining is provided, the thickness of back and sides including the lining shall be not less than 8 inches (203 mm). Where such lining is not provided, the thickness of back and sides shall be not less than 12 inches (305 mm). The firebox shall be 20 inches (508 mm) in depth and will be permitted to be open on all sides, provided all fireplace openings are located entirely within one room.

**1507.3 Lining:** The lining shall extend from the throat of the fireplace to a point at least 4 inches (102 mm) above the top of the enclosing masonry walls.

**1507.4 Clearance:** Clearances shall be provided in accordance with Sections 1507.4.1 and 1507.4.2.

**1507.4.1 Distance:** The distance between fireplace and combustibles shall be at least 4 inches (102 mm), and such combustibles shall not be placed within 6 inches (152 mm) of the fireplace opening. Wood facings or trim normally placed around the fireplace opening may be permitted when conforming to the requirements of this section, but such facing or trim shall be furred out from the fireplace wall at least 4 inches (102 mm) and attached to noncombustible furring strips. The edges of such facings or trim shall be covered with a noncombustible material. Where the walls of the fireplace are 12 inches (305 mm) thick, the facings or trim may be directly attached to the fireplace.

**1507.4.2 Metal hoods:** Metal hoods used as part of a fireplace or barbecue shall be at least 18 inches (457 mm) from combustible material unless approved for reduced clearances.

**1507.5 Metal:** Metal hoods used as a part of a fireplace or barbecue shall be at least No. 18 B&S Gage (0.0403 inch) sheet copper, No. 18 Galvanized Sheet Gage (0.052 in.) galvanized steel, or other equivalent corrosion resistant ferrous metal with all seams and connections of smokeproof unsoldered construction. The hoods shall be sloped at an angle of 45 degrees (0.79 rad) or less from the vertical, and shall extend horizontally at least 6 inches (152 mm) beyond the limits of the firebox.

**1507.6 Metal heat circulators:** Approved metal heat circulators may be installed in fireplaces, provided the thickness of the fireplace wall is not reduced.

**1507.7 Smoke chamber:** All walls, including back walls, shall be at least 8 inches (203 mm) in thickness.

**1507.8 Areas of flues, throats and dampers:** The net cross sectional area of the flue and of the throat between the firebox and the smoke chamber of a fireplace shall be at least that required in the mechanical code listed in Appendix A. All fireplaces shall be equipped with a damper of not less than No. 12 Manufacturer's Standard Gage (0.105 inch) metal. Damper openings shall be at least, when fully opened, equal to the required flue area. Other methods which will provide equal air flow shutoff may be provided subject to the approval of the building official.

**1507.9 Lintel:** Masonry over the fireplace opening shall be supported by a noncombustible lintel.

**1507.10 Hearth:** Every fireplace shall be constructed with a hearth of brick, stone, tile or other noncombustible material. For fireplaces with an opening of less than 6 square feet (0.56 $m^2$), the hearth shall extend not less than 16 inches (406 mm) in front and not less than 8 inches (203 mm) on each side of the fireplace opening. For fireplaces with an opening of 6 square feet (0.56 $m^2$) or more, the hearth shall extend not less than 20 inches (508 mm) in front and not less than 12 inches (305 mm) on each side of the fireplace opening. Such hearths shall be supported on trimmer arches of brick, stone, tile or concrete not less than 4 inches (102 mm) thick or other equally strong and fireresistance rated materials. All combustible forms or centering shall be removed after completion of the supporting construction.

**1507.11 Firestopping:** Firestopping between chimneys and combustible construction shall meet the requirements specified in Section 1420.0 and the mechanical code listed in Appendix A.

**1507.12 Support:** Fireplaces shall be supported on foundations designed in conformity with Section 1006.0.

**1507.13 Screens:** Screens or other approved protection devices shall be provided for all fireplace openings.

**1507.14 Other type fireplaces:** Other fireplaces not conforming to the requirements of this section shall be subject to approval by the building official prior to installation. Imitation fireplaces shall not be used for the

burning of gas, solid or liquid fuel. Approved factory built fireplaces may be installed and shall conform to the applicable portions of this code. Factory built fireplaces shall bear the label of an approved testing or inspection agency.

**1507.14.1 Woodburning stoves:** Woodburning stoves which have been tested in accordance with UL 1482 listed in Appendix A shall be approved for use. The approval of other woodburning stoves shall be based on approved research and testing reports submitted to the building official, demonstrating the performance of the unit and the installation conditions necessary to insure safe and adequate performance. Woodburning stoves shall be installed in accordance with required clearances from combustible materials and in accordance with applicable provisions of this code.

**1507.15 Solid wastes:** Solid waste shall not be burned in a fireplace or in a woodburning stove.

## SECTION 1508.0 INCINERATORS

**1508.1 Mechanical code:** Incinerators of all types shall be installed in accordance with the applicable provisions of the mechanical code listed in Appendix A.

## SECTION 1509.0 CONSTRUCTION OF METAL DUCTS AND VENTS

**1509.1 Mechanical code:** All metal vents, ducts and duct systems required under the provisions of this article for heating systems and equipment, and under the provisions of Article 7 for ventilating and air conditioning systems, shall be constructed and installed in accordance with the requirements of the mechanical code listed in Appendix A.

## SECTION 1510.0 SPARK ARRESTORS

**1510.1 Mechanical code:** All chimneys, stacks and flues, including incinerator stacks, which emit sparks shall be provided with a spark arrestor conforming to the requirements of the mechanical code listed in Appendix A.

# ARTICLE 16

## MECHANICAL EQUIPMENT AND SYSTEMS

### SECTION 1600.0 GENERAL

**1600.1 Scope:** The provisions of this article shall control the construction, inspection and maintenance of all mechanical equipment and systems in respect to structural strength, fire safety and operation.

**1600.2 Boilers:** All boilers and associated pressure piping shall meet the standards for construction, installation and inspection as set forth in Chapter 15 of Title 815 of the Kentucky Administrative Regulations.

**1600.3 Unfired pressure vessels:** All unfired pressure vessels shall meet the standards set forth in Section VIII of the 1977 Edition of the ASME Boiler and Pressure Vessel Code, ANSI/ASME PBV-VIII-I.

**1600.4 Mechanical code:** All mechanical equipment and systems not covered by Section 1600.2 or 1600.3 but which are required by other provisions of this code to be installed in accordance with the mechanical code listed in Appendix A, shall be constructed, installed and maintained in conformity with the *BOCA Basic Mechanical Code*/1981 including all applicable standards listed within Appendices A and B.

### SECTION 1601.0 PLANS AND SPECIFICATIONS

**1601.1 General:** Plans and specifications for the installation, repair, extension or removal of any mechanical equipment or system shall be submitted in accordance with the mechanical code listed in Appendix A, and a permit shall be secured prior to the commencement of any work.

**1601.2 Matter covered:** The plans and specifications shall show in sufficient detail all pertinent features and clearances of the appliances and systems, including: size and type of apparatus; construction of flue, stack or chimney; stack connections; type of fuel; method of operation; and the method of compliance with all regulations for the class and type of equipment installed.

**1601.3 Details:** An application for permit shall be accompanied by specifications and diagrammatic mechanical drawings in sufficient detail, complying with the provisions of the mechanical code listed in Appendix A, before a permit shall be issued for the mechanical equipment and system. The plans

shall be drawn to a scale of not less than ⅛ inch to the foot (10 mm/ m), and shall show the location and arrangement of all equipment and distribution elements including safeties and pressure controlling devices.

## SECTION 1602.0 INSPECTIONS AND TESTS

**1602.1 Inspection:** All mechanical equipment and systems requiring a permit shall be inspected in accordance with the mechanical code listed in Appendix A and shall not be placed in operation until having been tested and approved.

**1602.2 Concealment:** It shall be unlawful for owners, contractors or workers to lath over or in any way to conceal any piping, outlet boxes or other parts of the mechanical equipment or system requiring a permit until an inspection has been made thereof and due notice given that the work has been approved.

**1602.3 Defects and repairs:** Upon inspection or reinspection of a mechanical system, any defects or deficiencies which require repair to insure safe operation shall be rectified before the system is placed in use.

**1602.4 Power of condemnation:** When a system or any part thereof is found unsafe to life or property, it shall be condemned and such system shall not be restored to use until it has been made safe and approved.

## SECTION 1603.0 EXISTING BUILDINGS

**1603.1 Unsafe orders:** All existing mechanical equipment and systems shall be maintained and operated in accordance with the requirements of this code and the mechanical code listed in Appendix A. Any such equipment which does not comply with the requirements, and the operation of which is deemed unsafe to the building occupants, shall be altered as ordered by the building official to secure adequate safety.

## SECTION 1604.0 FEES

**1604.1 General:** A permit to begin work for new construction or alteration shall not be issued until the prescribed application and permit fees have been paid, nor shall an amendment to a permit necessitating an additional fee because of the additional work involved be issued until the additional fee shall have been paid.

## SECTION 1605.0 BOILER ROOMS

**1605.1 Boiler room:** Every boiler or combination boiler and cooling unit shall be installed in a space which allows a minimum clearance of 24 inches (610 mm) on all service sides. Where oil fired equipment is used, a 6 inch (152 mm) noncombustible sill (dike) shall be provided. Such room shall be constructed of at least one hour fireresistance rated construction, with opening protectives as required by Section 1415.0. The number of egress facilities shall conform to Section 812.2. Combustion air shall be provided to such room in conformance with the mechanical code listed in Appendix A. Storage or living

quarters shall not be permitted in any boiler or similar heating equipment room.

**Exception:** Buildings of Use Group R-3, except for combustion air requirements as set forth in the mechanical code listed in Appendix A.

**1605.2 Boiler room location:** Boiler rooms shall not be located immediately below exits; nor shall any space heater, floor furnace or other similar equipment be located in any aisle or passageway used as an element of a required means of egress from the building or structure.

## SECTION 1606.0 DRYING ROOMS

**1606.1 General:** A drying room or dry kiln installed within a building shall be constructed entirely of approved noncombustible materials or assemblies of such materials with the required fireresistance rating based on the fire hazard of the contents and the process, as regulated by the approved rules or as required in Article 6 for special uses.

**1606.2 Piping clearance:** All overhead heating pipes shall have a clearance of not less than 2 inches (51 mm) from combustible contents of the dryer.

**1606.3 Insulation:** When the operating temperature of the dryer is 175 degrees F. (79 degrees C.) or more, metal enclosures shall be insulated from adjacent combustible materials by not less than 12 inches (305 mm) of air space, or the metal walls shall be lined with ¼ inch asbestos mill board or other approved equal insulation.

**1606.4 Fire protection:** Drying rooms designed for high hazard materials and processes, including dry cleaning and other special uses provided for in Article 6, shall be protected by an approved fire suppression system conforming to the provisions of Article 17.

## SECTION 1607.0 REFUSE CHUTES

**1607.1 Chute discharge:** A refuse chute shall not feed directly to the combustion chamber of an incinerator, but shall discharge into an enclosed room or bin separated from the incinerator room by ceiling and walls of not less than two hour fireresistance rating, unless otherwise approved by the building official.

**1607.2 Chute enclosures:** Refuse chutes shall be enclosed with walls of masonry of not less than two hour fireresistance rating for interior chutes and of Type 2 construction for exterior chutes. All chutes shall be supported on substantial foundations complying with Article 10.

**1607.3 Chute height:** An interior refuse chute shall extend not less than 4 feet (1219 mm) above the roof and shall be covered with an approved ventilating skylight complying with Section 1426.0.

**1607.4 Service compartments:** Service openings for chutes shall be located in separate rooms or compartments enclosed in walls, partitions, floors and

ceilings which have a fireresistance rating of not less than one hour and in which the openings are equipped with fire doors or other approved protectives of not less than three quarter hour fireresistance rating or their approved labeled equivalent.

**1607.5 Opening protectives:** All openings between refuse rooms, chutes and incinerator rooms shall be protected with one and one half hour fire doors or their approved labeled equivalent complying with Article 14.

## SECTION 1608.0 REFUSE VAULTS

**1608.1 Refuse vault enclosures:** A vault for receiving combustible refuse from an exhaust system shall be constructed of not less than three hour fireresistance rated assemblies.

**1608.2 Openings to boiler rooms:** The opening between a vault and a boiler room shall not exceed 9 square feet (0.84 $m^2$) in area and shall be located at least 8 feet (2438 mm) from the firing door of the boiler, and the bottom of the opening shall be not less than 6 inches (152 mm) above the boiler room floor. All openings shall be equipped with approved automatic fire doors of not less than one and one half hour fireresistance rating or the approved labeled equivalent complying with Article 14.

**1608.3 Location:** When located within a building, a refuse vault shall extend above the roof or shall be directly vented to the outer air with ducts complying with Section 1509.0.

**1608.4 Fire protection:** A vault for combustible refuse which exceeds 360 cubic feet (10.1 $m^3$) in volume shall be protected by an approved automatic fire suppression system conforming to Article 17.

## SECTION 1609.0 DUST, STOCK AND REFUSE CONVEYOR SYSTEMS

**1609.1 Power transmission:** Power for fans located in rooms from which flammable dust is being removed shall be transmitted by means of a shaft passing through a bushed hole, or by a belt, chain or similar driving mechanism which is encased in a metal or other noncombustible dust tight enclosure, both within and without the room.

**1609.2 Collectors and separators:** Cyclone collectors and separators and their supports shall be constructed of noncombustible materials and shall be located whenever possible on the exterior of the building or structure. A collector or separator shall not be located nearer than 10 feet (3048 mm) to combustible construction or to an unprotected wall or floor opening, unless the collector is provided with a metal vent pipe which extends above the highest part of any roof within a distance of 30 feet (9144 mm).

**1609.3 Discharge pipes:** Discharge pipes shall conform to all the requirements for ducts, including clearances required for high heat appliances, as contained in the mechanical code listed in Appendix A. A delivery pipe from a cyclone collector shall not convey refuse directly into the firebox of a boiler, furnace, Dutch oven, refuse burner, incinerator or other appliance.

**1609.4 Vents for exhaust conveyor systems:** An exhaust system shall be vented to the outside of the building either directly by flue, or indirectly through the separator, bin, or vault into which it discharges.

**1609.5 Spark protection:** The outlet of an open air vent shall be protected with an approved metal or other noncombustible screen or by other equally efficient means to prevent the entry of sparks.

**1609.6 Explosion relief vents:** A safety or explosion relief vent shall be provided on all systems which convey combustible refuse or stock of an explosive nature, in accordance with the requirements of Article 6.

**1609.6.1 Screens:** When a screen is used in a safety relief vent, it shall be so attached as to permit ready release under emergency pressure.

**1609.6.2 Hoods:** The relief vent shall be provided with an approved noncombustible cowl or hood, or with a counterbalanced relief valve or cover arranged to prevent the escape of hazardous materials, gases or liquids.

# ARTICLE 17

## FIRE PROTECTION SYSTEMS

### SECTION 1700.0 GENERAL

**1700.1 Scope:** The provisions of this article shall specify where fire protection systems are required in all buildings or structures or parts thereof.

**1700.2 Installation requirements:** The installation methods, repair, operation and maintenance of fire protection systems shall be in accordance with this code and the fire prevention code listed in Appendix A.

**1700.3 Maintenance:** The owner, tenant or lessee of every building or structure shall be responsible for the care and maintenance of all fire protection systems, including equipment and devices, to insure the safety and welfare of the occupants. Fire protection systems shall not be disconnected or otherwise rendered unserviceable without first notifying the fire department. When installations of required fire protection systems are interrupted for repairs or other necessary reasons, the owner, tenant or lessee shall immediately advise the fire department and shall diligently prosecute the restoration of the protection.

**1700.4 Threads:** All threads provided for fire department connections to sprinkler systems, standpipe systems, yard hydrants or any other fire hose connections shall be uniform to those used by the local fire department.

**1700.5 Signs:** If fire suppression control valves are located in a separate room, or building, a sign shall be provided on the entrance door. The lettering for such sign shall be of a conspicuous color and shall be at least 4 inches (102 mm) in height, and shall read *Sprinkler Control Valves* or *Standpipe Control Valves* or indicate other types of systems (see Section 1713.8 for additional signs).

**1700.6 Tests:** Where required by this article and the standards referenced herein, all flow test connections and points of fluid discharge shall be reasonably accessible and acceptable to the administrative authority.

### SECTION 1701.0 PLANS AND SPECIFICATIONS

**1701.1 Required:** Plans shall be submitted to indicate conformance with this code and shall be reviewed by the department prior to issuance of the permit.

**Note:** Since the fire department is responsible for inspection for the proper maintenance of fire protection systems in buildings, the administrative authority shall cooperate with the fire department in the discharging of responsiblity to enforce this article.

**1701.2 Plans:** The plans and specifications submitted to the department shall contain sufficient detail to evaluate the hazard and the effectiveness of the system. The details on the hazards shall include materials involved, the location and arrangement, and the exposure to the hazard.

**1701.3 Calculations:** The details on the fire protection system shall include the design considerations, calculations and other information as required by this code.

## SECTION 1702.0 FIRE SUPPRESSION SYSTEMS

**1702.1 Where required:** Fire suppression systems shall be installed and maintained in full operating condition, as specified in this code, in the following locations indicated in Sections 1702.2 through 1702.18.

**Exception:** Buildings of Use Group R-3.

**1702.2 Use Group A-1:** In all buildings or portions thereof of Use Group A-1.

**Exception:** Auditoriums, foyers, lobbies, and toilet rooms.

**1702.3 Use Group A-2:** In all buildings or structures or portions thereof of Use Group A-2:

1. When more than 5,000 square feet (465 $m^2$) in area; or
2. When more than one story in height.

**1702.4 Use Group A-3:** In all buildings or structures or portions thereof of Use Group A-3 when more than 12,000 square feet (1116 $m^2$) in area.

**1702.5 Stages in Use Group A:** Stages of any size, in buildings of Use Group A in the following locations:

1. Over the stage;
2. Under the stage gridiron with side wall sprinkler heads rated at 135 degrees F. (57.22 degrees C.) having heat baffle plates. The heads shall be installed around the entire perimeter of the stage except above the proscenium opening, at points not more than 30 inches (762 mm) below the gridiron, nor more than 6 inches (152 mm) below the baffle plate;
3. Under all fly galleries;
4. Under the stage;
5. In all basements, cellars, workrooms, dressing rooms, store rooms and property rooms; and
6. In toilet, lounge and smoking rooms.

**1702.6 Use Group H:** In all buildings or structures or portions thereof of Use Group H.

**1702.7 Use Group I:** In all buildings or structures or portions thereof of Use Group I.

**Exceptions**

1. One story hospitals with patient rooms having direct egress to grade level at the exterior of the building.
2. In hospitals of Types 1, 2A or 2B construction, the automatic fire suppression system may be omitted from operating, X-ray rooms, delivery rooms, cardiac and intensive care rooms and patient sleeping rooms not exceeding 450 square feet (41.85 $m^2$) in area when each such room is protected by an automatic fire alarm system connected to a continuously attended station within the building.
3. One story day nurseries housing 100 children or less with each room having an exit directly to the outside.
4. Buildings of Use Group I-1 having an occupant load of less than six.
5. In buildings of Use Group I-1, the piping system may be dry provided a manually or automatically operated valve is installed at a continuously monitored location.

**1702.8 Use Groups M, S-1 and F:** In all buildings or structures of Use Groups M, S-1 and F:

1. When more than 12,000 square feet (1116 $m^2$) in area; or
2. When more than 24,000 square feet (2232 $m^2$) in total area on all floors; or
3. When more than three stories in height.

**1702.9 Public garages:** In all public garages:

1. When more than 10,000 square feet (930 $m^2$) in area.
2. When more than 7,500 square feet (697.5 $m^2$) in area and more than one story in height.
3. When more than 5,000 square feet (465 $m^2$) in area and more than two stories in height.
4. When more than three stories in height.
5. When located in buildings where the upper stories are designed for other uses.
6. When located in any story that is more than 50 percent below grade.

**Exception:** Open parking structures.

**1702.10 Bus garages:** In all bus garages:

1. When required by Section 1702.9.
2. When used as passenger terminals for four or more buses.
3. When used for storage or loading of four or more buses.

**1702.11 Unlimited area buildings:** In unlimited area buildings as required by Section 507.0.

**Exception:** Special industrial uses as indicated in Section 304.3.

**1702.12 Storage and workshop areas:** In all portions of Use Groups A, B, I, R-1 and R-2 occupied for storage, workshop or similar purposes.

**Exceptions**

1. Individual storage or workshop area located entirely within a dwelling unit.

2. Storage and workshop rooms less than 50 square feet (4.65 $m^2$) in area.

**1702.13 Windowless story:** In every story, cellar or basement of all buildings where there is not provided at least 20 square feet (1.86 $m^2$) of opening entirely above the adjoining ground level in each 50 lineal feet (15240 mm) or fraction thereof of exterior wall in the story, cellar or basement, on at least one side of the building. Openings shall have a minimum dimensions of not less than 22 inches (559 mm). Such openings shall be accessible to the fire department from the exterior and shall be unobstructed to allow firefighting and rescue operations from the exterior.

When openings in a story are provided on only one side and the opposite wall of such story is more than 75 feet (22860 mm) from such openings, the story shall be provided with an approved automatic fire suppression system, or openings as specified above shall be provided on at least two sides of the exterior walls of the story. If any portion of a basement or cellar is located more than 75 feet (22860 mm) from openings required in this section, the basement or cellar shall be provided with an approved automatic fire suppression system.

**1702.14 Painting rooms:** In spray painting rooms or shops where painting, brushing, dipping or mixing is regularly conducted using flammable materials.

**1702.15 Trash rooms and chutes:** In rooms or areas used for incineration, trash and laundry collection or similar uses; and at alternate floor levels and at the top of all chutes used in conjunction with these rooms or area.

**1702.16 Furnace rooms:** In furnace rooms, boiler rooms and rooms for similar uses.

**Exception:** Such room located entirely within and serving a single dwelling unit.

**1702.17 Unenclosed vertical openings:** In unenclosed vertical openings between floors as required by Sections 631.3 and 816.10.

**1702.18 Range hoods:** In range hoods, except domestic range hoods not used for commercial purposes, in accordance with the following requirements listed in Sections 1702.18.1 through 1702.18.7.

**1702.18.1 System operation:** When the fire suppression system is activated, all gas and electrical sources serving cooking appliances, grease consuming appliances or fume incinerators and equipment associated with the hoods shall be automatically deactivated. Such gas and electrical sources shall not be capable of reactivation except by manual means after the fire suppression system has been serviced and is again ready for actuation.

**1702.18.2 Actuation:** Hood and duct suppression (extinguishing) systems shall provide for both automatic and manual actuation of the system.

**Exception:** Automatic sprinkler systems need not be provided with means for manual actuation.

**1702.18.3 Manual station location:** A manual station for actuation of the suppression (extinguishing) system shall be located at or near one of the

means of egress from the area but not nearer than 10 feet (3048 mm) to the range hood unless otherwise specifically approved, and shall be securely mounted not less than 4½ feet (1372 mm) nor more than 5 feet (1524 mm) above the floor.

**1702.18.4 Maintenance:** The system shall be maintained at full operating capacity by the owner or tenant and shall be serviced every six months.

**1702.18.5 Nozzle accessibility:** All nozzles shall be accessible for cleaning and replacement.

**1702.18.6 $CO_2$ system installation:** $CO_2$ (carbon dioxide) suppression (extinguishing) systems shall be installed in accordance with this section and Section 1708.6.

**1702.18.7 Dry chemical system installation:** Dry chemical (approved dry chemical extinguishing media) suppression systems shall be installed in accordance with this section and Section 1710.6.

**1702.19 Alternate protection:** In special use areas of buildings or structures, an automatic fire alarm system may be installed in lieu of a fire suppression system when approved by the building official and fire department, and when such fire suppression system installation would be detrimental or dangerous to the specific use or occupancy.

**1702.19.1 Telephone central office equipment buildings:** Within telephone central office equipment buildings, the automatic fire suppression system may be omitted in the following rooms or areas when such rooms or areas are protected with an approved automatic fire alarm system.

1. Generator and transformer rooms.
2. Communication equipment areas when such areas are separated from the remainder of the building by one hour fireresistance rated wall and two hour fireresistance rated floor/ceiling assemblies, and are used exclusively for such equipment.

## SECTION 1703.0 SUPPRESSION SYSTEM SELECTION

**1703.1 General:** To guide the administrative authority with the selection of the proper type of fixed fire suppression system, the extinguishing agent for each type of hazard or fire may be classified as follows.

**Class A:** Fires involving ordinary combustible materials (such as wood, cloth, paper, rubber and many plastics) requiring the heat absorbing (cooling) effects of water, water solutions, or the coating effects of certain dry chemicals which retard combustion.

**Class B:** Fires involving flammable or combustible liquids, flammable gases, greases and similar materials where extinguishment is most readily secured by excluding air (oxygen), inhibiting the release of combustible vapors, or interrupting the combustion chain reaction.

**Class C:** Fires involving energized electrical equipment where safety to the operator requires the use of electrically nonconductive extinguishing agents.

**Note:** Electrical fires should not be fought with portable Class A or B extinguishers, or with hand held solid stream nozzle. However, fixed water spray systems may be used to fight fires in energized electrical systems.

**1703.2 Special hazards:** In rooms or buildings containing combustibles such as aluminum powder, calcium carbide, calcium phosphide, metallic sodium and potassium, quick lime, magnesium powder or sodium peroxide, which are incompatible with the use of water as an extinguishing agent, other extinguishing agents shall be used.

**1703.3 Types:** Where a fire suppression system is required in this code, Table 1703 may be used by the administrative authority to determine the type of suppression system suitable for the hazard involved, if not otherwise specified in this code.

**1703.4 Installation:** Fixed fire suppression systems shall be of an approved type designed and installed in accordance with the requirements of this code.

**1703.5 Tests:** All tests required by this code and the standards listed in this code shall be conducted at the expense of the owner or the owner's representative.

**Table 1703**
**GUIDE FOR SUPPRESSION SYSTEM SELECTION**

| Hazard | Water sprinklers or spray 1704.0 to 1706.0 | Foam 1707.0 | Carbon dioxide or halogenated 1708.0 to 1709.0 | Dry chemical 1710.0 |
|---|---|---|---|---|
| Class A fire potential | X | X | X | X |
| Class B fire potential | X | X | X | X |
| Class C fire potential | X | | X | |
| **SPECIAL FIRE HAZARD AREAS*** | | | | |
| Aircraft hangars | X | X | X | X |
| Alcohol storage | X | X | X | X |
| Ammunition loading | X | | | |
| Ammunition magazines | X | | | |
| Asphalt impregnating | X | X | | |
| Battery rooms | | | X | |
| Carburetor overhaul shops | X | X | X | X |
| Cleaning plant equipment | X | X | X | X |
| Computer rooms | X | | X | |
| Dowtherm | X | | | |
| Drying ovens | X | | X | X |
| Engine test cells | X | X | X | |
| Escalator, stair wells | X | | | |
| Explosives: manufacturing, storage | X | | | |
| Flammable liquids storage | X | X | X | |
| Flammable solids storage | X | | | |

* Within buildings or areas, so classified, as to require a supression system.

**Table 1703 (cont'd.)**
**GUIDE FOR SUPPRESSION SYSTEM SELECTION**

| Hazard | Water sprinklers or spray 1704.0 to 1706.0 | Foam 1707.0 | Carbon dioxide or halogenated 1708.0 to 1709.0 | Dry chemical 1710.0 |
|---|---|---|---|---|
| Fuel oil storage | X | X | | |
| Hangar decks | X | X | | |
| High piled storage in excess of 15 feet (4572 mm) in height | X | X | | |
| Hydraulic oil, lubricating oil | X | | X | |
| Hydroturbine generators | X | | X | |
| Jet engine test cells | X | X | X | |
| Library stacks | X | | X | |
| Lignite storage and handling | X | | | |
| Liquefied petroleum gas storage | X | | | |
| Oil quenching bath | X | X | X | X |
| Paints: manufacturing, storage | X | X | X | X |
| Paint spray booths | X | | X | X |
| Petrochemical storage | X | X | X | |
| Petroleum testing laboratories | X | X | X | |
| Printing presses | X | | X | |
| Rack and palletized storage in excess of 12 feet (3658 mm) in height | X | X | | |
| Range hoods | X | | X | X |
| Reactor and fractionating towers | X | | | |
| Record vaults | | | X | |
| Rubber mixing and heat treating | X | | | |
| Service stations (inside buildings) | X | | X | |
| Shipboard storage | X | | X | |
| Solvent cleaning tanks | | X | X | X |
| Solvent thinned coatings | | X | X | X |
| Switchgear rooms | | | X | |
| Transformers, circuit breakers (outdoors) | X | | | |
| Transformers, circuit breakers (indoors) | X | | X | |
| Turbine lubricating oil | X | X | X | X |
| Vegetable oil, solvent extraction | X | X | | |

## SECTION 1704.0 WATER SPRINKLER SYSTEMS

**1704.1 General:** Water sprinkler extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFiPA 13 listed in Appendix A.

**1704.2 Occupancy sprinkler system:** Within a building of mixed occupancies and where an occupancy is required by this code to be sprinklered with more than 20 sprinklers, the use group requiring sprinklers shall be separated from

other uses by fire separation walls and floor/ceiling assemblies having a fireresistance rating corresponding to the highest fire grading prescribed in Table 1402 for the separate uses and equipped with a complete sprinkler system.

**1704.3 Design:** The details on the system supplied with the plans and specifications shall include information and the calculations of the sprinkler spacing and arrangement with water supply and discharge requirements, size and equivalent lengths of pipe and fittings and water supply source. Sufficient information shall be included to identify the apparatus and devices used.

**1704.4 Actuation:** Water sprinkler extinguishing systems shall be automatically actuated unless otherwise specifically provided in this code.

**1704.5 Sprinkler alarms:** Approved audible or visual alarm devices shall be connected to every water sprinkler system and such alarm device shall be located in an approved location.

**Exception:** Alarms and alarm attachments shall not be required for limited area sprinkler systems (see Section 1705.5).

**1704.5.1 Additional alarms:** At least one additional audible or visual alarm device shall be installed within the building.

**1704.6 Water control valve tags:** Identification tags shall be provided in accordance with NFiPA 26 listed in Appendix A.

**1704.7 Sprinkler riser:** The sprinkler system riser(s) may also serve as the wet standpipe riser(s) in buildings required to have or having both systems (see Section 1711.4.1).

**1704.8 Tests:** A completed system shall be tested hydrostatically for two hours without visible leakage at not less than 200 psi (1379 kPa) or at 50 psi (345 kPa) in excess of the maximum static pressure when the maximum static pressure is in excess of 150 psi (1034 kPa).

## SECTION 1705.0 LIMITED AREA SPRINKLER SYSTEMS

**1705.1 General:** A limited area sprinkler system shall be of an approved type and installed in accordance with the provisions of this section.

**1705.2 Installation:** Where the provisions of this code require a limited number of sprinklers, a limited area sprinkler system may be installed to comply with these requirements.

**1705.3 Design:** The details on the system supplied with the plans and specifications shall include information and the calculations of the sprinkler spacing and arrangement with water supply and discharge requirements, size and equivalent lengths of pipe and fittings and water supply source. Sufficient information shall be included to identify the apparatus and devices used.

**1705.4 Actuation:** A limited area sprinkler system shall be automatically actuated.

**1705.5 Sprinkler alarms:** Alarms and alarm attachments shall not be required.

**1705.6 Water supply:** Limited area sprinklers may be supplied from the domestic water system provided the domestic water system is designed to adequately support the design flow of the largest number of sprinklers in any one of the enclosed areas. When supplied by the domestic water system, the maximum number of sprinklers in any one enclosed room or area shall not exceed 20, which number shall be capable of totally protecting the room or area.

**1705.6.1 Fire department connections:** A fire department connection is not required for limited area sprinkler systems supplied from the domestic water system.

**1705.6.2 Standpipe connection:** The water supply for the limited area sprinkler system shall be from the building standpipe system when available (see Section 1711.4.1).

**1705.6.3 Cross connection:** There shall not be a cross connection between the domestic water system and the standpipe system.

**1705.7 Use:** Limited area sprinklers shall be used only in rooms or areas enclosed with construction assemblies as required by this code.

## SECTION 1706.0 WATER SPRAY FIXED SYSTEMS

**1706.1 General:** Water spray extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFiPA 15 listed in Appendix A.

**1706.2 Design:** The details on the system supplied with the plans and specifications shall include information and the calculations of the sprinkler spacing and arrangement with water supply and discharge requirements, size and equivalent lengths of pipe and fittings and water supply source. Sufficient information shall be included to identify the apparatus and devices used.

**1706.3 Actuation:** Water spray extinguishing systems shall be the automatically actuated type with supplementary manual tripping capability.

**1706.4 Tests:** All new system piping shall be hydrostatically tested in accordance with the provisions of NFiPA 15 listed in Appendix A.

## SECTION 1707.0 FOAM EXTINGUISHING SYSTEMS

**1707.1 General:** Foam extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFiPA 11, 11A, 11B and 16 listed in Appendix A.

**1707.2 Design:** The details on the system supplied with the plans and specifications shall include complete computations showing pressure drop in all system piping, friction loss calculations of liquid lines and a detailed layout of the entire hazard area to be protected. Hydraulic characteristics of foam

proportioners and foam makers as determined by tests shall be supplied by the manufacturer to the department (including the range of operating conditions required for the proposed installation), to permit determination of the adequacy of the hydraulics of the proposed protection.

**1707.3 Actuation:** A foam extinguishing system shall be automatically actuated with supplementary manual tripping capability.

**1707.4 Tests:** All piping except that piping which handles expanded foam shall be subjected to a two hour hydrostatic pressure test of 200 psi (1379 kPa) or 50 psi (345 kPa) in excess of the maximum pressure anticipated, whichever is greater, without leakage. The system shall be subjected to a flow test to insure that the hazard area is fully protected in conformance with the design specifications, and to determine the flow pressures, actual discharge capacity, foam quality, consumption rate of foam producing materials, manpower requirements and other operating characteristics.

## SECTION 1708.0 CARBON DIOXIDE EXTINGUISHING SYSTEMS

**1708.1 General:** Carbon dioxide extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFiPA 12 listed in Appendix A.

**1708.2 Design:** The details on the system supplied with the plans and specifications shall include information and calculations of the amount of carbon dioxide, the location and flow rate of each nozzle including equivalent orifice area and the location, size and the carbon dioxide storage facility. Information shall be submitted pertaining to the location and function of the detection devices, operating devices, auxiliary equipment and electrical circuitry, if used. Sufficient information shall be indicated to identify properly the apparatus and devices used. Any special features shall be adequately explained.

**1708.3 Actuation:** Carbon dioxide extinguishing systems shall be automatically actuated with supplementary manual tripping capability.

**1708.4 Safety requirements:** In any proposed use of a carbon dioxide system where there is a possiblity that persons may enter or be trapped in atmospheres made hazardous by a carbon dioxide discharge, warning signs, discharge alarms and breathing apparatus shall be provided to insure prompt evacuation of and to prevent entry into such atmospheres, and also to provide means for prompt rescue of any trapped personnel.

**1708.5 Tests:** A completed system shall be tested for tightness up to the selector valve, and for continuity of piping with free unobstructed flow beyond the selector valve. The labeling of devices with proper designations and instructions shall be checked. Operational tests shall be conducted on all devices except cylinder valves in multi-cylinder high pressure systems. Where conditions prevail that make it difficult to determine adequately the system requirements or design, a suitable discharge test and concentration analysis test shall be made. All tests are to be conducted as indicated in NFiPA 12 listed in Appendix A.

**1708.6 Range hoods:** In addition to the requirements of this section and the requirements of Section 1702.18, range hood $CO_2$ systems shall conform to the following requirements of Sections 1708.6.1 through 1708.6.6.

**1708.6.1 Multiple hoods:** Where multiple hoods are served, each hood shall be provided with a separate manual station (actuator) and a separate $CO_2$ supply.

**1708.6.2 Design requirements:** Total $CO_2$ requirements shall be calculated on the following accumulative basis.*

1. Open area of hood (sq. ft.) ÷ 0.6 = pounds of $CO_2$.
2. Volume of hood (cu. ft.) (minimum depth of two feet) ÷ 8.0 = pounds of $CO_2$.
3. Hoods located over liquid surface operations; liquid surface area (sq. ft.) ÷ 0.4 = pounds $CO_2$ (10 pounds minimum).
4. Volume of plenum (cu. ft.) ÷ 8.0 = pounds of $CO_2$.
5. Volume of duct below fire damper (cu. ft.) ÷ 8.0 = pounds of $CO_2$.
6. Duct above fire damper, minimum 10 pounds $CO_2$.
7. In addition to the calculations, an additional 10 pounds of $CO_2$.

**1708.6.3 Operation:** Upon activation of the $CO_2$ system, the fan (s) shall cease to operate and the supply valve shall shut the pilot and burner(s) off.

**1708.6.4 Fire dampers:** Duct systems from range hoods shall not be equipped with fire dampers unless they are specifically approved for such use, or required as part of an approved extinguishing system or other approved system.

**1708.6.5 $CO_2$ Bottle storage:** $CO_2$ bottles shall be located at least 15 feet (4572 mm) from the range or range hood. The temperature in the storage area shall not exceed 120 degrees F. (48.89 degrees C.) or be less than 32 degrees F. (0 degrees C.).

**1708.6.6 Warning light:** An electric warning light of 10 watts or more shall be provided on the $CO_2$ bottle or system which will automatically illuminate when the bottle or system is depleted. The light shall be of a distinctive red color and shall be located in a conspicuous location.

## SECTION 1709.0 HALOGENATED FIRE EXTINGUISHING SYSTEMS

**1709.1 General:** Halogenated fire extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFiPA 12A and 12B listed in Appendix A.

**1709.2 Design:** The details on the system supplied with the plans and specifications shall include information and calculations of the amount of extinguishing agent; container storage pressure; the location and flow rate of each nozzle including equivalent orifice area; the location, size and equivalent lengths of pipe, fittings and hose; and the location and size of the storage facility. Information shall be submitted pertaining to the location and func-

* **Note:** 1 foot = 304.8 mm; 1 square foot = 0.093 $m^2$; 1 cubic foot = 0.028 $m^3$; 1 pound = 0.454 kg.

tion of the detection devices, auxiliary equipment and electrical circuitry, if used. Sufficient information shall be indicated to identify properly the apparatus and devices used. Any special features shall be adequately explained.

**1709.3 Actuation:** Halogenated fire extinguishing systems shall be automatically actuated with supplementary manual tripping capability.

**1709.4 Safety requirements:** In any proposed use of a halogenated fire extingushing system where there is a possibility that persons may enter or be trapped in atmospheres made hazardous by a discharge, warning signs, discharge alarms and breathing apparatus shall be provided to insure prompt evacuation of and to prevent entry into such atmospheres, and also to provide means for prompt rescue of any trapped personnel.

**1709.5 Tests:** A completed system shall be tested for tightness up to the selector valve, and for continuity of piping with free unobstructed flow beyond the selector valve. The labeling of devices with proper designations and instruction shall be checked. Operational tests should be conducted on all devices except cylinder valves in multi-cylinder systems. Where conditions prevail that make it difficult to determine adequately the system requirements or design, a suitable discharge test and concentration analysis should be made. All tests are to be conducted as indicated in NFiPA 12A and 12B listed in Appendix A.

## SECTION 1710.0 DRY CHEMICAL EXTINGUISHING SYSTEMS

**1710.1 General:** Dry chemical extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFiPA 17 listed in Appendix A.

**1710.2 Design:** The details on the system supplied with the plans and specifications shall include sufficient information and calculations on the amount of dry chemical; the size, length, and arrangement of connected piping, or piping and hose; description and location of nozzles so that the adequacy of the system can be determined. Information shall be submitted pertaining to the location and function of detection devices, operating devices, auxiliary equipment and electrical circuitry, if used. Sufficient information shall be indicated to identify properly the apparatus and devices used. Any special features shall be adequately explained.

**1710.3 Actuation:** Dry chemical extinguishing systems shall be automatically actuated with supplementary manual tripping capability.

**1710.4 Safety requirements:** Where there is a possibility that personnel may be exposed to a dry chemical discharge, warning signs, discharge alarms and breathing apparatus shall be provided to ensure prompt evacuation of such locations, and also to provide means for prompt rescue for any trapped personnel.

**1710.5 Tests:** A completed system shall be tested by a discharge of expellant gas through the piping and nozzles. Observations for gas leakage and for

continuity of piping with free unobstructed flow shall be made. Observations shall be made of the flow of expellant gas through all nozzles. The labeling of devices with proper designations and instructions shall be checked. After testing, all piping and nozzles are to be blown clean, using compressed air or nitrogen and the system properly charged and placed in the normal "set" condition. All tests are to be conducted as indicated in NFiPA 17 listed in Appendix A.

**1710.6 Range hoods:** In addition to the requirements of this section and the requirements of Section 1702.18, range hood dry chemical systems shall conform to the following requirements of Sections 1710.6.1 through 1710.6.7.

**1710.6.1 Labeling:** Dry chemical systems shall bear the label of an approved testing or inspection agency and shall be installed in accordance with their recommendations and shall be approved by the department and fire department.

**1710.6.2 Size:** The size of hood and duct covered by a single system shall not exceed the approved testing or inspection agency's recommendations.

**1710.6.3 Dry chemical:** Dry chemical agent used shall be nontoxic.

**1710.6.4 Multiple hood protection:** Multiple hoods may be protected by a common system if in conformance with a report of an approved testing or inspection agency.

**1710.6.5 Duct system limitation:** Each duct system shall constitute an individual system serving only exhaust hoods on one floor.

**1710.6.6 Container location:** Dry chemical containers may be located either on the cooking equipment stand or at a location remote from the range or range hood, but consistent with the dry chemical supply line distance limitations listed by an approved testing or inspection agency, or as approved by the department and fire department.

**1710.6.7 Portable fire extinguishers:** A hand portable fire extinguisher shall be installed in the cooking area and shall have a rating of at least 20 BC and be located not more than 15 feet (4572 mm) and not less than 10 feet (3048 mm) from the hazard. Dry chemical type extinguishers shall be of the alkaline type.

## SECTION 1711.0 STANDPIPE SYSTEMS

**1711.1 General:** All buildings and structures shall be equipped with 2½ inch or larger standpipes as required herein, and shall be made to comply with the requirements of this section.

**1711.2 Where required:** Standpipes shall be installed and maintained in full operating condition, as specified in this article and NFiPA 14 listed in Appendix A, in the locations described in Sections 1711.2.1 through 1711.2.4.

**1711.2.1 Use Groups A-1, A-2 or A-3:** In buildings two or more stories in height of Use Group A-1, A-2, or A-3 with an occupant load of more than 300.

**1711.2.2 Three stories:** In buildings three stories in height when:

1. Of Use Group B, F, M or S-1 more than 3,000 square feet (279 $m^2$) in area per floor; or
2. Of Use Group A, I, or R-1; or
3. Of any use group more than 10,000 square feet (930 $m^2$) in area per floor.

**1711.2.3 Four stories:** In buildings four stories or more in height regardless of the area per floor.

**1711.2.4 Public garages:** In all public garages:

1. When more than 10,000 square feet (930 $m^2$) in area; or
2. When more than 7,500 square feet (698 $m^2$) in area, and more than one story in height; or
3. When more than 5,000 square feet (465 $m^2$) in area, and more than two stories in height; or
4. When more than three stories in height; or
5. When located in buildings where the upper stories are designed for other uses; or
6. When located in any story that is more than 50 percent below grade.

**1711.3 Sizes:** Standpipes shall extend from the lowest portion of the building to a height 5 feet (1524 mm) above the finished floor of the topmost story and shall have minimum diameters as specified in the following Table 1711.

**Table 1711**
**BUILDING HEIGHT AND STANDPIPE SIZE**

| Maximum building height | Minimum standpipe size[b] |
|---|---|
| 3 stories or 40 feet | 2½ inches |
| 4 stories or 50 feet | 2½ inches |
| 5 stories or 65 feet | 4 inches |
| 6 stories or 75 feet | 4 inches |
| 7[a] stories or 85 feet | 6 inches |
| 8[a] stories or 95 feet | 6 inches |
| 95[a] feet to 250 feet | 6 inches |
| over 250[a] feet | 8 inches |

**Note a.** At least one standpipe shall extend through the roof and terminate in a two way 2½ inch hose connection.

**Note b.** In sprinklered buildings, the minimum standpipe diameter may be based on hydraulic calculations.

**Note c.** 1 foot = 304.8 mm.

**1711.4 Number of risers:** The number of standpipe risers shall be such that all parts of every floor area can be reached by a 30 foot (9144 mm) hose stream from a nozzle attached to not more than 100 feet (30480 mm) of hose connected to a riser outlet. In those buildings equipped with an interior smokeproof enclosure vestibule, at least one standpipe hose connection shall be located in the vestibule.

**1711.4.1 Combination:** The standpipe system riser(s) may also serve as the water sprinkler system riser(s) in buildings required to have or having both systems. A control valve shall be installed in each sprinkler system or standpipe to allow each system to remain independently operational.

**1711.5 Outlets:** Standpipe outlets shall comply with Sections 1711.5.1 and 1711.5.2.

**1711.5.1 Hose connections:** At each floor level, and not more than 5 feet (1524 mm) above the floor, there shall be connected to each standpipe a 2½ inch hose connection with valves and threads conforming the the local fire department standard. If deemed necessary by the local fire department, a 1½ inch hose connection shall be provided and equipped with not more than 100 feet (30480 mm) of 1½ inch approved lined fire hose with an approved variable fog nozzle and couplings and hung in an approved rack or cabinet. Hose provided for rack and cabinet use shall be of ozone resistant material and designed to be folded in a pin rack unit.

**Exception:** In sprinklered buildings, the 1½ inch hose connection, hose and cabinet are not required.

**1711.5.2 Roof hydrant:** Where standpipes extend through the roof, an approved hydrant or manifold shall be provided. The main control valve on a roof hydrant or manifold shall be located in an area not subject to freezing, as close to the roof access as practical and plainly marked (see Section 1713.0).

**1711.6 Material:** All standpipes shall be constructed of approved materials. All pipe, fittings and valves shall be of extra heavy pattern when the working pressure will exceed 175 psi (1207 kPa).

**1711.7 Capacity:** Each standpipe shall be sized for a minimum flow of 500 gallons per minute (0.032 $m^3/s$). Where only one standpipe is required, its supply piping shall be sized for a minimum flow of 500 gallons per minute (0.032 $m^3/s$). Where more than one standpipe is required, all common supply piping shall be sized for a minimum flow of 500 gallons per minute (0.032 $m^3/s$) for the first standpipe plus 250 gallons per minute (0.016 $m^3/s$) for each additional standpipe, the total not to exceed 2500 gallons per minute (0.16 $m^3/s$).

**Exception:** In buildings of Use Groups B, R-1, R-2, I-1 and I-2 equipped with a complete automatic fire suppression system, each standpipe shall be sized for a minimum flow of 250 gallons per minute (0.016 $m^3/s$). Where more than one standpipe is required, all common supply piping shall be sized for a minimum flow of 250 gallons per minute (0.016 $m^3/s$) for the first standpipe plus 250 gallons per minute (0.016 $m^3/s$) for each additional standpipe, the total not to exceed 1500 gallons per minute (0.095 $m^3/s$).

**1711.7.1 Pressure:** The supply shall be sufficient to maintain a residual pressure of 65 psi (448 kPa) at the topmost outlet of each standpipe with 500 gallons per minute (0.032 $m^3/s$) flowing.

**Exception:** Buildings less than 75 feet (22860 mm) in height when provided with a complete automatic fire suppression system.

## SECTION 1712.0 STANDPIPES FOR BUILDINGS UNDER CONSTRUCTION OR DEMOLITION

**1712.1 General:** Standpipes required by this section may be temporary or

permanent in nature, with or without a water supply, provided, however, that such standpipes shall remain in service until completion of the work.

**1712.2 Number required:** Every building or structure under construction five or more stories in height above grade shall be equipped with one or more standpipes at least 4 inches in diameter. A sufficient number of standpipes with hose(s) shall be provided so that every portion of the building can be reached with 100 feet (30480 mm) of hose and a 30 foot (9144 mm) hose stream.

**1712.3 Construction:** All standpipes shall be constructed of approved materials. All pipe, fittings and valves shall be extra heavy pattern when the working pressure exceeds 175 psi (120.7 kPa).

**1712.4 Height:** The standpipe systems shall be carried up with each floor and shall be installed and ready for use as each floor progresses. Standpipes shall not be more than one floor below the highest forms or staging.

**1712.5 Fire department connections:** At the street level there shall be provided for each temporary or permanent standpipe installation one or more two way fire department inlet connections. Fire department inlet connections shall be prominently marked and readily and easily accessible at all times (see Section 1713.8).

**1712.6 Outlets:** At each floor level and on each standpipe, there shall be provided one 2½ inch hose outlet and one 2½ inch hose valve with cap and chain. At each floor level and on each standpipe, there shall be provided a 1½ inch hose outlet with 100 feet (3048 mm) of approved hose. Outlets shall be located not more than 5 feet (1524 mm) above floor level.

**Exception:** In sprinklered buildings, the 1½ inch outlet is not required, however, the 1½ inch hose line shall be provided with a 1½ inch to 2½ inch reducer (see Section 1711.5.1).

**1712.7 Buildings under demolition:** Where a building is being demolished and a standpipe is existing within such a building, such standpipe shall be maintained in an operable condition so as to be available for use by the fire department. Such standpipe shall be demolished with the building but shall not be more than one floor below the floor above being demolished.

## SECTION 1713.0 FIRE DEPARTMENT CONNECTIONS
### (See Section 1712.5 for temporary standpipes)

**1713.1 Required:** All water sprinkler and standpipe systems shall be provided with at least one two way fire department connection. Each inlet of the fire department connection shall be at least 2½ inches in diameter. The pipes from the standpipe system and the water sprinkler system to the fire department connection shall not be smaller than 4 inches. Single fire department connections may be installed when approved by the department.

**Exception:** A fire department connection shall not be required for limited area sprinkler systems (see Section 1705.6.1).

**1713.2 Connections:** Fire department connections shall be arranged in such a manner that the use of any one water sprinkler connection will serve all the sprinklers, and the use of any one standpipe connection will serve all the standpipes within the building.

**1713.3 Location:** Fire department connections shall be located and be visible on a street front or in a location approved by the department. Such connections shall be located so that immediate access can be made by the fire department. Obstructions such as fences, bushes, trees, walls or any other similar object shall not be permitted for new or existing installations.

**1713.4 Height:** Fire department connections shall not be less than 18 inches (457 mm) and not more than 42 inches (1067 mm) in elevation, measured from the ground level to the center line of the inlets.

**1713.5 Projection:** Where the fire department connection would project beyond the property line or into the public way, a flush type fire department connection shall be provided.

**1713.6 Hose thread:** Hose thread in the fire department connection shall be uniform with that used by the local fire department.

**1713.7 Fittings:** Fire department inlet connections shall be fitted with check valves, ball drip valves, and caps and chains.

**1713.8 Signs:** A metal sign with raised letters at least one inch (25 mm) in height shall be mounted on all fire department connections serving sprinklers or standpipes. Such signs shall read *Automatic Sprinklers* and/or *Standpipe*.

## SECTION 1714.0 WATER SUPPLY AND OTHER EXTINGUISHING MEDIA

**1714.1 Required:** All fire suppression and standpipe systems shall be provided with at least one automatic supply of extinguishing material of adequate pressure, capacity and reliability to perform the function intended, except as provided in Section 1712.0.

**1714.2 Combination sprinkler/standpipe water supply:** Where both sprinklers and standpipes are installed, they may have a common fire water service as their combined source of supply. Connection shall not be made to any water main of the jurisdiction less than 4 inches in diameter. In sprinklered buildings with combined standpipes, the water supply shall be adequate for the sprinkler system or the standpipe system, whichever is greater.

**1714.3 Combination sprinkler/domestic water supply:** A sprinkler system may be connected to the domestic water supply system as allowed by this code, provided the supply system is of adequate pressure, capacity and size for the simultaneous operation of the water sprinkler system and domestic water needs. A check valve shall be installed in the water sprinkler supply line to prevent contamination of the domestic water.

**1714.4 Size:** The extinguishing material supply for fire suppression systems shall be sized in an approved manner in accordance with this code.

**1714.5 Standpipe water service:** Standpipes shall be connected to a street water main with a fire water service at least equal to the size of the largest standpipe within the building, or shall be hydraulically calculated to satisfy total demand. The size of the water service at the base of the standpipe risers shall be at least the size of the largest standpipe.

**1714.6 Standpipe interconnection:** The required water supply shall be connected to the base of each standpipe. Where more than one standpipe is required, all standpipes shall be interconnected at their base and an approved indicating valve shall be installed at the base of each standpipe so as to permit individual risers to be taken out of service if damaged or broken without interrupting the water supply to other risers.

## SECTION 1715.0 YARD HYDRANTS

**1715.1 Fire hydrants:** Fire hydrants installed on private property shall be located and installed as directed by the fire department. Hydrants shall conform to the standards of the administrative authority of the jurisdiction and the fire department. Hydrants shall not be installed on a water main less than 6 inches in diameter.

## SECTION 1716.0 AUTOMATIC FIRE ALARM SYSTEMS

**1716.1 Plans and specifications:** Where an automatic fire alarm system is required by this code, the plans and specifications shall show the location and number of all sending stations and signals with specifications of the type, construction and operation of the system including all automatic detection devices. Installation of all equipment shall conform to requirements of this code and NFiPA 71, 72A, 72B, 72C, 72D, 72E, 74 and 1221 listed in Appendix A.

**1716.2 Approval:** The automatic fire alarm system shall be approved for the particular application and shall only be used for detection and signaling in the event of fire. The automatic detecting devices shall be smoke detectors.

**1716.3 Where required:** An automatic fire alarm system shall be installed and maintained in full operating condition in the locations described in the following Sections 1716.3.1 through 1716.3.4.

**1716.3.1 Use Group I:** In all buildings of Use Group I.

**1716.3.2 Use Group R-1:** In all buildings of Use Group R-1.

**1716.3.3 Use Group B or R-2:** In all buildings of Use Group B or R-2 when such buildings have floors used for human occupancy located more than 75 feet (22860 mm) above the lowest level of fire department vehicle access.

> **Exception:** In buildings of Use Group R-2, smoke detectors are not required within the individual dwelling units except as required by Section 1716.3.4.

**1716.3.4 Dwelling units:** A minimum of one single station smoke detector

shall be installed in each guest room suite or sleeping area in buildings of Use Group R-1 and in dwelling units within buildings of Use Groups R-2 or R-3. It shall be installed in a manner and location approved by the authority having jurisdiction. When actuated, the detector shall provide an alarm suitable to warn the occupants within the individual unit (see Section 1717.3.1). In buildings having basements or cellars an additional smoke detector shall be installed in the basement or cellar in a location approved by the authority having jurisdiction.

**1716.4 Sprinklered buildings exception:** Buildings or portions thereof equipped with an automatic fire suppression system are not required to be equipped with an automatic fire alarm system but are required to be equipped with a manual fire alarm system conforming to Section 1717.0. This exception does not apply to single station smoke detectors as required in Section 1716.3.4.

**1716.5 Manual pull stations:** A manual fire alarm system conforming to the requirements of Section 1717.0 shall be installed in conjunction with an automatic fire alarm system.

**Exception:** Single station detectors required by Section 1716.3.4.

**1716.6 Distances:** Smoke detectors shall be installed not to exceed the lineal or square footage allowances specified, based on the test standards under which they were tested and approved.

**1716.7 Not mandatory:** In special use buildings and structures or parts thereof, an automatic fire alarm system may be installed in lieu of an automatic fire suppression system when approved by the department and fire department when such suppression would be detrimental or dangerous to the specific use and occupancy (see Section 1702.19).

**1716.8 Power supply:** The power for the automatic fire alarm system shall be provided from an emergency electrical system.

**Exception:** Single station detectors required by Section 1716.3.4.

**1716.9 Requirements:** All automatic fire alarm systems shall be of the closed circuit type and shall be electrically or mechanically supervised. In addition, such systems shall comply with the following Sections 1716.9.1 through 1716.9.3.

**Exception:** Single station detectors required by Section 1716.3.4.

**1716.9.1 Wiring:** All wiring shall conform to the requirements of NFiPA 72A through 72E listed in Appendix A.

**1716.9.2 Alarms:** Audible alarms of the approved type shall be provided. The operation of any detection device shall cause all audible or visual alarms to operate. Visual and audible alarms shall be provided in occupancies housing the hard of hearing. Alarm sounding devices shall be of an approved type, shall provide a distinctive tone and shall not be used for any purpose other than that of a fire alarm. They shall be located so as to be seen or effectively

heard above all other sounds, by all the occupants, in every occupied space within the building.

**1716.9.3 Zones:** Each floor shall be zoned separately. If the floor area exceeds 20,000 square feet (1860 $m^2$), additional zoning shall be provided. The length of any zone shall not exceed 200 feet (60960 mm) in any direction. Zoning indicator panels and controls shall be located as approved by the department. Annunciators shall lock in until the system is reset.

**1716.10 Fire alarm acceptance tests:** Upon completion of a fire alarm system, the installation shall be subjected to a performance test to demonstrate its efficiency of operation. Also, all connections and wiring, with signal devices disconnected, shall develop an insulation resistance of not less than one megohm.

## SECTION 1717.0 MANUAL FIRE ALARM SYSTEMS (PULL STATIONS)

**1717.1 Plans and specifications:** Where a manual fire alarm system is required by this code, the plans and specifications shall show the location and number of all sending stations and signals with specifications of the type, construction and operation of the system. Installation of all equipment shall conform to the requirements of this code and NFiPA 72A listed in Appendix A.

**1717.2 Approval:** The manual fire alarm system shall be approved for the particular application and shall be used for the fire protection signaling purpose only. Alarm boxes shall be painted a distinctive red color.

**1717.3 Where required:** A manual fire alarm system shall be installed and maintained in full operating condition in the locations described in the following Sections 1717.3.1 through 1717.3.4.

**1717.3.1 Automatic alarm system:** In all buildings required to be equipped with an automatic fire alarm system (see Section 1716.5).

**Exception:** Single station detectors as required by Section 1716.3.4.

**1717.3.2 Use Group A-4:** In all new and existing buildings of Use Group A-4.

**Exception:** Sanctuary and nave areas of churches and similar religious buildings.

**1717.3.3 Use Group B:** In all buildings of Use Group B when three or more stories in height.

**Exception:** Buildings equipped with an automatic fire suppression system and less than seven stories in height.

**1717.3.4 Use Group R-2:** In all buildings of Use Group R-2, when four or more stories in height.

**1717.4 Location:** Manual pull stations shall be located in each corridor of each story including basements or cellars, so that from each corridor door, not more than 200 feet (60960 mm) will be traversed in order to reach a manual station. Stations shall be located as near as possible and not more than 5 feet (1524 mm) from each exit. Where corridors are not provided,

manual stations shall be located so that any point in the building is not more than 200 feet (60960 mm) from a station. Where a stage is provided, a manual pull station shall be located adjacent to the lighting control panel.

**1717.5 Coding:** Coded stations shall be coded in conformance with NFiPA 72A listed in Appendix A.

**1717.6 Power supply:** The power for the fire alarm system shall be provided from an emergency electrical system.

**1717.7 Requirements:** Fire alarm systems shall be of the closed circuit type and shall be electrically or mechanically supervised. In addition, such systems shall comply with the following Sections 1717.7.1 through 1717.7.5.

**1717.7.1 Wiring:** All wiring shall conform to the requirements of NFiPA 72A through 72E listed in Appendix A.

**1717.7.2 Alarms:** Audible alarms of the approved type shall be provided. The operation of any fire alarm device shall cause all audible or visual alarms to operate. Visual and audible alarms shall be provided in occupancies housing the hard of hearing. Alarm sounding devices shall be of approved type, shall provide a distinctive tone and shall not be used for any purpose other than that of a fire alarm. They shall be of such character and so located as to be seen or effectively heard above all other sounds, by all the occupants, in every occupied space within the building.

**1717.7.3 Presignal system:** A presignal system may be installed in buildings of Use Group I. Presignal systems shall not be installed in other occupancies, unless approved by the department and by the fire department. Where a presignal system is installed, 24 hour personnel supervision shall be provided at a location approved by the fire department, in order that the alarm signal can be actuated in the event of fire or other emergency.

**1717.7.4 Box height:** The height of the manual pull station boxes shall be not more than 4 feet (1219 mm), measured vertically, from the floor level.

**1717.7.5 Zones:** Each floor shall be zoned separately. If the floor area exceeds 20,000 square feet (1860 $m^2$), additional zoning shall be provided. The length of any zone shall not exceed 200 feet (60960 mm) in any direction. Zoning indicator panels and controls shall be located as approved by the department. Annunciators shall lock in until the system is reset.

**1717.8 Acceptance tests:** Upon completion of a fire alarm system, the installation shall be subjected to a performance test to demonstrate its efficiency of operation. Also, all connections and wiring, with signal devices disconnected, shall develop an insulation resistance of not less than one megohm.

## SECTION 1718.0 SUPERVISION

**1718.1 Fire suppression systems:** Fire suppression systems shall be supervised by one of the following methods.

1. Approved central station system in accordance with NFiPA 71 listed in Appendix A.

2. Approved proprietary system in accordance with NFiPA 72D listed in Appendix A.
3. Approved remote station system of the jurisdiction in accordance with NFiPA 72C listed in Appendix A.
4. Approved local alarm service which will cause the sounding of an audible signal at a constantly attended location in accordance with NFiPA 72A listed in Appendix A.
5. Locking valves open.

**Exceptions**
1. Underground gate valves with roadway boxes.
2. Halogenated extinguishing systems.
3. Carbon dioxide extinguishing systems.
4. Dry chemical extinguishing systems.
5. Water sprinkler system when serving 20 or less sprinklers.

**1718.2 Fire protection systems:** All required fire protection systems shall be connected to an approved central station system, proprietary system, or remote station system of the jurisdiction when approved by the fire department.

**Exceptions**
1. Fire suppression systems shall conform to Section 1718.1.
2. Standpipe systems.
3. Fire alarm systems in buildings of Use Group R when less than five stories in height.
4. Single station detectors required by Section 1716.3.4.

## SECTION 1719.0 FIRE EXTINGUISHERS

**1719.1 Approval:** Portable fire extinguishers shall be of an approved size and type suitable for the occupational use of the building and shall be installed in a location visible and readily accessible to the occupants.

**1719.2 Where required:** Portable fire extinguishers shall be provided in accordance with Sections 607.9, 607.10, 608.2.6, 609.3, 617.9.5, 618.5, 620.5, 630.11, 1710.6.7, and 1818.7, this article and the fire prevention code listed in Appendix A.

# ARTICLE 18

## PRECAUTIONS DURING BUILDING OPERATIONS

### SECTION 1800.0 GENERAL

**1800.1 Scope:** The provisions of this article shall apply to all construction operations in connection with the erection, alteration, repair, removal or demolition of buildings and structures.

**1800.2 Other laws:** Nothing herein contained shall be construed to nullify any rules, regulations or statutes of state agencies governing the protection of the public or workers from health or other hazards involved in manufacturing, mining and other processes and operations which generate toxic gases, dust or other elements dangerous to the respiratory system, eyesight or health.

**1800.3 Combustible and explosive hazards:** The provisions of this code which apply to the storage, use or transportation of explosives, highly flammable and combustible substances, gases and chemicals shall be construed as supplemental to the requirements of the federal laws, the regulations of the Department of Transportation (DOT) and the rules and regulations of the jurisdiction.

### SECTION 1801.0 PLANS, SPECIFICATIONS AND SPECIAL PERMITS

**1801.1 Temporary construction:** Before any construction operation is started, plans and specifications shall be filed with the building official showing the design and construction of all sidewalk sheds, truck runways, trestles, foot bridges, guard fences and other similar devices required in the operation. Approval of the building official shall be secured before the commencement of any work.

**1801.2 Special permits:** All special licenses and permits for the storage of materials on sidewalks and highways, for the use of water or other public facilities and for the storage and handling of explosives shall be secured from the administrative authorities having jurisdiction.

**1801.3 Temporary encroachments:** Subject to the approval of the building official, sidewalk sheds, underpinning and other temporary protective guards and devices may project beyond the interior and street lot lines as may be

required to insure the safety of the adjoining property and the public. When necessary, the consent of the adjoining property owner shall be obtained.

## SECTION 1802.0 TESTS

**1802.1 Loading:** It shall be unlawful to load any structure, temporary support, scaffolding, sidewalk bridge or sidewalk shed or any other device or construction equipment during the construction or demolition of any building or structure in excess of its safe working capacity as provided in Article 9 for allowable loads and working stresses.

**1802.2 Unsafe equipment:** Whenever any doubt arises as to the structural quality or strength of scaffolding plank or other construction equipment, such material shall be replaced. However, the building official may accept a strength test to two and one half times the superimposed live load to which the material or structural member is to be subjected. The member shall sustain the test load without failure.

## SECTION 1803.0 INSPECTION

**1803.1 Unsafe conditions:** When inspection of any construction operation reveals that any unsafe or illegal conditions exist, the building official shall notify the owner and direct the owner to take the necessary remedial measures to remove the hazard or violation.

**1803.2 Failure to comply with orders:** Unless the owner so notified proceeds to comply with the orders of the building official within 24 hours, the building official shall have full power to correct the unsafe conditions as provided in Sections 121.0 and 123.0. All expenses incurred in the correction of such unsafe conditions shall become a lien on the property.

**1803.3 Unsafe construction equipment:** When the strength and adequacy of any scaffold or other device or construction equipment is in doubt, or when any complaint is made, the building official shall inspect such equipment and shall prohibit its use until tested as required in Section 1802.2 or until all danger is removed.

## SECTION 1804.0 MAINTENANCE

**1804.1 General:** All construction equipment and safeguards shall be constructed, installed and maintained in a substantial manner and shall be so operated as to insure protection to the workers engaged thereon and to the general public. It shall be unlawful to remove or render inoperative any structural, fire protective or sanitary safeguard or device herein required except when necessary for the actual installation and prosecution of the work.

## SECTION 1805.0 EXISTING BUILDINGS

**1805.1 Protection:** All existing and adjoining public and private property shall be protected from damage incidental to construction operations.

**1805.2 Chimney, soil and vent stacks:** Whenever a new building or structure is erected to greater or less heights than an adjoining building, the construction and extension of new or existing chimneys shall conform to the provisions of Section 1505.0, and of soil and vent stacks and the location of window openings to the provisions of Article 22, 20:090.

**1805.3 Adjoining walls:** The owner of the new or altered structure shall preserve all adjoining independent and party walls from damage as provided herein. The owner shall underpin where necessary and support the adjoining building or structure by proper foundations to comply with Section 1807.0.

**1805.3.1 Maintenance:** In case an existing party wall is intended to be used by the person who causes an excavation to be made, and such party wall is in good condition and sufficient for the use of both the existing and proposed building, such person shall preserve the party wall from injury and support it by proper foundations at his own expense, so that it shall be and remain as safe and useful as it was before the excavation was commenced. During the demolition, the party wall shall be maintained weatherproof and structurally safe by adequate bracing until such time as the permanent structural supports shall have been provided.

**1805.3.2 Beam holes:** When a structure involving a party wall is being demolished, the owner of the demolished structure shall, at his own expense, bend over all wall anchors at the beam ends of the standing wall and shall brick up all open beam holes and otherwise maintain the safety and usefulness of the wall.

**1805.3.3 Party wall exits:** A party wall balcony or horizontal exit shall not be destroyed unless and until a substitute means of egress has been provided and approved by the building official.

**1805.4 Adjoining roofs:** When a new building or demolition of an existing building is being prosecuted at a greater height, the roof, roof outlets and roof structures of adjoining buildings shall be protected against damage with adequate safeguards by the person doing the work.

## SECTION 1806.0 PROTECTION OF PUBLIC AND WORKERS

**1806.1 General:** Whenever a building or structure is erected, altered, repaired, removed or demolished, the operation shall be conducted in a safe manner and suitable protection for the general public and workers employed thereon shall be provided.

**1806.2 Fences:** Every construction operation located 5 feet (1524 mm) or less from the street lot line shall be enclosed with a fence not less than 8 feet (2438 mm) high to prevent entry of unauthorized persons. When located more than 5 feet (1524 mm) from the street lot line, a fence or other barrier shall be erected when required by the building official. All fences shall be of adequate strength to resist wind pressure as specified in Section 915.0.

**1806.3 Sidewalk bridge:** Whenever the ground is excavated under the side-

walk, a sidewalk bridge shall be constructed at least 4 feet (1219 mm) wide, or a protected walkway of equal width shall be erected in the street, provided the required permit for such walkway is obtained from the administrative authority.

**1806.4 Sidewalk shed:** Sidewalk sheds shall be provided in accordance with Sections 1806.4.1 through 1806.4.4.

**1806.4.1 Within 10 feet of street lot line:** When any building or part thereof which is located within 10 feet (3048 mm) of the street lot line is to be erected or raised to exceed 40 feet (12192 mm) in height, or whenever a building more than 40 feet (12192 mm) in height within 10 feet (3048 mm) of the street lot line is to be demolished, a sidewalk shed shall be erected and maintained for the full length of the building on all street fronts for the entire time that work is performed on the exterior of the building.

**1806.4.2 Within 20 feet of street lot line:** When the building being demolished or erected is located within 20 feet (6096 m) of the street lot line and is more than 40 feet (12192 mm) in height, exterior flare fans or catch platforms shall be erected at vertical intervals of not more than two stories.

**1806.4.3 Buildings higher than six stories:** When the building being demolished or erected is more than six stories or 75 feet (22860 mm) in height, unless set back from the street lot line a distance more than one half its height, a sidewalk shed shall be provided.

**1806.4.4 Walkway:** An adequately lighted walkway at least 4 feet (1219 mm) wide and 8 feet (2438 mm) high in the clear shall be maintained under all sidewalk sheds for pedestrians. Where ramps are required, they shall conform to the provisions of this article and Section 815.0.

**1806.5 Thrust out platforms:** The building official may approve thrust out platforms or other substitute protections in lieu of sidewalk sheds when deemed adequate to insure the public safety. Thrust out platforms shall not be used for the storage of materials.

**1806.6 Watchman:** Whenever a building is being demolished, erected or altered, a watchman shall be employed to warn the general public when intermittent hazardous operations are conducted across the sidewalk or walkway.

## SECTION 1807.0 EXCAVATIONS

**1807.1 Temporary support:** Until permanent support has been provided, all excavations shall be safeguarded and protected by the person causing the excavations to be made, to avoid all danger to life or limb. Where necessary, such excavations shall be retained by temporary retaining walls, sheet piling and bracing or other approved method to support the adjoining earth.

**1807.1.1 Examination of adjoining property:** Before any excavation or demolition is undertaken, license to enter upon adjoining property for the purpose of physical examination shall be afforded by the owner and tenants of such

adjoining property to the person undertaking such excavation or demolition, prior to the commencement and at reasonable periods during the progress of the work.

**1807.1.2 Notice to the building official:** If the person who causes an excavation to be made or an existing structure to be demolished has reason to believe that an adjoining structure is unsafe, that person shall forthwith report in writing to the building official. The building official shall inspect such premises, and if the structure is found unsafe, the building official shall order it repaired.

**1807.1.3 Responsiblity of adjoining owner:** The person making or causing an excavation to be made shall, before starting the work, give at least a one week notice in writing to the owner of each neighboring building or structure, the safety of which may be affected. Having received consent to enter a building, structure or premises, such person shall make the necessary provisions to protect it structurally and to insure it against damage by the elements which may ensue from such excavation. If license to enter is not afforded, then the adjoining owner shall have the entire responsibility of providing both temporary and permanent support of his premises at his own expense. For that purpose, the adjoining owner shall be afforded the license when necessary to enter the property where the excavation is to be made.

**1807.1.4 Excavations for other than construction purposes:** Excavations made for the purpose of removing soil, earth, sand, gravel, rock or other materials shall be performed in such a manner as will prevent injury to neighboring properties or to the street which adjoins the lot where such materials are excavated, and to safeguard the general public health and welfare.

**1807.2 Permanent support:** Permanent support shall be provided in accordance with Sections 1807.2.1 and 1807.2.2.

**1807.2.1 Deep excavations:** Whenever an excavation is made to a depth of more than 2 feet (610 mm) below the established curb, the person who causes such excavation to be made, if afforded the necessary license to enter the adjoining premises, shall preserve and protect from injury at all times and at his own expense such adjoining structure or premises which may be affected by the excavation. If the necessary license is not afforded, it shall then be the duty of the owner of the adjoining premises to make his building or structure safe by installing proper underpinning or foundations or otherwise. Such owner, if it be necessary for the prosecution of his work, shall be granted the necessary license to enter the premises where the excavation or demolition is contemplated.

**1807.2.2 Shallow excavations:** Wherever an excavation is made to a depth less than 2 feet (610 mm) below the curb, the owner of a neighboring building or structure the safety of which may be affected by the proposed excavation, shall preserve and protect from injury and shall support his building or structure by the necessary underpinning or foundations. If necessary for that

purpose, such owner shall be afforded a license to enter the premises where the excavation is contemplated.

## SECTION 1808.0 REGULATION OF LOTS

**1808.1 Grading of lot:** When a building has been demolished and building operations have not been projected or approved, the vacant lot shall be filled, graded and maintained in conformity to the established street grades at curb level. The lot shall be maintained free from the accumulation of rubbish and all other unsafe or hazardous conditions which endanger the life or health of the public. Provision shall be made to prevent the accumulation of water or damage to any foundations on the premises or the adjoining property.

**1808.2 Utility connections:** All service utility connections shall be discontinued and capped in accordance with the approved rules and the requirements of the authority having jurisdiction.

## SECTION 1809.0 RETAINING WALLS AND PARTITION FENCES

**1809.1 General:** When the adjoining grade is not higher than the legal level, the person causing an excavation to be made shall erect, when necessary, a retaining wall at his own expense and on his own land. Such wall shall be built to a height sufficient to retain the adjoining earth, shall be properly coped as required in Section 1313.0 and shall be provided with a guardrail or fence not less than 42 inches (1067 mm) in height.

## SECTION 1810.0 STORAGE OF MATERIALS

**1810.1 General:** All materials and equipment required in construction operations shall be stored and placed so as not to endanger the public, the workers or adjoining property.

**1810.2 Design capacity:** Materials or equipment stored within the building, or on sidewalks, sheds or scaffolds shall be placed so as not to overload any part of the construction beyond its design capacity, nor interfere with the safe prosecution of the work.

**1810.3 Special loading:** Unless the construction is designed for special loading, materials stored on sidewalk sheds and scaffolds shall not exceed a one day supply. All materials shall be piled in an orderly manner and height, to permit removal of individual pieces without endangering the stability of the pile.

**1810.4 Pedestrian walkways:** Materials or equipment shall not be stored on the street without a permit issued by the administrative official having jurisdiction. When so stored they shall not unduly interfere with vehicular traffic, or the orderly travel of pedestrians on the highway or street. The piles shall be arranged to maintain a safe walkway not less than 4 feet (1219 mm) wide, unobstructed for its full length, and adequately lighted at night and at all necessary times for the use of the public.

**1810.5 Obstructions:** Material and equipment shall not be placed or stored so as to obstruct access to fire hydrants, standpipes, fire or police alarm boxes, utility boxes, catch basins or manholes, nor shall they be located within 20 feet (6096 mm) of a street intersection, or so placed as to obstruct normal observations of traffic signals or to hinder the use of public transit loading platforms.

## SECTION 1811.0 REMOVAL OF WASTE MATERIAL

**1811.1 General:** Material shall not be dropped by gravity or thrown outside the exterior walls of a building during demolition or erection. Wood or metal chutes shall be provided for this purpose and any material which in its removal will cause an excessive amount of dust shall be wet down to prevent the creation of a nuisance.

## SECTION 1812.0 PROTECTION OF ADJOINING PROPERTY

**1812.1 General:** Adjoining property shall be completely protected from any damage incidental to the building operation when the owner of the adjoining property permits free access to the building at all reasonable times to provide the necessary safeguards in accordance with Section 1807.0.

## SECTION 1813.0 PROTECTION OF FLOOR AND WALL OPENINGS

**1813.1 Noncombustible floor construction:** The arches, slabs or structural floor fillings of buildings of Type 1 and Type 2 construction shall be installed as the building progresses.

**1813.2 Combustible floor construction:** In Type 3 and Type 4 construction when double flooring is used, the underfloor shall be laid on each story as the building progresses; and when double floors are not used, the floors shall be planked over two stories below the level where work is being performed.

**1813.3 Steel structural frames:** In steel construction, the entire tier of iron or steel beams upon which the structural work is in progress shall be planked over, with the exception of necessary hoistways and permanent openings. Steel work shall not advance more than six floors ahead of the permanent floor construction.

**1813.4 Guardrails:** All floor and wall openings shall be protected with substantial guardrails and toe boards in accordance with ANSI A12.1 listed in Appendix A.

## SECTION 1814.0 SCAFFOLDS

**1814.1 Load capacity:** Scaffolds and their components shall be capable of supporting without failure at least four times the maximum intended load. All platforms and supporting elements of scaffolds shall be designed and constructed to support uniform minimum live loads in pounds per square foot of the platform area in accordance with the classifications described in Table 1814.

**1814.2 Erection:** Built up, swinging and suspended scaffolds shall be erected by competent workers only.

**1814.3 Scaffolding:** Scaffolding shall be constructed in accordance with Sections 1814.3.1 and 1814.3.2.

**1814.3.1 All buildings:** All scaffolding exceeding 85 feet (25908 mm) or seven stories in height used in construction operations involving the erection, alteration or maintenance of buildings, shall be constructed of noncombustible or fire-retardant materials complying with the provisions of Section 1403.0.

**Table 1814**
**SCAFFOLD LOAD CAPACITY**

| Classification | Service type | Load (pounds per square foot) |
|---|---|---|
| Light duty | Carpenters | 25 |
| | Stone setters (no stone on scaffold) | 25 |
| | Miscellaneous (no material on scaffold) | 25 |
| Medium duty | Bricklayers | 50 |
| | Stucco | 50 |
| | Lathers and plasterers | 50 |
| Heavy duty | Stone masons | 75 |

**Note a.** 1 psf = 4.882 kg/m².

**1814.3.2 Use Group I:** All scaffolding used in construction operations involving the repair or partial demolition during occupancy of buildings of Use Groups I-1 and I-2 shall be constructed of noncombustible or fire-retardant materials complying with the provisions of Section 1403.0.

## SECTION 1815.0 HOISTS

**1815.1 Hoist protection:** All material hoists shall be adequately protected. When erected on the outside of a building over 85 feet (25908 mm) or seven stories in height, the hoist structure shall be built of noncombustible or approved fire-retardant materials with the exception of the loading platform.

**1815.2 Passengers prohibited:** Persons shall not be permitted to ride a material hoist. Temporary elevators shall be installed when necessary to transport workers as provided in Article 21.

**1815.3 Guarding of cables:** All hoisting cables and signal cords shall be guarded whenever they pass through or cross working spaces to prevent injury to persons.

**1815.4 Rigger's license:** All persons engaged in the erection of derricks and other hoisting apparatus shall secure a license or certificate of fitness for the performance of such work from the authorized administrative official.

## SECTION 1816.0 STAIRWAYS AND LADDERS

**1816.1 Temporary stairways:** When a building has been constructed to a greater height than 50 feet (15240 mm) or four stories, or when an existing building exceeding 50 feet (15240 mm) in height is altered, at least one temporary lighted stairway shall be provided unless one or more of the permanent stairways are erected as the construction progresses.

**1816.2 Ladders:** Temporary ladders, when permitted for access to floors before stairways are installed, or which are designed for other working purposes, shall extend at least 42 inches (1067 mm) above the floor level which they serve.

## SECTION 1817.0 LIGHTING

**1817.1 General:** All stairways and parts of buildings under demolition, erection or repair shall be adequately lighted while persons are engaged at work, to comply with the provisions of Sections 824.0 and 2001.2.5.

## SECTION 1818.0 FIRE HAZARDS

**1818.1 General:** The provisions of this code and of the fire prevention code listed in Appendix A shall be strictly observed to safeguard against all fire hazards attendant upon construction operations.

**1818.2 Temporary heating:** Whenever salamanders or other heating devices are used for temporary heating, all regulations as to maximum temperature, distance from combustible materials, spark arrestors, removal of noxious gases, and other requirements prescribed by the building official shall be fully observed. When the source of temporary heat consists of salamanders or other open flame devices, temporary canvas enclosures shall comply with Section 1404.0.

**1818.3 Steam boilers:** All temporary or permanent high pressure steam boilers shall be operated only by licensed operating engineers in accordance with the provisions of the mechanical code listed in Appendix A. When located within a building or within 10 feet (3048 mm) thereof, all such boilers shall be enclosed with approved noncombustible construction.

**1818.4 Storage of flammables:** Storage of gasoline for hoists, oils, paints and other highly flammable materials shall be permitted only as specified in Article 6 and when stored in approved safety containers. The storage of larger quantities may be approved by the administrative official when stored in separate compartments or enclosures of approved noncombustible construction.

**1818.5 Flame cutting and welding:** The use of oxyacetylene torches for cutting or welding shall be permitted only in accordance with ANSI Z49.1 listed in Appendix A.

**1818.6 Concrete forms:** Combustible materials shall not be stored on any

floor of a building under construction until all combustible concrete forms are removed from the tier immediately above.

**1818.7 Fire extinguishing equipment:** Required fire extinguishers, water buckets, auxiliary fire fighting tools or other portable extinguishing equipment shall be installed and maintained on all floors of a construction operation in accessible locations as required in Article 17 and the fire prevention code listed in Appendix A.

**1818.8 Standpipes and fire lines:** Where standpipes are provided as a permanent part of the building, they shall be installed and made ready for instant use of the fire department as the structure progresses in accordance with the provisions of Section 1712.0. Free access from the street to such standpipes shall be maintained at all times. Materials shall not be stored within 5 feet (1524 mm) of any fire hydrant or in the roadway between such hydrant and the center line of the street.

**1818.9 Housekeeping:** Rubbish and trash shall not be allowed to accumulate on the site and shall be removed as fast as conditions warrant. Combustible rubbish shall be removed daily, and shall not be disposed of by burning on the premises or in the immediate vicinity. The entire premises and area adjoining and around the operation shall be kept in a safe and sanitary condition and free of accumulation of trash, rubbish, nuts, bolts, small tools and other equipment.

## SECTION 1819.0 HEALTH HAZARDS

**1819.1 General:** Every construction or maintenance operation which results in the diffusion of dust, stone and other small particles, toxic gases or other harmful substances in quantities hazardous to health shall be safeguarded by means of local ventilation or other protective devices to insure the safety of the public as required by the regulations of the administrative official.

**1819.2 Removal of dust:** Dust, sand blasts or other harmful agents, when employed or occurring in construction operations, shall be disposed of at or near the point of origin to prevent their diffusion over adjoining premises or streets.

**1819.3 Protective equipment:** Facilities shall be provided for housing the necessary vision, respiratory and protective equipment required in welding operations in approved closed containers and in accordance with the regulations of the administrative official.

## SECTION 1820.0 WELDING SAFETY PRECAUTIONS

**1820.1 Welding enclosures:** All welding and flame cutting operations shall be performed in protected areas with full consideration to safety and fire hazards. Such closed spaces shall be properly ventilated while welding or cutting is being done. Suitable protection against the rays of the electric arc shall be maintained by the contractor where arc welding operations might be

viewed within harmful range by persons other than the welding operators and inspectors.

**1820.2 Flammable materials:** Proper precautions shall be taken to avoid all risk of fire or explosion, and flammable or explosive materials shall not be stored in the vicinity of welding or cutting operations.

## SECTION 1821.0 SANITATION

**1821.1 General:** Every building in the course of demolition, erection or repair shall be provided with toilet and drinking water facilities which shall be constructed and installed in accordance with the plumbing code listed in Appendix A.

## SECTION 1822.0 DISPUTES

**1822.1 General:** The building official, when requested by any person, aggrieved or otherwise, shall serve a written notice on any owner, tenant and their agents who fail to conform to the requirements of this article directing such person to take the necessary remedial action. If the person whose duty it is to protect his own or adjoining property under those provisions fails to proceed to fully comply with such notice within three days of the receipt thereof, or within a reasonable time thereafter as determined by the building official, the building official may cause the necessary work to be done when the health, safety and general welfare of the public are involved. The cost of such work shall become a lien against the property of the offending owner, and the legal authority of the jurisdiction shall institute appropriate action for its recovery.

# *ARTICLE 19*

## RESERVED FOR LOCAL JURISDICTION'S ORDINANCE ON SIGNS

# ARTICLE 20

## ELECTRIC WIRING AND EQUIPMENT

### SECTION 2000.0 GENERAL

**2000.1 Installations and repairs:** All electrical wiring and equipment shall be installed in conformity with the *National Electrical Code* incorporated by reference in the *Kentucky Building Code*.

**2000.2 Electrical inspectors:** Inspections conducted to determine compliance with the *National Electrical Code* shall be conducted by a certified electrical inspector in accordance with 815 KAR 35:010.

**2000.3 Certificate of approval:** After the *Kentucky Building Code* becomes effective pursuant to KRS 198B.110 and after a certified electrical inspector has been employed, contracted for or with, or otherwise provided for by the local government or the department, no utility shall initiate permanent electrical service to any new building until a final certificate of approval has been issued by a certified electrical inspector. Unless the department shall notify the utility in writing as to which buildings are subject to departmental approval, it shall be presumed by the utility that the building is subject to the jurisdiction of the local government. Nothing in this section shall prohibit the supply or use of necessary electrical services during the construction and testing.

**2000.4 Temporary use and permission:** The building official may, in his discretion, give temporary permission for reasonable time to supply and use current and part of an electrical installation before such installation has been fully completed and a final certificate of approval has been issued; provided that the part covered by the temporary certificate complies with all the requirements specified for lighting, heat or power in the *National Electrical Code*.

# ARTICLE 21

# ELEVATOR, DUMBWAITER AND CONVEYOR EQUIPMENT, INSTALLATION AND MAINTENANCE

## SECTION 2100.0 GENERAL

**2100.1 Scope:** Except as may be otherwise provided by statute, the provisions of this article shall control the design, construction, installation, maintenance and operation of all elevators, dumbwaiters, escalators, moving stairways and moving walks hereafter operated, installed, relocated or altered in all buildings and structures. The design, construction, installation, maintenance and operation of all miscellaneous hoisting and elevating equipment shall be subject to such special requirements as are deemed necessary by the building official to secure their safe operation. The provisions of this article shall not apply to portable elevating devices used to handle materials only, and located and operated entirely within one story. All such equipment shall be constructed, operated and maintained in compliance with accepted engineering practice. The construction, alteration, maintenance, operation, inspection and tests of manlifts shall be in conformity to the Safety Standard for Manlifts listed in ANSI A17.1.

**2100.2 Referenced standard:** Except as otherwise provided in this code, and except where more restrictive provisions govern, the construction, alteration, maintenance, operation, inspections and tests of elevators, dumbwaiters, moving walks and escalators shall conform to ANSI A17.1 listed in Appendix A.

**2100.3 Purpose and exceptions:** The purpose of this code is to provide reasonable safety for life and limb. In case of practical difficulty or unnecessary

hardship, the building official may grant exceptions from the literal requirements or permits the use of other methods, but only when it is clearly evident that reasonable safety is thereby secured.

## SECTION 2101.0 PLANS, SPECIFICATIONS AND PERMITS

**2101.1 Application:** The person responsible for the installation, relocation, or alteration of any equipment covered by this article shall file an application for permit with the Elevator Inspection Section, Department of Housing, Building and Construction, Frankfort, Kentucky 40601, accompanied by governing specifications and accurately scaled and fully dimensioned plans showing: the location of the installation in relation to the plans and elevation of the building; the location of the machinery room and equipment to be installed, relocated or altered; and all structural supporting members thereof, including foundations. Such plans and specifications shall specify all materials to be employed and all loads to be supported or conveyed and shall be sufficiently complete to illustrate all details of construction and design.

**2101.2 Permits:** Equipment or devices subject to the provisions of this code shall not be constructed, installed, relocated or altered unless a permit has been received from the building official before the work is commenced. A copy of such permit shall be kept at the construction site at all times while the work is in progress.

**2101.3 Identification of equipment:** For all elevators which are subject to periodic inspections, each such elevator or device shall be identified by a serial number stamped on the crosshead of the elevator car and on the front of the car door sill; and on devices other than elevators, on truss or frame, in figures not less than ⅜ inch (10 mm) high. After such devices have been so designated, their numbers shall not be changed except by permission of the building official, and all correspondence in regard to such device shall refer to said number.

## SECTION 2102.0 TESTS AND INSPECTIONS

**2102.1 General:** All equipment and devices covered by the provisions of this code shall be subjected to acceptance and maintenance tests and periodic inspections as required herein.

**2102.2 Acceptance tests:** Acceptance tests and inspections shall be required on all new, relocated and altered equipment subject to the provisions of this article. Tests and inspections shall be of such nature as to determine whether the entire installation is designed, constructed and installed in compliance with this code, and shall include all parts of the equipment and machinery. All such tests shall be made in conformance with the requirements of Section 2102.5, in the presence of the building official, by the person installing such equipment.

**2102.3 Periodic tests and periodic inspections:** Periodic tests shall be required on all new and existing power elevators, and periodic inspections shall be made of all new and existing equipment subject to the provisions of this article.

**2102.3.1 Periodic tests:** Periodic tests shall be made by the building official, or by an approved qualified agent or agency, and shall be made at the expense and responsibility of the owner. Where such tests are not made by the building official, the approved agent or agency shall submit a detailed report of the tests to the building official on approved forms not more than 30 days following the completion of the tests.

**2102.3.2 Deleted by Kentucky**

**2102.4 Frequency of tests and inspections:** Tests and inspections shall be conducted at frequencies specified in the following Sections 2102.4.1 and 2102.4.2.

**2102.4.1 Periodic inspection intervals:** Annual Inspection. Every passenger elevator and escalator shall be inspected once every 12 months.

**2102.4.2 Maintenace test intervals:** Full load safety tests shall be made at intervals not exceeding the following:

1. Power elevator car and counterweight safeties, governors and oil buffers, every five years; and
2. Hydraulic elevators shall have a pressure relief test at not less than every 12 months.

**2102.5 Minimum requirements for tests and inspections:** The minimum requirements for the inspection and test of the devices subject to this article shall conform to this section.

**2102.5.1 Elevators, dumbwaiters and escalators:** The equipment and machinery of elevators, dumbwaiters and escalators shall be inspected and tested to the requirements of ANSI A17.1 listed in Appendix A.

**2102.5.2 Deleted by Kentucky**

**2102.5.3 Manlifts:** All equipment and machinery of manlifts shall be inspected and tested to insure reasonable safety of operation and shall include tests of the brake, terminal stopping device, cables and emergency stopping device. Acceptance tests shall also include a load capacity test as provided in in the accepted standard listed in ANSI A17.1.

**2102.5.4 Deleted by Kentucky**

## SECTION 2103.0 CERTIFICATE OF COMPLIANCE

**2103.1 General:** The operation of all equipment governed by the provisions of this article and hereafter installed, relocated or altered shall be unlawful by persons other than the installer thereof until such equipment has been inspected and tested as herein required and a final or limited certificate of compliance has been issued therefor by the building official.

**2103.2 Final certificate of compliance:** The building official shall issue a final certificate of compliance for each unit of equipment which has satisfactorily met all the inspections and tests required by this article. Such final certificate shall bear the signature of the person who made the inspection and tests, and shall designate the rated load and speed, the date of the acceptance tests and inspections, and the name of the building official who made or witnessed such tests and inspections. The final certificate shall also include the necessary space for inserting the name of the person who made the periodic inspection and witnessed the periodic and maintenance tests and the date of the periodic inspection and the maintenance test.

**2103.3 Limited certificate of compliance:** The building official may issued a limited certificate of compliance for any equipment covered by this article, which is hereafter being installed, relocated or altered, to permit its limited use by the person designated therein during the period of such installation, relocation or alteration. Such certificate shall be signed by the building

official, shall bear the dates of issue, renewal and expiration, and shall designate the class of service allowed.

**2103.3.1 Tests and minimum safeguards required:** A limited certificate shall not be issued for an elevator until such elevator has satisfactorily passed tests for rated load, car and counterweight safety, and terminal stopping devices. Permanent or temporary guards and enclosures shall be installed on the car, around the hoistway and at the landing entrances. Equipment other than elevators shall be tested and protectives provided as deemed necessary by the building official to insure safe operation for the limited service specified.

**2103.3.2 Special conditions:** Automatic and continuous pressure operation elevators shall not be placed in temporary operation from the landing push buttons unless the door locking device and interlocks required by ANSI A17.1 listed in Appendix A are installed and operative. When the car can be operated only from the inside, landing entrance guards shall be provided with locks that can be released from the hoistway side only.

**2103.3.3 Time limitation:** Limited certificates of operation shall be issued for periods of not more than 30 days, but may be renewed by the building official for additional periods of not more than 30 days each.

**2103.4 Posting certificates of compliance:** The owner or lessee shall post the last issued certificate of compliance in a conspicuous place available to the building official.

## SECTION 2104.0 MAINTENANCE AND ACCIDENTS

**2104.1 Owner responsibility:** The owner or the owner's legal agent for the building in which the equipment is located shall be responsible for the care, maintenance and safe operation of all equipment covered by this article after the installation thereof and its acceptance by such owner or agent. The owner or legal agent shall make or cause to be made all periodic tests and inspections, and shall maintain all equipment in a safe operating condition, as required by this article.

**2104.2 Contractor responsibility:** The person installing any device covered by this article shall make all acceptance tests and be responsible for the care and

safe operation of such equipment during its construction and until temporarily or finally accepted by the building owner or the owner's legal agent.

**2104.3 Maintenance items:** All operating and electrical parts and accessory equipment of devices subject to this article shall be maintained in safe operating condition. The maintenance of elevators, dumbwaiters and escalators shall conform to ANSI A17.1 listed in Appendix A.

**2104.4 Unsafe conditions:** If upon inspection, any equipment covered in this article is found in an unsafe condition, or not in accordance with the provisions of this code, the building official shall thereupon serve a written notice of such finding upon the building owner or lessee, stating the time when recommended repairs or changes shall be completed. After the service of such notice, it shall be the duty of the owner to proceed within the time allowed to make such repairs or changes as are necessary to place the equipment in a safe condition. It shall be unlawful to operate such equipment after the date stated in the notice unless such recommended repairs or changes have been made and the equipment has been approved by the building official, or unless an extension of time has been secured from the building official in writing.

**2104.4.1 Power to seal equipment:** The building official, in addition to any other penalties herein provided, shall have the power to seal out of service any device or equipment covered by this article when in case of emergency in the opinion of the building official, such device is in a condition to render it unsafe for operation; or for willful failure to comply with recommendations and orders

**2104.4.2 Notice of sealing out of service:** Before sealing any device out of service, the building official, except in case of emergency, shall serve written notice upon the building owner or lessee stating intention to seal the equipment out of service and the reasons therefor.

**2104.4.3 Unlawful to remove seal:** Any device sealed out of service by the building official shall be plainly marked with a sign or tag indicating the reason for such sealing. Any tampering with, defacing or removal of the sign, tag or seal without approval of the building official shall constitute a violation of this article.

**2104.5 Accidents reported and recorded:** The owner of the building shall immediately notify the building official of every accident involving personal injury or damage to apparatus on, about or in connection with any equipment

covered by this article, and shall afford the building official every facility for investigating such accident. When an accident involves the failure, breakage, damage or destruction of any part of the apparatus or mechanism, it shall be unlawful to use such device until after an examination by the building official and approval of the equipment for continued use. It shall be the duty of the building official to make a prompt examination into the cause of the accident and to enter a full and complete report thereof in the records of the building department. Such records shall be open for public inspection at all reasonable hours.

**2104.6 Removal of damaged parts:** It shall be unlawful to remove from the premises any part of the damaged construction or operating mechanism of elevators, or other equipment subject to the provisions of this article, until permission to do so has been granted by the building official.

## SECTION 2105.0 EXISTING INSTALLATIONS

**2105.1 Retroactive provisions:** The provisions of this article are not retroactive except as specifically provided hereunder; and except further that if, upon inspection of any device covered by this code, the equipment is found in a dangerous condition, or there is an immediate hazard to those riding on or using such equipment, or if the design or the method of operation in combination with devices used is considered inherently dangerous in the opinion of the building official, the building official shall notify the owner or lessee in writing of the existing condition and shall recommend such alterations or additions as may be deemed necessary to eliminate the dangerous situation.

**2105.2 Projections into hoistway:** All ledges, floor beams, saddles, timbers and other projections, that project more than 2 inches (51 mm) from the inside of the general surface of the hoistway enclosure shall be fitted with smooth beveled guards set directly over the entire length of the projection, except door interlocks and contacts, door closers, door tracks and hangers, and door operating or signal devices in front of car openings, landing sills and separator beams between adjacent elevators. The angle of the bevels or guard plates shall preferably be not less than 75 degrees (1.31 rad) but never less than 60 degrees (1.05 rad) from the horizontal.

**2105.3 Emergency interlock release switch:** Emergency interlock release switches are prohibited.

**2105.4 Lighting:** The cars and entrances of all elevators shall be properly lighted at all times when in service. Minimum illumination shall be not less than 5 foot candles (53.82 lux) at the landing edge of the platform.

**2105.5 Belt and chain driven machines:** Single belted and chain driven machines are permitted only on freight elevators, and only when equipped with electrically released spring applied brakes and with terminal stopping and electrical safety devices required for new electric elevators. The brakes shall be applied directly to the hoisting machine and shall be arranged to operate automatically if the driving belt or chain breaks or comes off. Double belted elevator machines are permitted only on freight elevators and when driven by a line shafting which is used to apply power for other purposes.

**2105.6 Replacement or relocation of gate switches or interlocks:** The building official may require the replacement or relocation of car gate electric contacts, safety cutout switches or interlocks where such devices are found to be tied or blocked so as to render them inoperative.

**2105.7 Removal of pipes from hoistway:** The building official may order the removal from existing elevator hoistways of any pipe conveying gases, vapors or liquids which might endanger life if discharged into the hoistway or ignited.

**2105.8 Existing passenger elevators:** In addition to other provisions of this section, existing passenger elevators shall comply with Sections 2105.8.1 through 2105.8.5.

**2105.8.1 Hoistway enclosure:** All existing passenger hoistways shall be fully enclosed from floor to ceiling on all floors to comply with Section 2108.0.

**2105.8.2 Hoistway doors and interlocks:** All existing electric and electrically controlled and operated hydraulic passenger elevators equipped with mechanical locks and electrical contacts in good operating condition may be continued in their present form. If not so equipped, such passenger elevators shall be provided with hoistway landing doors equipped with approved type interlocks conforming to the requirements for new elevators; except that approved type interlock switches may be installed in connection with existing hoistway door closers, provided the combination door closer and interlocks conform to all the requirements for approved interlocks, except as to the required tests. The use of service and emergency keys for opening hoistway doors from the landing shall conform to the requirements of ANSI A17.1 listed in Appendix A.

**2105.8.3 Car doors and gates:** All openings on existing passenger elevator cars shall be provided with doors or gates. Car doors and gates of electric or electrically controlled and operated hydraulic passenger elevators shall be provided with approved car door or gate electric contacts conforming to ANSI A17.1 listed in Appendix A.

**2105.8.4 Hydraulic passenger elevators:** Hydraulic passenger elevators, except those equipped with electric control and operating devices, shall be provided with self closing hoistway doors arranged to lock automatically when closed in lieu of interlocks. Car doors or gates on electric or electrically controlled and operated hydraulic elevators shall be equipped with car door or gate electric contacts conforming to the requirements for new elevators.

**2105.8.5 Emergency signal or telephone:** Existing power passenger and freight elevators shall be provided with emergency signal devices conforming to the requirements of ANSI A17.1 listed in Appendix A.

**2105.9 Existing freight elevators:** In addition to other provisions of this section, existing freight elevators shall comply with Sections 2105.9.1 through 2105.9.5.

**2105.9.1 Hoistway enclosure:** If not now enclosed, enclosures shall be required on existing freight elevators as required for existing passenger elevators in Section 2105.3, except as provided in Section 2105.9.3.

**2105.9.2 Hoistway doors:** All landing openings in existing electric or electrically controlled and operated hydraulic freight elevator hoistways which are enclosed in fireresistance rated partitions shall be provided with fire doors equipped either with approved hoistway door interlocks, or approved hoistway door electric contacts and mechanical locks conforming to ANSI A17.1 listed in Appendix A, or with fusible links and automatic self closing devices.

**2105.9.3 Landing gates:** Where automatic self closing landing doors with fusible links are used, or where fireresistance rated hoistway enclosures are not required, the landing openings of electric or electrically controlled and operated hydraulic elevators shall be equipped with landing gates not less than 5½ feet (1676 mm) high and provided with either hoistway gate interlocks or hoistway gate electric contacts and mechanical locks conforming to ANSI A17.1 listed in Appendix A.

**2105.9.4 Hydraulic freight elevators:** Interlocks or electric contacts shall not be used on hydraulic elevator landing doors or gates, except where such elevators are provided with electric control and operating devices; and provided further that the landing openings of such elevators shall be equipped with self closing gates at least 5½ feet (1676 mm) high with approved mechanical locks. Full automatic gates shall be prohibited. Semi-automatic gates shall be prohibited, except on hydraulic elevators with mechanical control and operating devices.

**2105.9.5 Gates on cars:** All openings on existing electric or electrohydraulic freight elevator cars, except the opening immediately adjacent to the operating device, shall be provided with car gates and car gate electric contacts when the distance between the hoistway side of the landing door adjacent to such opening and the hoistway edge of the landing threshold is more than 4 inches (102 mm). All such elevators using lever, wheel or cable operating devices shall have car gates and car gate contacts installed at all car openings. All openings on existing continuous pressure or automatic operation freight elevator cars that can be operated from the landings shall be provided with car gates and car gate electric contacts. Existing sidewalk elevators shall not be subject to the provisions of this section. Car gate electric contacts shall be of approved type conforming to ANSI A17.1 listed in Appendix A.

## SECTION 2106.0 ALTERATIONS

**2106.1 General:** Alterations to existing elevators shall conform to ANSI A17.1 listed in Appendix A. Alterations to all other devices subject to this article shall conform to such requirements as the building official deems necessary for safe operation.

**2106.2 Relocated equipment:** The relocation of an existing installation of any device covered by this article shall be deemed to be a new installation and shall conform to the requirements therefor.

## SECTION 2107.0 POWER ELEVATOR OPERATION

**2107.1 Designated operator:** Every power elevator, except automatic and continuous pressure operation types and sidewalk elevators, shall be in the charge of a competent designated operator.

**2107.2 Emergency operation of elevators:** In all structures where elevators are to be installed, elevator emergency operation shall be provided in accordance with the requirements of ANSI A17.1 listed in Appendix A and Sections 2107.2.1 through 2107.2.3.

**2107.2.1 Buildings with elevator service:** In all buildings and structures serviced by an elevator, all elevators shall be provided with a minimum clear distance between walls, or between wall and door excluding return panels, not less than 68 inches by 54 inches (1727 mm by 1372 mm), and a minimum distance from wall to return panel not less than 51 inches (1295 mm). The minimum clear width of the door shall be 32 inches (813 mm).

**2107.2.2 Elevators for fire department use:** In all structures where elevator service is required for fire department use (see Section 629.8), all elevators shall be provided with a minimum distance between walls, or between wall and door excluding return panels, not less than 80 inches by 54 inches (2032 mm by 1372 mm) and a minimum distance from wall to return panel not less than 51 inches (1295 mm), with a 42 inch (1067 mm) side slide door to allow for turning a wheelchair or accommodating an ambulance stretcher in its horizontal position.

**2107.2.3 Elevator operator:** In every structure over 150 feet (45720 mm) in height, a competent elevator operator shall be available at all times to assist the fire department in obtaining access to any floor in the building or structure served by elevators except where an automatic or continuous pressure operation elevator is available.

**2107.3 Passenger restriction:** Freight elevators shall be subject to the passenger restrictions indicated in Sections 2107.3.1 and 2107.3.2.

**2107.3.1 Freight operators:** Except as provided in Section 2107.3.2, it shall be unlawful for any person other than the operator or those individuals necessary to handle freight to ride on any elevator other than a passenger elevator. It shall be unlawful for the owner or other responsible person to permit any individual or other than above specified to ride on any elevator other than a passenger elevator.

**2107.3.2 Other employees:** Employees of the owner may ride on a freight elevator, subject to approval of the building official and the requirements of ANSI A17.1 listed in Appendix A.

**2107.4 Use by handicapped persons:** If interior access in multi-story buildings is provided by elevator(s), all passenger elevators shall meet the following requirements of Sections 2107.4.1 through 2107.4.11.

**2107.4.1 Operation and leveling:** The elevator shall be automatic and be provided with a self leveling feature that will automatically bring the car to the floor landing within a tolerance of $^{3}$ ½ inch (13 mm) under normal loading and unloading conditions. This self leveling shall, within its zone, be entirely automatic and independent of the operating device and shall correct for overtravel or undertravel. The car shall also be maintained approximately level with the landing irrespective of the load.

**2107.4.2 Door size:** Minimum clear width for elevator doors shall be 32 inches (813 mm).

**2107.4.3 Door protective and reopening device:** Doors closed by automatic means shall be provided with a door reopening device which will function to stop and reopen a car door and adjacent hoistway door in case the car door is obstructed while closing. This reopening device shall also be capable of sensing an object or person in the path of a closing door without requiring contact for activation at nominal heights of 5 inches and 29 inches above the floor. Door reopening devices shall remain effective for a period of not less than 20 seconds.

**2107.4.4 Car call:** The minimum acceptable time for doors to remain open shall not be less than five seconds.

**2107.4.5 Car interior:** The car interior shall allow for the turning of a wheelchair. The minimum clear distance between walls, or between wall and door excluding return panels, shall be not less than 68 by 54 inches (1727 mm by 1372 mm). Minimum distance from wall to return panel shall be not less than 51 inches (1295 mm).

**2107.4.6 Car controls:** Elevator control panels shall have the following features:

1. Buttons. All control buttons shall be at least ¾ inch (19 mm) in their smallest dimensions. They may be raised, flush or recessed.
2. Tactile and Visual Control Indicators. All control buttons shall be designated by raised or indented standard alphabet characters for letters, arabic characters for numerals, or standard symbols, and as

required in ANSI A17.1-1978 and A17.1a-1979. Raised and indented characters and the main entry floor shall be designated by a raised or indented star on the left of the floor designation. All raised or indented designations for control buttons shall be placed immediately to the left of the button to which they apply. Applied plates, permanently attached, are an acceptable means to provide raised or indented control designations. Floor buttons shall be provided with visual indicators to show when each call is registered. The visual indicators shall be extinguished when each call is answered.

3. Height. All floor buttons shall be not higher than 54 inches (1370 mm) above the floor. Emergency controls, including the emergency alarm and emergency stop, shall be grouped at the bottom of the panel and shall have their centerlines not less than 35 inches (890 mm) above the floor.
4. Location. Controls shall be located on a front wall if cars have center opening doors, and at the side wall or at the front wall next to the door if cars have side opening doors.

**2107.4.7 Hall buttons:** The centerline of the hall call buttons shall be a nominal 42 inches above the floor. Director buttons, exclusive of border, shall be a minimum of ¾ inch (19 mm) in size and raised, flush or recessed. Visual indication shall be provided to show each call registered, and extinguished when the call is answered. Depth of flush or recessed buttons when operated shall not exceed ⅜ inch (10 mm). Buttons shall not be obstructed by chairs, ashtrays, or decorative ornaments, etc.

**2107.4.8 Hall lantern:** A visual and audible signal shall be provided at each hoistway entrance, indicating to the prospective passenger the car answering the call and its direction of travel. The visual signal for each direction shall be a minimum of 2½ inches (64 mm) in size and visible from the proximity of the hall call button. The audible signal shall sound once for the up direction and twice for the down direction. The centerline for the fixture shall be located a minimum of 6 feet (1829 mm) from the floor. The use of in-car lanterns conforming to above and located in the jamb shall be acceptable.

**2107.4.9 Door jamb marking:** The floor designation shall be provided at each hoistway entrance on both sides of the jamb, and visible from within the car and the elevator lobby at a height of 60 inches (1524 mm) above the floor. Designations shall be on a contrasting color background a minimum of 2½ inches (64 mm) high and raised .030 inch (0.8 mm). Applied plates permanently attached shall be acceptable.

**2107.4.10 Car position indicators:** In elevator cars, a visual car position indicator shall be provided above the car control panel or over the door to show the position of the elevator in the hoistway. As the car passes or stops at a floor served by the elevators, the corresponding numeral shall illuminate. Numerals shall be a minimum of ½ inch (13 mm) high.

**2107.4.11 Emergency communications:** Emergency two-way communication systems between the elevator and a point outside the hoistway shall comply with ANSI A17.1-1978 and A17.1a-1979. The highest operable part of a two-way communication system shall be a maximum of 54 inches (1370 mm) from the floor of the car. It shall be identified by raised or recessed symbol and lettering complying with Section 30, and located adjacent to the device. If the system uses a handset, then the length of the cord from the panel to the handset shall be at least 29 inches (735 mm).

## SECTION 2108.0 HOISTWAY ENCLOSURES AND VENTING

**2108.1 Hoistway enclosures:** Hoistway enclosures shall be constructed in accordance with Sections 2108.1.1 through 2108.1.3.

**2108.1.1 Elevator enclosures:** All elevator and other hoistway enclosures other than dumbwaiter shafts shall be constructed to afford at least the fireresistance rating specified in Table 401 with approved opening protectives conforming to Section 2112.0 and Article 14.

**2108.1.2 Dumbwaiter enclosures:** Shaft enclosures and dumbwaiters having a car area of more than 3 square feet (0.28 $m^2$) which travel through more than one story and serve more than two adjacent floors shall be of one hour fireresistance rated construction with approved three quarter hour opening protectives or the approved labeled equivalent complying with Article 14, except that when the load capacity exceeds 100 psf (488.2 kg/$m^2$) the enclosure and opening protectives shall comply with the requirements of Section 2108.1.1 for fireresistance rating.

**2108.1.3 Special dumbwaiter enclosures:** The enclosure of dumbwaiters not more than 3 square feet (0.28 $m^2$) in area with a load capacity of not more than 25 pounds (11.35 kg), and all dumbwaiters serving not more than two adjacent levels, shall be enclosed with approved noncombustible materials.

**2108.2 Number of elevators permitted in hoistway:** Where four or more elevators serve all or the same portion of a building, they shall be located in not less than two hoistways, and more than four elevators shall not be located in any one hoistway.

**2108.3 Vents required:** Hoistways of elevators and dumbwaiters serving more than three stories shall be provided with means for venting smoke and hot gases to the outer air in case of fire, except as listed in Sections 2108.3.1 and 2108.3.2.

**2108.3.1 Fire suppression system alternative:** In buildings other than of Use Groups R-1, R-2 and I-2 and similar buildings with overnight sleeping quarters, hoistways not extending into the top story may be provided with approved fire suppression system connected to the building water supply system or conforming to Section 1704.0 in lieu of the required vents.

**2108.3.2 Sidewalk elevator hoistways:** Sidewalk elevator hoistways are not required to be vented.

**2108.4 Vents:** Vents shall be located:

1. In the side of the hoistway enclosure directly below the floor or floors at the top of the hoistway, and shall open either directly to the outer air or through noncombustible ducts to the outer air; or
2. In the wall or roof of the penthouse or overhead machinery space above the roof, provided that openings have a total of not less than the minimum specified in Section 2108.5 in lieu of the required vents.

**2108.5 Area of vents:** Except as herein provided, the area of the vents shall be not less than 3½ percent of the area of the hoistway nor less than 3 square feet (0.28 $m^2$) for each elevator car, and not less than 3½ percent nor less than ½ square foot (0.047 $m^2$) for each dumbwaiter car in the hoistway whichever is greater. Of the total required vent area, not less than one third shall be of the permanently open type. Where mechanical ventilation conforming to the mechanical code listed in Appendix A and providing equivalent venting is provided in the overhead elevator machine room, the required vent area may be reduced, provided the following conditions of Sections 2108.5.1 through 2108.5.4 are met.

**2108.5.1 Restricted use:** The building is not of Use Groups R-1, R-2 or I-2 or similar building with overnight sleeping quarters.

**2108.5.2 Machine room location:** The machine room is so located that it does not have outside exposure.

**2108.5.3 Hoistway extension:** The hoistway does not extend to the top story of the building.

**2108.5.4 Exhaust fan operation:** The machine room exhaust fan is automatically reactivated by thermostatic means.

**2108.6 Closed vents:** Closed portions of the required vent area shall consist of windows, skylights or duct openings glazed with plain glass not more than ⅛ inch thick.

**2108.6.1 Skylights:** Skylights used as required vents shall conform to Section 1426.3.

**2108.6.2 Windows:** Windows used as required vents shall conform to Section 1416.0, except that they shall be glazed with ⅛ inch plain glass.

## SECTION 2109.0 ELEVATOR EXIT RESTRICTIONS

**2109.1 General:** Elevators shall not be accepted as a required element of an exit. Elevators shall not be installed in a common enclosure with a stairway, and the path of travel on any exit stairway shall not pass directly in front of any elevator hoistway door.

## SECTION 2110.0 ELEVATOR AND DUMBWAITER MACHINERY AND EQUIPMENT

**2110.1 General:** Elevator and dumbwaiter machinery and equipment shall conform to ANSI A17.1 listed in Apppendix A.

## SECTION 2111.0 MACHINE ROOMS AND RELATED CONSTRUCTION FOR PASSENGER AND FREIGHT ELEVATORS AND DUMBWAITERS

**2111.1 General:** The construction of machine rooms and related construction for passenger and freight elevators and dumbwaiters shall conform to ANSI A17.1 listed in Appendix A.

## SECTION 2112.0 ELEVATOR OPENING PROTECTIVES

**2112.1 General:** All hoistway enclosure doors for elevators, dumbwaiters and other hoisting equipment shall be constructed in accordance with the provisions of Article 14 and as herein required.

**2112.2 Hoistway doors:** Door openings of elevator hoistway enclosures shall be equipped with protective assemblies having a fireresistance rating of not less than one and one half hours or their approved labeled equivalent. However, when the shaft opens into a vestibule enclosed with not less than two hour fireresistance rated construction in which all vestibule openings are protected with assemblies having a fireresistance rating of not less than one hour, the fireresistance rating of the hoistway doors may be reduced to three quarter hour.

**2112.3 Hardware:** All hardware on opening protectives shall be of an approved type installed as tested, except that interlocks, mechanical elevator door locks and electric contacts and door operating mechanisms of approved types shall be exempt from the fire test requirements.

**2112.4 Door operation on dangerous floors:** In every structure where elevator emergency operation is provided, each elevator lobby shall be provided with a smoke detector located on the lobby ceiling. When the detector is activated, elevator doors shall not open and all cars serving that lobby are to return to the main floor in accordance with the requirements of Section 2107.2. If the main floor detector or a transfer floor detector is activated, all cars serving the main floor or transfer floor shall return to a location approved by the fire department and building official in accordance with the requirements of Section 2107.2. The smoke detector is to operate before the optical density exceeds 0.03 per foot (0.098 per m). The detector may serve to close the lobby doors.

## SECTION 2113.0 ELEVATOR CAR EMERGENCY SIGNALS AND SIGNS

**2113.1 Emergency signals:** Elevator cars shall be provided with car emergency signals conforming to the requirements of ANSI A17.1 listed in Appendix A.

**2113.2 Emergency signs:** A pictograph sign, of a standarized type approved by the building official, shall be posted over each elevator call station on all floors, indicating that in case of fire occupants shall not use elevators and that stairways are the approved method of exit.

## SECTION 2114.0 SPECIAL PURPOSE PERSONNEL ELEVATORS

**2114.1 Restricted use:** Special purpose personnel elevators shall be restricted to employees only. They shall comply with the applicable requirements of this article and shall be installed only when permitted by the building official in feed, flour and cereal mills, grain elevators and in similar buildings of other use groups.

**2114.2 Hoistways and hoistway enclosures:** Where the hoistway is adjacent to areas permitting passage of people (e.g., passageways, stairwells, elevator landings), it shall be enclosed to a height of not less than 7 feet (2134 mm) above the floor or stair treads. The enclosure shall be of sufficient strength to prevent contact between the enclosure material and the car or counterweight when the enclosure is subjected to a force of 250 pounds (113.6 kg) applied at right angles at any point over an area of 4 inches (102 mm) by four inches (102 mm). Openwork enclosures may be used and shall reject a ball 1 inch (25 mm) in diameter.

**2114.2.1 Enclosures required:** Except at the entrance, cars shall be fully enclosed with metal at sides and top. The enclosure at the sides shall be solid or of openwork which will reject a ball of 1 inch (25 mm) in diameter. The minimum clear height inside the car shall be 78 inches (1981 mm).

**2114.3 Limitation of load, speed and platform area:** The rated load shall not exceed 650 pounds (295.5 kg). The inside net platform area shall not exceed 9 square feet (.84 $m^2$). The minimum rated load shall not be less than that based on 70 pounds (31.8 kg) per square foot of inside net platform area or 250 pounds (113.6 kg), whichever is greater. The rated speed shall not exceed 100 feet (30480 mm) per minute.

**2114.4 Emergency signal and/or communication:** Each elevator shall be equipped with an alarm button or switch in the car operating station and an alarm device mounted in a location which shall be readily available to a person who is normally situated in the vicinity when the elevator is in use; or a means of voice communication to a receiving station always attended when

the installation is in use. If the alarm device or means of voice communication is normally activated by utility power supply, it shall be backed up by a manual or battery operated device.

**2114.5 through 2117.5 Deleted by Kentucky**

## SECTION 2118.0 ESCALATORS

**2118.1 General:** All escalators and their enclosures shall comply with the provisions of this section and ANSI A17.1 listed in Appendix A. When serving as a required exit element, escalators shall meet the additional requirements of Section 820.0.

**2118.2 Construction materials:** Escalator construction materials shall comply with the provisions of Sections 2118.2.1 and 2118.2.2.

**2118.2.1 Machine room enclosure:** When not approved as a required exit element, the stairwell may be open when protected with an exhaust system or ventilation and water curtains as provided in Section 631.3, or with a power operated shutter conforming to Section 2118.3; except that the machine room shall be enclosed with one hour fireresistance rated construction and shall be properly lighted and ventilated. When such escalator serves as a required exit element, the complete enclosure including the machine room shall be constructed with a fireresistance rating complying with the requirements of Section 816.0 for interior stairways.

**2118.2.2 Noncombustible materials:** The escalator shall be constructed entirely of noncombustible and fire-retardant materials except electrical equipment, wiring, wheels, handrails and the use of 1/28 inch wood veneers on balustrades backed up with noncombustible materials.

**2118.3 Automatic fire shutter:** Unenclosed escalators that do not meet the requirements of Article 8 for exit stairways and which are not protected with an approved exhaust system and automatic water curtain specified in Section 631.3 shall be equipped with a power operated automatic shutter at every floor pierced thereby, constructed of noncombustible materials with a fireresistance rating of not less than one and one half hours.

**2118.3.1 Construction:** The shutter shall be so as to close immediately upon the automatic detection of fire or smoke by an approved device and shall completely shut off the well opening. The shutter shall operate at a speed of not more than 30 feet per minute (0.15 m/s); and shall be equipped with a sensitive leading edge to arrest its progress when in contact with any obstacle, and to continue its progress on release therefrom.

# ARTICLE 22

## STATE PLUMBING CODE

### SECTION 2200.0 GENERAL

**2200.1 Scope:** The design and installation of all plumbing systems, including sanitary and storm water sewage disposal in buildings shall comply with the requirements of the Kentucky State Plumbing Code as set out in Title 815 Chapter 20 of the Kentucky Administrative Regulations and reprinted here.

### 20:010 DEFINITIONS

**Section 1. Definition of Terms**

**Air break (drainage system):** A piping arrangement in which a drain from a fixture, appliance, or device discharges indirectly into another fixture, receptacle, or interceptor at a point below the flood level rim.

**Air gap (drainage system):** The unobstructed vertical distance through the free atmosphere between the outlet of waste pipe and the flood level rim of the receptacle into which it is discharging.

**Air gap (water distribution system):** The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture or other device and the flood level rim of the receptacle.

**Anchors:** See "Supports."

**Approved:** Accepted or acceptable under an applicable specification stated or cited in this code.

**Area drain:** A receptacle designed to collect surface or storm water from an open area.

**Aspirator:** A fitting or device supplied with water or other fluid under positive pressure which passes through an integral orifice or "constriction" causing a vacuum. Aspirators are often referred to as "suction" apparatus, and are similar in operation to an ejector.

**Autopsy table:** A fixture or table used for post mortem examination of a body.

**Backflow:** The flow of water or other liquids, mixtures, or substances into the

distributing pipes of a potable supply of water from any source or sources other than its intended source. Back siphonage is one type of backflow.

**Backflow connection:** Any arrangement whereby backflow can occur.

**Backflow preventer:** A device or means to prevent backflow.

**Backflow preventer, reduced pressure zone type:** An assembly of differential valves and check valves including an automatically opened spillage port to the atmosphere.

**Back siphonage:** The flowing back of used, contaminated, or polluted water from a plumbing fixture or vessel or other sources into a potable water supply pipe due to a negative pressure in such pipe.

**Basement:** The basement is the lowest level of a dwelling unit which is wholly or partly below the ground level in which the entrance and exit is made by use of a stairway or other mechanical means and which may or may not have an entrance and exit at the basement floor level.

**Basement floor drains:** A basement floor drain is a drain placed in the basement floor of a residence which may or may not receive sanitary waste water.

**Battery of fixtures:** Any group of two or more similar adjacent fixtures which discharge into a common horizontal waste or soil branch.

**Bedpan hopper:** See "Clinical sink."

**Bedpan steamer or boiler:** A fixture used for scalding bedpans or urinals by direct application of steam or boiling water.

**Bedpan unit:** A small workroom in the nursing area designed and equipped for emptying, cleaning, and sometimes for steaming bedpans, and for no other purpose.

**Bedpan washer and sterilizer:** A fixture designed to wash bedpans and to flush the contents into the sanitary drainage system. It may also provide for disinfecting utensils by scalding with steam or hot water.

**Bedpan washer hose:** A device supplied with hot and cold water and located adjacent to a water closet or clinical sink to be used for cleaning bedpans.

**Boiler blowoff:** An outlet on a boiler to permit emptying or discharge of sediment.

**Boiler blowoff tank:** A vessel designed to receive the discharge from a boiler blowoff outlet and to cool the discharge to a temperature which permits its safe discharge to the drainage system.

**Branch:** The branch of any system of piping is that part of the system which extends horizontally, at a slight grade, with or without lateral or vertical extensions or vertical arms, from the main to receive fixture outlets not directly connected to the main.

**Branch, fixture:** See "Fixture branch."

**Branch interval:** A distance along a soil or waste stack corresponding in

general to a story height, but in no case less than eight feet, within which the horizontal branches from one floor or story of a building are connected to the stack.

**Branch vent:** A vent connecting one or more individual vents with a vent stack or stack vent.

**Building:** A structure having walls and a roof designed and used for the housing, shelter, enclosure, or support of persons, animals or property.

**Building classification:** The arrangement of buildings in classes according to occupancy.

**Building drain:** That part of the lowest piping of a drainage system which receives the discharge from soil, waste, and other drainage pipes inside the walls of the building and conveys it to the building sewer, beginning two feet outside the building wall.

**Building drain, combined:** A building drain which conveys both sewage and storm water or other drainage.

**Building drain, sanitary:** A building drain which conveys sewage only.

**Building drain, storm:** A building drain which conveys storm water or other drainage but not sewage.

**Building gravity drainage system:** A drainage system which drains by gravity into the building sewer.

**Building sewer:** That part of the drainage system which extends from the end of the building drain and conveys its discharge to a public sewer, private sewer, individual sewage disposal system, or other point of disposal.

**Building sewer, combined:** A building sewer which conveys both sewage and storm water or other drainage.

**Building sewer, sanitary:** A building sewer which conveys sewage only.

**Building sewer, storm:** A building sewer which conveys storm water or other drainage but no sewage.

**Building subdrain:** That portion of a drainage system which does not drain by gravity into the building sewer.

**Cesspool:** A lined and covered excavation in the ground which receives a discharge of domestic sewage or other organic wastes from a drainage system, so designed as to retain the organic matter and solids, but permitting the liquids to seep through the bottom and sides.

**Circuit vent:** A branch vent that serves two or more traps and extends from the downstream side of the highest fixture connection of a horizontal branch to the vent stack.

**Clinical sink (bedpan hopper):** A fixture for the rinsing of bedpans and soiled linens. Such fixture shall have a trap size of not less than three inches.

**Code:** Means the State Plumbing Code.

**Combination fixture:** A fixture combining one sink and laundry tray or a two or three compartment sink or laundry tray in one unit.

**Combined building drain:** See "Building drain, combined."

**Combined building sewer:** See "Building sewer, combined."

**Combination waste and vent system:** A specially designed system of waste piping embodying the horizontal wet venting of one or more sinks or floor drains by means of a common waste and vent pipe adequately sized to provide free movement of air above the free water surface in the drain.

**Common vent:** A vent connecting at the junction of two fixture drains and serving as a vent for both fixture drains.

**Conductor:** A pipe inside the building which conveys storm water from the roof to a storm or combined building drain.

**Continuous vent:** A vertical vent that is a continuation of the drain to which it connects.

**Continuous waste:** A drain from two or more fixtures connected to a single trap.

**Cross connection:** Any physical connection or arrangement between two otherwise separate piping systems, one of which contains potable water and the other either water of unknown or questionable safety or steam, gas, or chemical whereby there may be a flow from one system to the other, the direction of flow depending on the pressure differential between the two systems. See "Backflow and back siphonage."

**Dead end:** A branch leading from a soil, waste or vent pipe, building drain, or building sewer, and terminating at a developed length of two feet or more by means of a plug, cap, or other closed fitting.

**Developed length:** The length of a pipe line measured along the center line of the pipe and fittings.

**Diameter:** The nominal diameter as designated commercially.

**Domestic sewage:** The water borne wastes derived from ordinary living processes.

**Double offset:** Two changes of direction installed in succession or series in a continuous pipe.

**Downspout:** See "Leader."

**Drain:** Any pipe which carries waste water or water borne wastes in a building drainage system.

**Drainage pipe:** See "Drainage system."

**Drainage system:** Includes all the piping, within public or private premises, which conveys sewage, rain water, or other liquid wastes to a point of disposal. It does not include the mains of a public sewer system or private or public sewage treatment or disposal plant. Neither does this apply to plumbing appliances.

**Drainage system (building gravity):** A drainage system which drains by gravity into the building sewer.

**Drainage system, subbuilding:** See "Building subdrain."

**Dry well:** See "Leaching well."

**Dual vent:** See "Common vent."

**Durham system:** A term used to describe soil or waste systems where all piping is of threaded pipe, tube, or other such rigid construction, using recessed drainage fittings to correspond to the types of piping.

**Dwelling unit:** One or more rooms with provision for living, sanitary and sleeping facilities arranged for the use of one family or individual.

**Effective opening:** The minimum cross sectional area at the point of water supply discharge, measured or expressed in terms of (i) diameter of a circle, or (ii) if the opening is not circular, the diameter of a circle of equivalent cross sectional area.

**Ejector:** See "Aspirator."

**Existing work:** A plumbing system or any part thereof installed prior to the effective date of this code.

**Farmstead:** As defined in KRS 318.010(8) and determined by the following:

(a) Must have 10 acres or more;
(b) Must have a barn and equipment incident to producing a crop;
(c) Must have a crop basis registered with the ASC Office;
(d) Must be outside the corporate limits of a municipality;
(e) Must not be connected to or utilize a municipal or water district water supply on any portion of the property;
(f) Farming must be agricultural in nature as defined in KRS 132.010(7) and registered with the PVA in that county; and the owner must earn a substantial portion of his/her income from his property, i.e., at least:

10-30 acres—$1,000 plus $60 per acre or fraction thereof over 10 acres;

30-60 acres—$2,000 plus $40 per acre or fraction thereof over 30 acres;

60-100 acres—$3,400 plus $25 per acre or fraction thereof over 60 acres.

**Fire line:** A system of pipes and equipment used exclusively to supply water for extinguishing fires.

**Fixture:** See "Plumbing fixture."

**Fixture branch:** A fixture branch is the piping distance between a soil, waste and vent stack and the fixture trap.

**Fixture drain:** The drain from the trap of a fixture to the junction of that drain with any other drain pipe.

**Fixture supply:** The water supply pipe connecting a fixture to a branch water supply pipe or directly to a main water supply pipe.

**Fixture unit, drainage (d.f.u.):** A measure of the probable discharge into the drainage system by various types of plumbing fixtures. The drainage fixture unit value for a particular fixture depends on its volume rate of drainage discharge, on the time duration of a single drainage operation, and on the average time between successive operations. (Note: In general, on small systems, one drainage fixture unit approximates one cubic foot per minute.)

**Fixture unit, supply (s.f.u.):** A measure of the probable hydraulic demand on the water supply by various types of plumbing fixtures. The supply fixture unit value for a particular fixture depends on its volume rate of supply, on the time duration of a single supply operation, and on the average time between successive operations.

**Flood level:** See "Flood level rim."

**Flood level rim:** The edge of the receptacle from which water overflows.

**Flooded:** The condition which results when the liquid in a container or receptacle rises to the flood level rim.

**Floor drain:** A floor drain is a drain placed in the floor of a building for the purpose of receiving sanitary waste water.

**Floor pantry:** A workroom in the nursing area designed and equipped to prepare supplemental diets or beverages, and to assemble food trays at meal times if used in conjunction with decentralized food service.

**Flow pressure:** The pressure in the water supply pipe near the faucet or water outlet while the faucet or water outlet is wide open and flowing.

**Flush valve:** A device located at the bottom of a tank for flushing water closets and similar fixtures.

**Flushing type floor drain:** A drain which is equipped with an integral water supply enabling flushing of the drain receptor and trap.

**Flushometer valve:** A device which discharges a predetermined quantity of water to fixtures for flushing purposes and is closed by direct water pressure.

**Frostproof closet:** A hopper with no water in the bowl and with the trap and water supply control valve located below frost line.

**Grade:** The fall (slope) of a line of pipe in reference to a horizontal plane. In drainage it is usually expressed as the fall in a fraction of an inch per foot length of pipe.

**Grease interceptor:** See "Interceptor."

**Grease trap:** See "Interceptor."

**Hangers:** See "Supports."

**Horizontal branch drain:** A drain branch pipe extending laterally from a soil or waste stack or building drain, with or without vertical sections or branches, which receives the discharge from one or more fixture drains and conducts it to the soil or waste stack or to the building drain.

**Horizontal pipe:** Any pipe or fitting which makes an angle of less than 45 degrees with the horizontal.

**Hot water:** Water at a temperature of not less than 120 degrees F.

**House drain:** See "Building drain."

**House sewer:** See "Building sewer."

**Indirect waste pipe:** A waste pipe which does not connect directly with the drainage system, but which discharges into the drainage system through an air break or air gap into a trap, fixture, receptor or interceptor.

**Individual sewage disposal system:** A system for disposal of domestic sewage by means of a septic tank, cesspool or mechanical treatment, designed for use apart from a public sewer to serve a single establishment or building.

**Individual vent:** A pipe installed to vent a fixture drain. It connects with the

vent system above the fixture served or terminates outside the building into the open air.

**Individual water supply:** A supply other than an approved public water supply which serves one or more families.

**Industrial floor drain:** An industrial floor drain is a drain placed in the floor of a building other than in a toilet room or shower room to receive waste water.

**Industrial wastes:** Liquid wastes resulting from the processes employed in industrial and commercial establishments.

**Insanitary:** Contrary to sanitary principles, injurious to health.

**Interceptor:** A device designed and installed so as to separate and retain deleterious, hazardous, or undesirable matter from normal wastes while permitting normal sewage or liquid wastes to discharge into the drainage system by gravity.

**Installed:** Altered, changed or a new installation.

**Kitchen sink unit:** A kitchen sink unit is defined as a sink, double or single compartment, food waste disposer, and dishwasher placed in a unit so arranged that the dishwasher abuts the sink.

**Leaching well or pit:** A pit or receptacle having porous walls which permit the contents to seep into the ground.

**Leader:** An exterior drainage pipe for conveying storm water from roof or gutter drains.

**Liquid waste:** The discharge from any fixture, appliance, area or appurtenance, which does not contain fecal matter.

**Load factor:** The percentage of the total connected fixture unit flow which is likely to occur at any point in the drainage system.

**Local vent stack:** A vertical pipe to which connections are made from the fixture side of traps and through which vapor and/or foul air may be removed from the fixture or devices used on bedpan washers.

**Local ventilating pipe:** A local ventilating pipe is a pipe through which foul air is removed from a room or fixture.

**Loop vent:** A circuit vent which loops back to connect with a stack vent instead of a vent stack.

**Main:** The main of any plumbing system is that part of such system of horizontal, vertical or continuous piping which receives the waste, soil, main or individual vents from fixture outlets, or traps, directly or through branch pipes.

**Main sewer:** See "Public sewer."

**Main vent:** The principal artery of the venting system to which vent branches may be connected.

**Manufacturer's floor drain:** See "Industrial floor drain."

**Multiple dwelling:** Building containing more than two dwelling units.

**Nonpotable water:** Water not safe for drinking, personal or culinary use.

**Nuisance:** Public nuisance as known in common law or in equity jurisprudence; whatever is dangerous to human life or detrimental to health; whatever building, structure, or premise is not sufficiently ventilated, sewered, drained, cleaned, or lighted, in reference to its intended or actual use; and whatever renders the air or human food or drink or water supply unwholesome.

**Nurses' station:** An area in the nursing unit separated from the corridor by counter or desk, designed to permit nurses to record and file each patient's history and progress, observation and control of corridor, preparation of medicines and maintain contact with patients, the hospital and the outside by local and public means of communication.

**Offset:** A combination of elbows or bends which bring one section of the pipe out of line but into a line parallel with the other section.

**Oil interceptor:** See "Interceptor."

**Person:** A natural person, his heirs, executors, administrators or assigns and includes a firm, partnership or corporation, its or their successors or assigns. Singular includes plural; male includes female.

**Pitch:** See "Grade."

**Plumbing:** Plumbing means the art of installing in buildings the pipes for distributing the water supply, the fixtures for using water and drainage pipes for removing waste water and sewage, together with fittings, appurtenances, and appliances of various kinds, all within or adjacent to the building. It shall include:

(a) The water service pipe which forms the connection between the property line and the building other than piping serving fire fighting equipment;

(b) Private water supply systems;

(c) House sewers which convey the waste water and sewage from the building to the property line or other points of disposal but not including sewers located between manholes and sewers extending five feet from a main or manhole on private property; and

(d) Storm sewers and rain water piping located within a building to a point two feet outside of the building and private sewage disposal systems other than those which have a treated effluent.

**Plumbing appliance:** Any one of a special class of plumbing fixture which is intended to perform a special function. Its operation and/or control may be dependent upon one or more energized components, such as motors, controls, heating elements, or pressure or temperature sensing elements. Such fixtures may operate automatically through one or more of the following actions: a time cycle, a temperature range, a pressure range, a

measured volume or weight, or the fixture may be manually adjusted or controlled by the user or operator.

**Plumbing appurtenance:** A manufactured device, or a prefabricated assembly of component parts, and which is an adjunct to the basic piping system and plumbing fixtures. An appurtenance demands no additional water supply, nor does it add any discharge load to a fixture or the drainage system. It is presumed that it performs some useful function in the operation, maintenance, servicing, economy, or safety of the plumbing system.

**Plumbing fixtures:** A receptacle or device which is either permanently or temporarily connected to the water distribution system of the premises, and demands a supply of water therefrom, or it discharges used water, liquid borne waste materials, or sewage either directly or indirectly to the drainage system of the premises, or which requires both a water supply connection and a discharge to the drainage system of the premises. Plumbing appliances as a special class of fixture are further defined.

**Plumbing inspector:** A duly authorized employee or agent of the Department of Housing, Buildings and Construction who is charged with the responsibility of inspecting plumbing installations and with the enforcement of the state plumbing laws and code.

**Plumbing system:** The plumbing system of a building includes: appliances and water heaters; the water supply distributing pipes; the fixtures and fixture traps; the soil, waste and vent pipes; the house drain and house sewer; the storm water drainage within a building with their devices, appurtenances and connections, all within or adjacent to the building.

**Pool:** See "Swimming pool."

**Potable water:** Water free from impurities present in amounts sufficient to cause disease or harmful physiological effects and conforming in its bacteriological and chemical quality to the requirements of the Public Health Service Drinking Water Standards or the regulations of the Department of Housing, Buildings and Construction.

**Private or private use:** In the classification of plumbing fixtures, private applies to fixtures in residences and apartments and to fixtures in private bathrooms of hotels as well as similar installations in other buildings where the fixtures are intended for the use of a family or an individual.

**Private sewer:** A sewer, serving two or more buildings, privately owned, and not directly controlled by public authority.

**Public or public use:** In the classification of plumbing fixtures, public applies to fixtures in general toilet rooms of schools, gymnasiums, hotels, railroad stations, public buildings, bars, public comfort stations, and other installations (whether pay or free) where a number of fixtures are installed so that their use is similarly unrestricted.

**Public sewer:** A common sewer directly controlled by public authority.

**Public water main:** A water supply pipe for public use controlled by public authority.

**Receptor:** A fixture or device which receives the discharge from indirect waste pipes.

**Relief vent:** An auxiliary vent which permits additional circulation of air into or between drainage and vent systems.

**Return offset:** A double offset installed so as to return the pipe to its original alignment.

**Revent pipe:** See "Individual vent."

**Rim:** An unobstructed open edge of a fixture.

**Riser:** A water supply pipe which extends vertically one full story or more to convey water to branches or to a group of fixtures.

**Roof drain:** A drain installed to receive water collecting on the surface of a roof and to discharge it into a leader or a conductor.

**Roughing-in:** The installation of all parts of the plumbing system which can be completed prior to the installation of fixtures. This includes drainage, water supply, and vent piping, and the necessary fixture support.

**Safe waste:** See "Indirect waste."

**Sand interceptor:** See "Interceptor."

**Sand trap:** See "Interceptor."

**Sanitary sewer:** A sewer which carries sewage and excludes storm, surface, and ground water.

**Scrub sink:** A device usually located in the operating suite to enable operating personnel to scrub their hands prior to operating procedures. The hot and cold water supply is activated by a knee action mixing valve or by wrist or pedal control.

**Seepage well or pit:** A covered pit with open jointed lining into which septic tank effluent is received that will seep or leach into the surrounding porous soil.

**Separator:** See "Interceptor."

**Septic tank:** A water tight receptacle which receives the discharge of a building sanitary drainage system or part thereof, and is designed and constructed so as to digest organic matter through a period of detention and allow the liquids to discharge into the soil outside of the tank through a system of open joint or perforated piping, or a seepage pit.

**Sewage:** Any liquid waste containing animal or vegetable matter in suspension or solution, and may include liquids containing chemicals in solution.

**Sewage ejectors:** A device for lifting sewage by entraining it in a high velocity jet of steam air or water.

**Side vent:** A vent connecting to the drain pipe through a fitting at an angle not greater than 45 degrees to the vertical.

**Size of pipe and tubing:** See "Diameter."

**Slope:** See "Grade."

**Soil pipe:** A soil pipe is any pipe which conveys the discharge of water closets or similar fixtures, with or without the discharges from other fixtures, to the house drain.

**Soil vent:** See "Stack vent."

**Special wastes:** Wastes which require special treatment before entry into the normal plumbing system.

**Special waste pipe:** Pipes which convey special wastes.

**Stack:** A general term for any vertical line of soil, waste or vent piping.

**Stack group:** A group of fixtures located adjacent to the stack so that by means of proper fittings, vents may be reduced to a minimum.

**Stack vent:** The extension of a soil or waste stack above the highest horizontal drain connected to the stack.

**Stack venting:** A method of venting a fixture or fixtures through the soil or waste stack.

**Sterilizer, boiling type:** A boiling type "sterilizer" is a fixture (nonpressure type), used for boiling instruments, utensils, and/or other equipment used for disinfection. Some devices are portable, others are connected to the plumbing system.

**Sterilizer, instrument:** A device for the sterilization of various instruments.

**Sterilizer, pressure instrument washer sterilizer:** A pressure instrument washer sterilizer is a fixture (pressure vessel) designed to both wash and sterilize instruments during the operating cycle of the fixture.

**Sterilizer, pressure (autoclave):** A fixture (pressure vessel) designed to use steam under pressure for sterilizing. Also called an autoclave.

**Sterilizer, utensil:** A device for the sterilization of utensils as used in hospital services.

**Sterilizer vent:** A separate pipe or stack, indirectly connected to the building drainage system at the lower terminal, which receives the vapors from nonpressure sterilizers, or the exhaust vapors from pressure sterilizers, and conducts the vapors directly to the outer air. Sometimes called vapor, steam, atmospheric, or exhaust vent.

**Sterilizer, water:** A water sterilizer is a device for sterilizing water and storing sterile water.

**Still:** A device used in distilling liquids.

**Storm drain:** See "Building storm drain."

**Storm sewer:** A sewer used for conveying rain water, surface water, condensate, cooling water, or similar liquid wastes.

**Subsoil drain:** A drain which collects subsurface water and conveys it to a place of disposal.

**Sump:** A tank or pit, which receives sewage or liquid waste, located below the normal grade of the gravity system and which must be emptied by mechanical means.

**Sump pump:** A mechanical device other than an ejector or bucket for removing sewage or liquid waste from a sump.

**Supports:** Devices for supporting and securing pipe, fixtures, and equipment.

**Swimming pool:** Any structure, basin, chamber, or tank containing any artificial body of water for swimming, diving, wading or recreational bathing.

**Trap:** A fitting or device which provides a liquid seal to prevent the emission of sewer gases without materially affecting the flow of sewage or waste water through it.

**Trap seal:** The vertical distance between the crown weir and the top of the dip of the trap.

**Utility room:** A workroom in the patient nursing area, designed and equipped to facilitate preparation, cleaning and incidental sterilizing of the various supplies, instruments, utensils, etc., involved in nursing treatment and care, exclusive of medications handled in nurses stations and bedpan cleaning and sterilizing.

**Vacuum:** Any pressure less than exerted by the atmosphere.

**Vacuum breaker:** See "Backflow preventer."

**Vacuum breaker, nonpressure type (atmospheric):** A vacuum breaker which is not designed to be subjected to static line pressure.

**Vacuum breaker, pressure type:** A vacuum breaker designed to operate under conditions of static line pressure.

**Vent pipe:** A vent pipe is any pipe provided to ventilate a house drainage system and to prevent tray siphonage and back pressure.

**Vent system:** A pipe or pipes installed to provide a flow of air to or from a drainage system or to provide a circulation of air within such system to protect trap seals from siphonage and back pressure.

**Vertical pipe:** Any pipe or fitting which makes an angle of 45 degrees or less with the vertical.

**Wall hung water closet:** A wall mounted water closet installed in such a way that no part of the water closet touches the floor.

**Waste pipe and special waste:** A waste pipe is any pipe which receives the discharge of any fixture (except water closets or similar fixtures) and discharges to the house drain, soil or waste stacks. When such pipe does

not connect directly with a house drain, waste or soil stack, it is termed a special waste.

**Water distributing pipe:** A pipe within the building or on the premises which conveys water from the water service pipe or meter to the point of usage.

**Water lifts:** See "Sewage ejector."

**Water outlet:** A discharge opening through which water is supplied to a fixture, into the atmosphere (except into an open tank which is part of the water supply), to a boiler or heating system, to any devices or equipment requiring water to operate but which are not part of the plumbing system.

**Water riser pipe:** See "Riser."

**Water service pipe:** The pipe from the water main or other source of potable water supply to the water distributing system of the building served.

**Water supply stub:** A vertical pipe less than one story in height supplying one or more fixtures.

**Water supply system:** The water service pipe, the water distributing pipes, and the necessary connecting pipes, fittings, control valves, and all appurtenances in or adjacent to the building or premises.

**Well, bored:** A well constructed by boring a hole in the ground with an auger and installing a casing.

**Well, drilled:** A well constructed by making a hole in the ground with a drilling machine of any type and installing casing and screen.

**Well, driven:** A well constructed by driving a pipe in the ground. The drive pipe is usually fitted with a well point and screen.

**Well, dug:** A well constructed by excavating a large diameter shaft and installing a casing.

**Wet vent:** A vent which receives the discharge of wastes other than from water closets.

**Yoke vent:** A pipe connecting upward from a soil or waste stack to a vent stack for the purpose of preventing pressure changes in the stack.

## 20:020 PARTS OR MATERIALS LIST

**Section 1. Definitions as used in this regulation:**

(1) "APML" shall mean the "Approved Parts or Materials List."
(2) "Parts or materials" shall mean all types of fittings and piping used in the soil, waste and vent systems, house sewers, potable water supply, plumbing fixtures, appurtenances, and mechanical sewage system in private residences.
(3) "Committee" shall mean the State Plumbing Code Committee.
(4) "Code" shall mean the State Plumbing Code.
(5) "Department" shall mean the Department of Housing, Buildings and Construction.

(6) "Person" shall mean any individual, public or private corporation, political subdivision, government agency, municipality, copartnership, association, firm, trust, estate, or other entity whatsoever.

**Section 2. Approved Parts and Material List (APML).** The use of any part or material in any drainage or plumbing system or section thereof, other than those currently authorized by the code, is prohibited unless the use of such part or material has been considered by the committee and approved by the department for inclusion in the APML. The APML may also specify methods of installation and/or restrictions applicable to a particular part or material.

**Section 3. Amending the APML.**

(1) A person desiring to have the APML amended shall petition, in writing, for an opportunity to be heard by the committee no later than 14 days prior to the next scheduled meeting of the committee. Such request shall include a description of the part or material for which approval is sought, available technical data, and a listing of other authorities which have approved the use of the part or material, and any other pertinent information requested by the committee.

(2) The committee shall hold hearings, upon adequate notice to the affected parties, specifying the matters to be considered before the submission to the secretary of its suggested amendments to the APML; provided, however, that nothing herein contained shall be construed to prohibit the amendment of the APML by the department after the prior review of the committee.

(3) The committee will consider all parts or materials for which approval is sought and will forward 30 days thereafter its recommended disposition to the department. Provided, however, that a hearing will be held before the committee if requested, within 30 days following the determination of the committee, by a person having an interest in the subject matter. Upon adoption of a recommendation by the department, the APML will be amended as necessary, and filed by reference in accordance with 1 KAR 1:010.

**Section 4. Custody of the APML.** It shall be the responsibility of the director, Division of Plumbing, to maintain an up-to-date APML and to make it available for inspection during regular office hours. Copies of the APML may be obtained by mailing a self addressed stamped envelope to the Division of Plumbing, Department of Housing, Buildings and Construction, Frankfort, Kentucky 40601. The cost of reproduction shall not exceed ten cents per page.

## APPROVED PARTS AND MATERIALS LISTING

Pursuant to 815 KAR 20:020 the following list of parts and materials shall be incorporated in the Kentucky State Plumbing Code.

(1) Flexible ¾ inch hot and cold water connectors for hot water heaters, minimum wall thickness, .032.

(2) Flushmate water closet tank.

(3) Tabular traps with gasket in trap seal.

(4) Magic Flush Sewage Systems. Limited for use in governmental, industrial or commercial applications where proper operation and maintenance is assured.

(5) Cromaglass Sewage Systems, Model Numbers CA-100, CA-5, CA-15 and CA-25.

(6) Envirovac Vacuum Sewage Systems. Limited for use for mobile facilities and not permanent applications.

(7) Multi-flow Sewage Systems.

(8) Pure Spray Sewage Treatment System.

(9) Whirl Air Sewage System.

(10) Jet Air Sewage System.

(11) Clivus Multrum USA, Inc., System. The size of the drainfield system for the disposal of gray water only, the discharge from lavatories, bathtubs, and sinks, may be reduced by 40 percent when the equilibrium rate of a percolation test is ½ inch or more.

(12) Zero Perk System. This system may be substituted for a septic tank drainfield system when the equilibrium rate of a percolation test is one inch or more. The length of the block lines for the disposal of the effluent in this system may be reduced by 50 percent.

(13) The sewage systems listed below may be substituted for the septic tank when the equilibrium rate of a percolation test is one inch or more:
a. Cromaglass
b. Multi-flow
c. Pure Spray
d. Whirl Air
e. Jet Air

(14) Polyethylene Sump Pump Basin. Polyethylene sump pump basin must be constructed of polyethylene material and be provided with a sump cover.

(15) No Caulk Roof Flashing. No caulk roof flashing shall be 18″ × 18″ galvanized iron base with a neoprene boot forming a water tight seal with the stack that it serves.

(16) Kitchen Sink Faucet. Kitchen sink faucets may have corrugated supply piping provided the piping has a wall thickness equal to Type M copper pipe.

(17) Polyethylene Distribution Box. Polyethylene distribution box as manufactured by the Hancor Company for level subsoil drainage systems only.

(18) Aerocrete Sewage Treatment Plant.

(19) Microphor Company. Two quart flush toilets.

(20) Bi A Robi Systems Treatment Plant.

(21) Polyethylene Roof Flashing. Polyethylene roof flashing shall have a base which will extend six inches in all directions from the base of a stack and shall have a boot with a preformed thermoplastic rubber gasket.

(22) Lab-Line Enfield L-E Acid Waste Systems.

(23) Floor drains, shower drains, urinal drains and cleanouts manufactured by Plastic Oddities, Inc.

(24) Tubular plastic components conforming to ASTM F409, bathtub waste and overflow, traps, continuous sink wastes and extension tubes as manufactured by J & B Products Corporation.

(25) Sink and lavatory faucets and pop up lavatory assembly parts manufactured of CPVC plastic as manufactured by Nibco Co.

(26) In-Sink-Erator's Ultra System. For instant hot water to serve individual fixtures, Model #777W.

(27) "Singular" Home Treatment Unit for sewage treatment as manufactured by Norweco, Inc.

(28) Compression joints. Failsafe hot and cold water systems.

(29) Orion Fittings for acid waste piping systems for above and below ground.

(30) McKnight Utilities, Inc. Coate Aer Individual Home Sewage Treatment Plant.

(31) R & G Slone Manufacturing Company. Fuseal Mechanical Joint for the connection of polyproplene and waste piping.

(32) Hancor, Inc. Dual chamber alternator valve to be used where dual lateral systems are installed and their sewage ejector sump.

(33) Johns Manville Flex I Drain roof drain system.

(34) Advanced Drainage Systems, Inc. NDS Diverter Valve designed for use in septic tank leach fields.

(35) Hancor, Inc. Hancor 500 and 750 gallon Polyethylene Septic Tanks.

(36) Hancor, Inc. Hancor 1,000 gallon Polyethylene Septic Tank.

(37) Hydrocide Liquid Membrane (HLM) to be used as a shower pan material conforming to ASTM C836—76. The density of the material must be at least 1/16 inch thick.

(38) Dektite pipe flashing system to be used on metal building decks for plumbing vent stacks as manufactured by Buildex Corporation.

(39) Jomar 3 and 4 water conserver water closets to operate efficiently on 3.5 gallons of water per flush.

(40) Superinse toilet that operates on one gallon of water per flush as manufactured by Universal Rundle for the Thetford Wastewater Treatment Systems.

(41) Cycle-let Waste Treatment and Water Recycling System as manufactured by Thetfort Corporation to be approved on an individual basis as to engineering requirements.

## 20:040 TRUCK IDENTIFICATION

**Section 1. Truck identification.** All trucks used in the operation of a plumbing business shall be properly identified. The equipment shall bear the name of the company and the master plumber's Kentucky license number. All such identification shall be in letters not smaller than 3 inches high and must be kept legible at all times.

## 20:050 INSTALLATION PERMITS

**Section 1. Issuance of permits.**

(1) Except as otherwise provided by subsection (3) of this section, permits to construct, install or alter plumbing, sewerage or drainage shall be issued only to licensed master plumbers.

(2) Journeyman plumbers shall not construct, install or alter plumbing, sewerage or drainage except when the work is done under the supervision of a licensed master plumber.

(3) Permits to construct, install or alter plumbing, sewerage or drainage may be issued to homeowners who desire to install plumbing in homes actually occupied by them or in a home to be constructed by them for their own personal residential use, provided:
   (a) Application is made for the permit prior to the beginning of the work; and
   (b) The homeowner files with his application an affidavit stating that he will abide by the terms of this section; and
   (c) All work is performed in compliance with the state plumbing law and code and the rules and regulations thereunder promulgated; and
   (d) All the work is personally performed by the owner; and
   (e) Only one homeowner permit for construction of a new home shall be issued to an individual in a five year period.

(4) No permit shall be required for the repairing of leaks, cocks, valves, or for cleaning out waste or sewer pipes.

**Section 2. When a permit is required.** A plumbing construction permit shall be required for the following:

(1) For all new plumbing installations.

(2) For all existing plumbing installations where a fixture or a soil waste opening is to be moved or relocated.

(3) For each individual unit of a multi-store building where there is more than one unit.

(4) For each individual building. (Buildings shall be deemed separate if the connection between them is not a necessary part of the structure of either building, or if they are not under a continuous roof.)

(5) For a new house sewer and for a house sewer that is to be replaced.

(6) For a new water service and for a water service that is to be replaced.

(7) For a new water heater installation and for a water heater installation that is to be replaced.

(8) For any other installation which constitutes "plumbing" within the meaning of KRS Chapter 318 and the state plumbing code.

**Section 3. Plumbing installation permit fees.**

(1) The fee for each plumbing installation permit for residential, one and two family units, shall be fifteen dollars ($15) plus:
   (a) Four dollars ($4) for each plumbing fixture or appliance or plumbing fixture opening or appliance opening left in the soil or waste pipe system including openings left for future fixtures or appliances;
   (b) Four dollars ($4) for each domestic water heater.

(2) The fee for each plumbing installation permit for other than residential, one and two family units, shall be fifteen dollars ($15) plus:
   (a) Five dollars ($5) for each plumbing fixture or appliance or plumbing fixture opening or appliance opening left in the soil or waste pipe system including openings left for future fixtures or appliances;
   (b) Five dollars ($5) for each domestic water heater.

(3) In the event only a new domestic water is installed or replaced, the fee for the plumbing installation permit shall be ten dollars ($10).

(4) In the event only a new water service is constructed or replaced the fee for the plumbing construction permit shall be fifteen dollars ($15).

(5) In the event only a new house sewer is constructed or replaced the fee for a plumbing construction permit shall be fifteen dollars ($15).

(6) In the event only a new private sewage disposal system is constructed or replaced the fee for a plumbing construction permit shall be fifteen dollars ($15).

(7) All persons securing plumbing permits shall be entitled to plumbing inspections at no additional cost; provided, however, that all inspections in excess of three (3) shall be charged at the rate of three dollars ($3) per inspection.

(8) All plumbing installation permits issued under this regulation shall

expire one year after date of issuance thereof; provided, however, if construction is begun within one year after date of issuance the permit shall not expire until completion of the planned plumbing installation.

(9) Plumbing fixtures may be replaced without procuring a plumbing installation permit provided the county plumbing inspector is notified of the installation.

**Section 4. Plumbing inspection fees for public building.** The schedule of fees for inspection of the construction, installation or alteration of plumbing in public buildings shall be the same as specified in Section 3 of this regulation.

## 20:060 QUALITY AND WEIGHT OF MATERIALS

**Section 1. Materials, quality of.** All materials used in any drainage or plumbing system or part thereof, shall be free of defects.

**Section 2. Label, cast or stamped.** Each length of pipe, fitting, trap, fixture and device used in a plumbing or drainage system shall be stamped or indelibly marked with the weight or quality thereof, and, with the maker's mark or name.

**Section 3. Vitrified clay pipe, cement asbestos pipe, concrete pipe, truss pipe, extra heavy SDR 35 sewer piping, polyethylene sewer piping, polyethylene and corrugated polyethylene subsoil drainage tubing.**

(1) Vitrified clay pipe shall conform to ASTM Standard Specifications C200.

(2) Cement asbestos pipe shall conform to ASTM Standard Specifications C428.

(3) Concrete pipe shall conform to ASTM Standard Specifications C14.

(4) Truss pipe shall conform to ASTM Standard Specifications D2680—74. (Solid wall shall conform to ASTM Standard Specifications D2751—74.)

(5) Extra heavy SDR 35 sewer piping shall conform to ASTM Standard Specifications D3033—74 and D3034—74.

(6) Polyethylene sewer piping shall conform to ASTM D3350 and is limited for use between a septic tank and a distribution box or boxes.

(7) Polyethylene and corrugated polyethylene subsoil drainage tubing shall conform to ASTM Standard Specifications F405—74 and shall bear the NSF seal of approval. No pipe or fittings shall be used unless the manufacturer of such material submits to the department a sample of the pipe and fittings that will be used along with an analysis of the material from a private testing laboratory approved by the department. Such a report must be submitted to the department on an annual basis as of July 1, of each year. Polyvinyl chloride subsoil

drainage tubing shall conform to ASTM D2729. They shall have two rows of ¾ inch holes within an arch of 120 degrees of circumference of the piping and shall be on four inch centers. Such tubing shall be visibly marked with the name of the manufacturer and the commercial standard number at ten feet intervals.

**Section 4. Cast iron pipe.** (Hub and Spigot and NO-HUB).

(1) Extra heavy. Extra heavy cast iron pipe and fittings shall conform to CS 188—59 and A74—69.

(2) Service weight. Service weight cast iron pipe and fittings shall conform to A74—69, or 301—72.

(3) Coating. Cast iron pipe and fittings for underground use shall be coated with asphaltum, coal tar pitch or using a coating conforming to ASTM A174.

**Section 5. Wrought iron pipe.** All wrought iron pipe shall conform to the latest ASTM "standard specifications for welded wrought iron pipe."

**Section 6. Mild steel pipe.** All steel pipe shall conform to the latest ASTM "standard specifications for welded and seamless steel pipe."

**Section 7. Brass pipe; copper pipe; and brass tubing.** Brass pipe, copper pipe and brass tubing shall conform respectively to the latest standard specifications of ASTM for "brass pipe, copper pipe, and brass tubing, standard sizes."

**Section 8. Borosilicate pipe.**

(1) Borosilicate pipe shall conform to the latest ASTM standards.

(2) **Plastic pipe.** All plastic piping used in a drainage, waste and vent system shall be Schedule 40 or 80, Type 1, Grade 1, polyvinyl chloride compounds as defined and described in tentative specifications for rigid polyvinyl chloride (PVC) (ASTM Designation: D1784—75), or Schedule 40 or 80 acrylonitrile-butadiene-styrene compound as defined and described in standard specification for acrylonitrile-butadiene-styrene (ABS) (ASTM Designation: D1788—73). Pipe and fittings shall be produced and labeled in accordance with the provisions of Commercial Standard ASTM D2665—76, as amended, for PVC and ASTM D2661—76 for ABS, and both shall bear the NSF seal of approval. All pipe and fittings shall bear the ASTM designation together with the NSF seal, the manufacturer's identification and the size. The use of plastic pipe and fittings (PVC or ABS) as outlined herein shall be restricted to buildings where the soil and/or waste and vent stack do not exceed 45 feet in height, the vertical distance from the base of the stack to its terminus through the roof of the building.

(3) **Stainless steel tubing.** Stainless steel tubing for hot and cold water piping must be Grade H conforming to CS A268—68. Stainless steel

tubing for the soil, waste and vent system must be either Grade G or H conforming to CS A268—68.

(4) **Polyethylene pipe.** Polyethylene pipe used in acid waste systems shall conform to D1204—62T.

(5) **Polypropylene pipe.** Polypropylene pipe used in acid waste systems shall conform to ASTM D2146—65T.

**Section 9. Lead pipe, diameter, weights.**

(1) Lead soil, waste and vent pipes shall be in accordance with the standards of the Lead Industries Association and Federal Specifications WW-P-325, which are identical in substance, and shall not be lighter than the following weights:

| Size inside diameter inch | Commercial designation "D" or "XL" | | Wall thickness, inches | Weight, pounds | Per foot ounces |
|---|---|---|---|---|---|
| 1½ | D | XL | 0.138 | 3 | 8 |
| 2 | D | XL | 0.142 | 4 | 12 |
| 3 | D | XL | 0.125 | 6 | 0 |
| 4 | D | XL | 0.125 | 8 | 0 |

(2) All lead bends and lead traps shall be of the weight known as Extra Heavy (X.H.) and shall have at least ⅛ inch wall thickness. Weights for lead water service or supply pipes shall be according to the maximum working pressure in pounds per square inch as given in Federal Specification WW-P-325.

**Section 10. Sheet lead.** Sheet lead for shower pans shall weigh not less than four pounds per square foot and shall weigh not less than three pounds per square foot for vent pipe flashings.

**Section 11. Sheet copper or brass.** Sheet copper or brass shall not be lighter than No. 18 B&S gauge, except for local and interior ventilating pipe it shall not be lighter than No. 26 B&S gauge.

**Section 12. Threaded fittings.**

(1) Plain screwed fittings shall be either cast iron, malleable iron, or brass of standard weight and dimensions.

(2) Drainage fittings shall be either cast iron, malleable iron, or brass, with smooth interior waterway, with threads tapped out of solid metal.

(3) All cast iron fittings used in a water supply distribution shall be galvanized.

(4) All malleable iron fittings shall be galvanized.

**Section 13. Caulking ferrules.** Caulking ferrules shall be of red brass and

shall be in accordance with the following table:

| Pipe sizes inches | Inside diameter, inches | Length, inches | Minimum weight each |
|---|---|---|---|
| 2 | 2¼ | 2½ | 1 lb. 0 oz. |
| 3 | 3¼ | 4½ | 1 lb. 12 oz. |
| 4 | 4¼ | 4½ | 2 lb. 8 oz. |

**Section 14. Soldering nipples.** Soldering nipples shall be recessed red cast brass, iron pipe size. When cast, they shall be of full bore and of a minimum weight.

**Section 15. Floor flanges for water closets and service sinks or similar fixtures.** Floor flanges shall either be hard lead, brass, cast iron, galvanized malleable iron, ABS or PVC. Hard lead and brass flanges shall be not less than ⅛ inch thick. Cast iron and galvanized malleable iron shall be not less than ¼ inch thick and shall have a 2 inch caulking depth.

**Section 16. New materials.** Any material other than that specified in this code is prohibited unless such material is specifically approved by the State Plumbing Code Committee and the Department of Housing, Buildings and Construction as being equal to or better than the material specified herein. It shall be the responsibility of any person or company seeking the approval of a material not included in this code to prove to the satisfaction of such agencies that the material is equal to or better than the material for which it is intended to replace.

## 20:070 PLUMBING FIXTURES

**Section 1. Materials.** All receptacles used as water closets, urinals, or otherwise for the disposal of human excreta, shall be of vitrified earthenware, hard natural stone, or cast iron with a light color porcelain enameled on the inside, except as indicated in Section 4.

**Section 2. Installation.** All plumbing fixtures shall be installed free and open in a manner to afford access for cleaning. Where practical, all pipes from fixtures shall be run to the wall and no trap or pipe shall extend nearer to the floor than 12 inches except laundry trays or similar fixtures.

**Section 3. Water closet bowls.** Water closet bowls shall be made of one piece and of such form as to hold a sufficient quantity of water when filled to the trap overflow to prevent fouling of its interior surfaces, and it shall be provided with an integral flushing rim so constructed as to flush the entire interior of the bowl.

**Section 4. Plastic water closet bowl and tank.** A plastic water closet bowl and tank shall be made with a polypropylene lining inside the one piece bowl and tank. The outer surface of the bowl shall be constructed of PVC material

and the filler material between the two surfaces shall be made of polyurethane foam. The bowl shall have a 3 inch water seal and shall have a 2⅛ inch waste opening passage.

**Section 5. Frostproof closet:** A frostproof water closet may be installed only in a building that has at least a 12 inch air break between it and any building used for habitation or occupancy. The room shall be tightly enclosed and accessible from the outside only. The soil pipe between the trap and hopper shall be of extra heavy cast iron, 4 inches in diameter and shall be light colored porcelain enamel on the inside. The building must have a nonabsorbent floor. Each frostproof water closet shall have a 4 inch vent.

**Section 6.**

(1) **Floor drains and shower drains.** A floor drain or a shower drain is considered a plumbing fixture and shall be provided with a strainer.

(2) **Shower drain pan construction.** Shower drain pans shall be constructed of sheet lead weighing not less than four pounds per square foot, nonplasticized chlorinated polyethylene conforming to ASTM D412—66, D1204—54 and D568—61 not less than 0.040 inches or other approved material. Shower pans shall be constructed without seams and shall extend to a minimum height of 6 inches on all vertical walls. Shower pans shall not be required on a concrete floor below the outside grade level.

(3) **Fiberglass bathtubs, showers, tub enclosures and shower stalls.** Fiberglass bathtubs and tub enclosures shall conform to Commercial Standards CS 221-59. Acrylic faced bathtubs shall conform to ASTM E84B or E162. Fiberglass shower stalls and shower receptors shall conform to Commercial Standards CS 222-59.

(4) **Metamorphosed carbonate aggregate polyester resinous martrix-marbleoid bathtubs, lavatories and shower stalls.** Metamorphosed carbonate aggregate polyester resinous martrix-marbleoid bathtubs, lavatories and shower stalls shall conform to ANSI Z124-3.

**Section 7. Floor drains, shower drains or urinal drains in inaccessible places.** Floor drains, shower drains or urinal drains shall have a cast iron P trap when installed under concrete floors or inaccessible places. They shall be either caulk or screw type.

**Section 8. Fixture strainer.** All fixtures other than water closets and pedestal urinals shall be provided with a fixed strong metallic or porcelain strainer. The total outlet area shall not be less than that of the interior area of the trap.

**Section 9. Fixture overflow.** The overflow pipe from a fixture shall be connected to the inlet side of a trap and be so arranged that it may be readily and effectively cleaned.

**Section 10. Ventilation of rooms containing fixtures.** Plumbing fixtures, except bedroom lavatories, shall not be located in any room which does not contain a window placed in an external wall or is not otherwise provided with

adequate ventilation. The minimum size of the external fresh air inlet shall be 2¼ square feet of opening. Where forced ventilation is used, the minimum change of air shall be six times per hour and the vent must be extended to the outside of the building or a ductless fan may be used, provided:

(1) The unit bears the label of the Underwriters Laboratories, Inc.;
(2) The unit is installed so as to operate at all times when the lighting circuit is activated;
(3) The unit be installed in either the wall or ceiling;
(4) The unit is installed in accordance with the manufacturer's recommendations;
(5) The manufacturer makes available cartridges that will be replaced on a six month basis;
(6) A unit be provided for each 800 cubic feet of room volume.

**Section 11. Fixture additions.** Any fixture or fixtures added to a plumbing system shall be installed to comply with the other sections of this code, and the discharge from the additional fixture or fixtures shall enter the soil pipe below the lowest vented opening.

**Section 12. Defective fixtures.** All newly installed fixtures found defective or old fixtures found to be in an unsanitary condition shall be repaired, replaced or removed within 30 days upon written notice from the department.

**Section 13. Water heaters.** Water heaters shall be properly connected to the hot and cold water supply and shall be connected to an adequate size flue or chimney, but in no case shall this be connected to a flue serving a coal burning apparatus. The flue or chimney shall extend 2 feet above the roof and be properly flashed and shall not terminate within 6 feet of a door or window. No fuel fired water heater shall be placed in any bathroom, toilet room or a room used for sleeping. If a water heater is placed in a closed room or closet, the door must be a louver door or provided with proper ventilation to provide combustion air and circulation. (See 815 KAR 20:120, Section 11.)

## 815 KAR 20:071 STORAGE AND INSTALLATION OF SCHEDULE 40, ABS AND PVC PLASTIC PIPE AND FITTINGS

**Section 1. Storage.**

(1) Pipe. Pipe shall remain in lifts until ready for use. Lifts shall not be stacked more than three high and shall always be stacked wood on wood. Loose pipe shall be stored in racks with a minimum support space of 3 feet. Pipe shall be shaded but not directly covered when stored outside in high ambient temperatures. This will provide for free circulation of air and reduce heat build up due to direct sunlight exposure.

(2) Fittings. Fittings shall be stored in their original cartons to be kept free of dirt and to reduce the possibility of damage. When possible all fittings shall be stored indoors.

(3) Solvent cement and primers. Solvent cement and primers, because of flammability, must be stored in an area where they will not be

exposed to ignition, sparks, open flames or heat. They shall not be used beyond their marked shelf life.

**Section 2. Handling.** Care must be exercised to avoid rough handling of pipe and fittings. They must not be dragged over sharp projections, dropped or have heavy objects dropped on them. Pipe ends must be inspected for cracks in the event of abuse prior to installation. (When transported by truck or trailer, piping must be reasonably supported.)

**Section 3. Installation.**

(1) Underneath concrete floors. All pipe and fittings shall be laid on stable earth conditions and have 4 inches of grillage on its bottom, top and sides. If ground is unstable it must be removed and the excavation filled with grillage to the underneath side of the piping. No part of a soil or waste pipe shall be placed in a concrete slab except those pipes that pass vertically through it.

(2) Above concrete floors. All horizontal piping shall be properly aligned and installed without strain. Piping shall not be bent or pulled in position either before or after solvent welds have been made. It shall be supported at intervals not to exceed 4 feet and at the end of the branches and at the change of direction and shall be so installed as to permit freedom of movement. All vertical piping shall be supported at their bases and all upward movement shall not be restricted. Closet flanges shall be securely fastened to the floor through which it passes.

**Section 4. Hangers.** Hangers and straps must be at least 1 inch wide and shall not compress, distort, cut or abrade the piping. They shall allow free movement at all times.

**Section 5. Making Solvent Cement Joints.**

(1) (a) Cement shall not be thinned. All cement that has thickened shall be discarded. No cement shall be used beyond its shelf life. It shall not be subject to temperatures below 30 degrees Fahrenheit.

(b) Installers shall avoid prolonged breathing of vapors. Prolonged contact with skin is harmful. Install only with adequate ventilation. Avoid contact with eyes and skin. Solvents are also flammable.

(2) Socket fit. ABS and PVC fittings are manufactured to a close tolerance. All joints shall be an interference fit between pipe and fittings. Additional cement shall not be permitted for the correction of loosely fitted joints.

(3) Joining techniques. Piping shall be cut square with a saw or pipe cutter designed especially for plastic pipe. Pipe and fittings shall be protected from serrated holding devices or abrasions.

(a) Burrs shall be removed from both inside and outside of the pipe. Dust, dirt and moisture shall be removed from the surfaces that

are to be cemented.

(b) Solvent chemical cleaner recommended by the company whose product is being installed shall be applied inside the fitting and on the outside of the piping that is to be joined.

(c) A paint brush shall be used to apply the solvent cement. Apply a moderate even coating of cement in the fitting socket as well as covering the pipe on the joining surfaces only.

(d) Joints shall be assembled as quickly as possible before the cement dries. Insert the piping into the fitting socket turning the pipe slightly to insure even distribution to the cement. Hold the piping in a firm position so it does not "back out" of the joint.

(e) Remove excess solvent cement from the exterior of the joint with a clean dry cloth. The joint shall not be handled for a two minute period. A 15 minute period shall be allowed for the joint to develop handling strength.

(f) No cemented pipe joint shall be made in conditions of excessive moisture, humidity or when the temperature is below 40 degrees or above 90 degrees Fahrenheit.

**PVC-DWV TYPE 1**
**THERMAL EXPANSION TABLE**
**Chart Shows Length Change In Inches**
**vs. Degrees Temperature Change**

| | LENGTH (feet) | | | | |
|---|---|---|---|---|---|
| | 20 | 40 | 60 | 80 | 100 |
| 40° F. | .278 | .557 | .835 | 1.134 | 1.392 |
| 50° F. | .348 | .696 | 1.044 | 1.392 | 1.740 |
| 60° F. | .418 | .835 | 1.253 | 1.670 | 2.088 |
| 70° F. | .487 | .974 | 1.462 | 1.949 | 2.436 |
| 80° F. | .557 | 1.114 | 1.670 | 2.227 | 2.784 |
| 90° F. | .626 | 1.235 | 1.879 | 2.506 | 3.132 |
| 100° F. | .696 | 1.392 | 2.088 | 2.784 | 3.480 |

**ABS-DWV TYPE 1**
**THERMAL EXPANSION TABLE**
**Chart Shows Length Change In Inches**
**vs. Degrees Temperature Change**

| | LENGTH (feet) | | | | |
|---|---|---|---|---|---|
| | 20 | 40 | 60 | 80 | 100 |
| 40° F. | 0.536 | 1.070 | 1.609 | 2.143 | 2.680 |
| 50° F. | 0.670 | 1.340 | 2.010 | 2.680 | 3.350 |
| 60° F. | 0.80 | 1.610 | 2.410 | 3.220 | 4.020 |
| 70° F. | 0.938 | 1.880 | 2.820 | 3.760 | 4.700 |
| 80° F. | 1.072 | 2.050 | 3.220 | 4.290 | 5.360 |
| 90° F. | 1.206 | 2.420 | 3.620 | 4.830 | 6.030 |
| 100° F. | 1.340 | 2.690 | 4.020 | 5.360 | 6.700 |

(7 Ky. R. 525; 767; eff. 3-4-81)

**Section 6. Commingling of Plastic Pipe.** Plastic pipe shall not be commingled except through the use of male and female adapters.

**Section 7. Mixing of Plastic and Metal Piping.** Plastic and metal piping shall discharge into one another by the use of proper fittings and adapters.

**Section 8. Thermal Expansion.** Each plumbing installation must be engineered and designed giving due consideration to the expansion characteristics of the material. Below are expansion tables for both PVC and ABS Schedule 40 plastic piping.

## 20:080 WASTE PIPE SIZE

**Section 1.** The minimum size (nominal inside diameter) of traps, soil or waste branches for a given fixture shall not be less than that given in the following table:

| | Minimum size (in inches) | | |
|---|---|---|---|
| | Trap | Branch | Fixture unit |
| Automatic clothes washer | 2" | 2" | 2" |
| Basement floor drain | 3" | 3" | 3" |
| Bath, sitz | 1½" | 1½" | 2" |
| Bathtub | 1½" | 1½" | 1½" |
| Combination fixture | 2" | 2" | 2" |
| Dental cuspidor | 2" | 2" | 2" |
| Dishwashers | 1½" up | 1½" up | 1½" up |
| Disposal unit | 1½" | 1½" | 1½" |
| Drinking fountain | 1¼" | 1¼" | 1" |
| Floor drain in toilet room | 3" | 3" | 3" |
| Floor drain in utility room | 3" | 3" | 3" |
| Industrial floor drain | 4" | 4" | 4" |
| Kitchen sink unit | 1½" up | 1½" up | 1½" up |
| Laundry tray | 1½" | 1½" | 1½" |
| Lavatory | 1¼" | 1¼" | 1" |
| Santistand | 3" | 4" | 6" |
| Shower stall | 1½" | 1½" | 1½" |
| Sinks, bar or soda fountain | 1½" | 1½" | 1½" |
| Sinks, barium | 2" | 2" | 2" |
| Sinks, chemical | 1½" up | 1½" up | 1½" up |
| Sinks, clinic | 3" | 4" | 6" |
| Sinks, kitchen, residence | 1½" | 1½" | 1½" |
| Sinks, plaster | 2" | 2" | 2" |
| Sinks, service | 3" | 3" | 3" |
| Sinks, service wall type | 2" | 2" | 2" |
| Sink, three compartment | 2" | 2" | 2" |
| Urinal, lip | 1½" | 1½" | 1½" |
| Urinal, pedestal | 3" | 3" | 3" |
| Urinal, stall | 2" up | 2" up | 2" up |
| Urinal, trough | 1½" | 1½" | 1½" |
| Water closet | 3" | 3" or 4" | 6" |

## 20:090 SOIL, WASTE AND VENT SYSTEMS

**Section 1. Grades and supports of horizontal piping.** All horizontal piping shall be run in practical alignment and at a uniform grade of not less than ⅛ inch per foot, and shall be supported or anchored in accordance with the manufacturer's recommendations but in no instance to exceed 10 feet in length. All stacks shall be supported at their bases and all pipes shall be rigidly secured. No hub pipe and fittings shall be supported at each joint of pipe and fittings. Polyvinyl chloride and acrylonitrile-butadiene-styrene Schedule 40 horizontal piping shall be supported at intervals not to exceed 5 feet and at the base of all vertical stacks and at all trap branches as close to the trap as possible. Polyethylene pipe and fittings must be continuously supported with a V channel. Stacks must be rigidly supported at their bases and at each floor level.

**Section 2. Change in direction.** All changes in direction shall be made by the appropriate use of 45 degree wyes, half wyes, quarter, sixth, eighth or sixteenth bends, except that a single sanitary tee may be used in a vertical stack, or a sanitary tee may be turned on its back or side at an angle of not more than 45 degrees.

**Section 3. Prohibited fittings.** No double hub bend or double hub tee or inverted hubs shall be used on sewers, soil or waste line. The drilling and tapping of house sewers or house drains, soil, waste or vent pipes, and the use of saddle hubs and bands is prohibited. Double sanitary tees may be used on vertical soil, waste and vent lines. All pipes shall be installed without hubs or restrictions that would reduce the area or capacity of the pipe.

**Section 4. Dead ends.** In the installation of any drainage system, dead ends shall be avoided.

**Section 5. Protection of material.** All pipes passing under or through walls shall be protected from breakage. All pipes passing through or under cinder, concrete, or other corrosive material shall be protected against external corrosion.

**Section 6. Materials.** All main or branch soil, waste and vent pipes and fittings within or underneath a building shall be hub and spigot extra heavy or service weight cast iron, NO-HUB service weight cast iron, galvanized steel, galvanized wrought iron, lead, brass, Types K, L, M, DWV copper, standard high frequency welded tubing conforming to ASTM B586-73, Types R-K, R-L, R-DWV brass tubing, DWV brass tubing conforming to ASTM B587-73, seamless stainless steel tubing, Grade G or H conforming to CS268-68 polyvinyl chloride Schedule 40 or 80 conforming to ASTM D2665-76 and D1784-75, acrylonitrile-butadiene-styrene Schedule 40 or 80 conforming to ASTM D2661-76 and D1788-73, silicon iron or borosilicate. All mains or branch soil waste and vent pipe and fittings underground shall either be hub and spigot extra heavy or service weight cast iron, no hub service weight cast iron, Type K or L copper pipe, Type R-K, R-L brass tubing, lead, silicon iron or borosilicate pipe and fittings or plastic DWV listed above.

**Section 7. Size of waste pipe per fixture unit on any one stack.** The following table, based on the rate of discharge from a lavatory as a unit, shall be employed to determine fixture equivalents.

| Pipe size (in inches) | Maximum developed length | Fixture units |
|---|---|---|
| 1¼" | 25 ft. | 1 |
| 1½" | 30 ft. | 2 |
| 2" | 50 ft. | 6 |
| 2½" | 100 ft. | 12 |
| 3" | 225 ft. | 30 |
| 4" | | 96 |
| 5" | | 180 |
| 6" | | 420 |
| 8" | | 1200 |
| 10" | | 2400 |
| 12" | | 4200 |

**Section 8. Size of combined soil and waste pipe per fixture unit on any one stack.** The following table, based on the rate of discharge from a lavatory as the unit, shall be employed to determine fixture equivalents.

| Pipe size (in inches) | (Maximum developed length of combined soil and waste and vent) | Fixture units |
|---|---|---|
| *3" | 100 ft. | 24 |
| 4" | | 96 |
| 5" | | 180 |
| 6" | | 420 |
| 8" | | 1200 |
| 10" | | 2400 |
| 12" | | 4200 |

*Not more than two water closets or two bathroom groups

**Section 9. Soil and waste branch interval.** The total number of fixture units installed on any soil or waste branch interval shall not exceed one half of the fixture units set forth in the table in Section 8, above.

**Section 10. Soil and vent stacks.** Every building in which plumbing fixtures are installed shall have a soil waste and/or vent stack, or stacks extending full size through the roof, except as otherwise provided for in Sections 7 or 8 of this regulation. Soil, waste and/or vent stacks shall be as direct as possible and free from sharp bends or turns. The required size of the soil, waste and/or vent stacks shall be determined from the total of all fixture units connected to the stack in accordance with Section 7 or 8 except that no more than two water closets shall discharge into a 3 inch stack.

**Section 11. Future openings.** All openings left or installed in a plumbing system for future openings shall be complete with its soil and/or waste and

vent piping and shall comply with all other sections of this code.

**Section 12. House drain.** When a 3 inch house drain enters a building it shall be provided with a 3 inch stack. One floor drain may be added to the house drain with a 3 inch trap provided that it conforms with the requirements of Sections 26 and 30 of this regulation, without counting toward the fixture units of the system. Eight and one half fixture units may be added to the 3 inch house drain if an additional 2 inch stack is provided, the fixtures are vented in accordance with Section 23 of this code, the center of the last fixture opening does not exceed 10 feet (horizontal measures) from the center line of the house drain and three fixtures are installed on a lower level than the other fixtures in the system.

**Section 13. Soil and waste stacks, fixture connections.** All soil and waste stacks and branches shall be provided with correctly faced inlets for fixture connections. Each fixture shall be independently connected to the soil and/or waste system. Fixture connections to water closets, floor outlet pedestal sinks, pedestal urinals, or other similar plumbing fixtures shall be made by either cast iron, lead, brass, copper, or plastic closet bends. All 3 inch closet bends shall have a 4 inch by 3 inch flange.

**Section 14. Changing soil and vent pipes.** In an existing building where the soil, waste and vent piping is not extended undiminished through the roof or where there is a sheet metal soil or waste piping, such piping shall be replaced with appropriate sizes and materials as prescribed for new work when a fixture or fixtures are changed or replaced.

**Section 15. Prohibited connections.** No fixture connections shall be made to a lead bend or a branch of a water closet or a similar fixture. Vent pipes above the highest installed fixture on a branch or main shall not be used as a soil or waste pipe.

**Section 16. Soil, waste and vent pipe protected.** No soil, waste, or vent pipe shall be installed or permitted outside a building unless adequate provision is made to protect it from frost. The piping must be wrapped with one layer of heavy hair felt and at least two layers of two ply tar paper, all properly bound with copper wire or in lieu thereof, the vent shall be increased to full size, the size of the increaser required as if it were passing through the roof.

**Section 17. Roof extensions.** All roof extensions of soil and waste stacks shall be run full size at least 1 foot above the roof, and when the roof is used for other purposes than weather protection, such extensions shall not be less than 5 feet above the roof. All stacks less than 3 inches in diameter shall be increased to a minimum of 3 inches in diameter before passing through a roof. When a change in diameter is made, the fitting must be placed at least 1 foot below the roof.

**Section 18. Terminals.** If a roof terminus of any stack or vent is within 10 feet of the top, bottom, face or side edge of any door, window, scuttle, or air shaft, and not screened from such an opening by a projecting roof or building wall, it shall be extended at least 2 feet above the top edge of the window or opening.

**Section 19. Terminals adjoining high buildings.** No soil, waste or vent pipe extension of any new or existing building shall be run or placed on the outside of a wall, but shall be carried up in the inside of the building unless the piping is protected from freezing. In the event the new building is built higher than the existing building, the owner of the new building shall not locate windows within 10 feet of any existing vent stack on the lower building.

**Section 20. Traps, protected; vents.** Every fixture trap shall be protected against siphonage and back pressure. Air circulation shall be assured by means of an individual vent. Crown vents are not permitted.

**Section 21. Distance of trap from vent.**

(1) The distance between the vent and the fixture trap shall be measured along the center line of the waste or soil pipe from the vertical inlet of the trap to the vent opening. The fixture trap vent, except for water closets and similar fixtures, shall not be below the dip of the trap, and all 90 degree turns in the water line of the main waste, soil, or vent pipes shall be washed. Each fixture trap shall have a vent located with a developed length not greater than that set forth in the table below.

| Size of fixture drain (in inches) | Distance trap to vent |
|---|---|
| 1¼" | 2'6" |
| 1½" | 3'6" |
| 2" | 5' |
| 3" | 6' |
| 4" | 10' |

(2) A fixture branch on a water closet shall not be more than 3 feet.

**Section 22. Main vents to connect at base.** When a main vent or vent stack is used, it shall connect full size at the base of the main soil or waste pipe at or below the lowest fixture branch and shall extend undiminished in size through the roof or shall be reconnected with the main soil or vent stack at least 6 inches above the rim of the highest fixture. This section shall not apply to one and two story installations. When it becomes necessary to increase a vertical vent stack it then becomes a main vent and must comply with other sections of this code.

**Section 23. Vents, required sizes.**

(1) The required size of a vent or vent stacks shall be determined by the total number of fixture units it serves and the developed length of the vent, in accordance with the following table, interpolating, when necessary, between permissible length of vent given in the following table.

(2) If a fixture opening is installed more than 25 feet of developed length from the point where it is connected to the main soil or waste systems,

or, if more than 10 feet of vertical piping is used, the vent shall be continued full size through the roof or returned full size to the main vent.

**MAXIMUM PERMISSIBLE LENGTHS OF VENTS**

| Pipe size (in inches) | Maximum length (in feet) | Fixture units |
|---|---|---|
| 1¼" | 30' | 2 |
| 1½" | 150' | 8 |
| 2" | 200' | 18 |
| 2½" | 250' | 36 |
| 3" | 300' | 72 |
| 4" | 400' | 240 |
| 5" | 600' | 420 |
| 6" | 800' | 720 |

**Section 24. Branch and individual vents.** In no instance shall a branch or individual vent be less than 1¼ inches in diameter and shall not exceed the maximum length permitted for a main vent.

**Section 25. Vent pipes, grades and connections.** All vent and branch vent pipes shall be free from drops or sags and be so graded and connected as to drip back to the soil or waste pipe by gravity. Where vent pipes connect to a horizontal soil or waste pipe, the vent branch shall be taken off above the center line of the pipe, and the vent pipe must rise vertically at an angle 45 degrees to the vertical, to a point 6 inches above the fixture it is venting before offsetting horizontally or connecting to the branch, main, waste, soil or vent.

**Section 26. Vents not required.** Vents will not be required on a backwater trap, or a subsoil catch basin trap, or a basement floor drain provided that the basement floor drain is the first opening on the house drain and that the basement floor drain branches into the house drain so that measuring along the flow line from the center of the stack, the floor drain shall not be closer than 5 feet to the stack, nor farther than 20 feet. The floor drain line shall be 4 inches above the house drain. All floor drains on a house drain in between stacks shall be vented. All floor drains shall be the caulk-on type.

**Section 27. When common vent permissible.** Where two water closets, two lavatories or two of any fixtures of identical purpose are located on opposite sides of a wall or partition, or directly adjacent to each other within the prescribed distance as set forth in Section 21 of this regulation measured along the center line of the flow of water, the fixtures may have a common soil or waste pipe and a common vent. It shall be vented in accordance with the other sections of this code. All fixtures installed on a common waste and vent system must enter the stack through the use of a double fixture fitting. This cannot be a sanitary cross or a double combination T-Y or double wye and ⅛ bend.

**Section 28. Floor drain individual vent not required.** Manufacturers' floor drains do not require individual vents when they are placed on a waste line for floor drains only within the prescribed distance of 10 feet from the main waste

line, or stack, provided the base of the stack is washed and the stack or stacks are undiminished through the roof, or connected to a main vent stack.

**Section 29. Floor drains and service sinks.** Floor drains and service sinks installed on the operational floor level of sewage and water treatment plant facilities which discharge into an open sump and are not connected directly to the sanitary sewage system are not required to be trapped or vented.

**Section 30. A basement floor drain does not require an individual vent.** A basement floor drain does not require an individual vent if it conforms to Section 26 of this regulation, or if it is the first floor drain on the main and is ahead of all sanitary openings and is not farther than 5 feet from the main.

**Section 31. House drain material.** House drains shall be either extra heavy cast iron, service weight cast iron, brass Type (K) or (L) copper, lead, ABS or PVC plastic, or duriron.

**Section 32. Indirect waste connections.** Waste pipe from a refrigerator drain, or any other receptacle where food is stored or waste water from a water cooled compressor, shall connect indirectly with the house drain, soil or waste pipe. The drain shall be vented to the outside air. Such waste pipes shall discharge into an open sink or another approved open receptacle that is properly supplied with water in accordance with other sections of this code. Such connections shall not be located in an inaccessible or unventilated area.

**Section 33. Bar and soda fountain wastes.** Bar and soda fountain wastes, sinks and receptacles shall have a 1½ inch P trap and branches. The main shall not be less than 2 inches. The fresh air pipe shall not be less than 1½ inches. The main waste line shall discharge into a properly vented and trapped open receptacle inside or outside a building. Food storage compartment drains shall be indirectly connected through a trapped receptacle whose upper edge is raised at least 1 inch above the finished floor line.

**Section 34. Open receptacles.** Soil or waste piping receiving the discharge from an open receptacle shall be at least 6 inches above the surface of the ground when it discharges into a septic system.

**Section 35. Refrigerator wastes.** Refrigerator waste pipes shall not be less than 1½ inches from one to three openings, and at least 2 inches from four to eight openings. Each opening shall be trapped. Such waste piping shall be provided with sufficient cleanouts to allow for thorough cleaning.

**Section 36. Overflow pipes.** Waste from a water supply tank or exhaust from a water lift shall not directly connect to a house drain, soil, or waste pipe. Such waste pipe shall discharge upon a roof or into a trapped open receptacle.

**Section 37. Acid and chemical wastes.** Except as provided herein, no corrosive liquids shall be permitted to discharge into the soil, waste or sewer system. Such waste shall be thoroughly diluted or neutralized by passing through a properly constructed and acceptable dilution or neutralizing pit before entering the house sewer.

**Section 38. Laboratory waste piping.** Laboratory waste piping shall be sized in accordance with the other sections of this code. Each fixture shall be individually trapped. A continuous waste and vent pipe system may be used, provided the waste discharges into a vented dilution pit outside the building with a vent equal to the size of the drain. The vent may be eliminated when a pit has a ventilated cover. If under certain conditions a dilution pit is not required and is not used, each fixture shall be individually vented. If construction conditions permit, the base of the stack of the continuous waste and vent system shall be washed by the last fixture opening, and continue full size independently through the roof. All fixture branches exceeding more than the distance specified in the table in Section 21 of this regulation from the main shall be revented. The distance shall be measured from the center of the main to the center of the vertical riser. Fixture connections shall rise vertically to a height so that the trap will not be lower than 12 inches from the bottom of the sink. Two or more sinks may be connected into a common waste before entering the riser of the continuous waste and vent system, provided the fixtures are not more than 5 feet from the center of one fixture to the center of the other.

**Section 39. Acid waste piping.** Underground piping for acid wastes shall be extra heavy salt glazed vitrified pipe, silicon iron, lead, polyethylene pipe and fittings conforming to PS 10-69, PS 11-69, and PS 12-69, polypropylene pipe conforming to ASTM 2581-73, or other materials approved by the department. Piping for acid wastes and vents above ground shall be of silicon iron, lead, borosilicate, or polyethylene pipe conforming to PS 10-69, PS 11-69, and PS 12-69 polypropylene pipe conforming to ASTM 2581-73, or reinforced thermosetting resin pipe conforming to ASTM D2996 (green or poly thread).

**Section 40. Special vents.** Flat or wet vents serving a plumbing fixture may be constructed only with special permission when a plumbing system is being remodeled or when additions are added to an original system.

## 20:100 JOINTS AND CONNECTIONS

**Section 1. Water and air tight joints.** All joints and connections shall be made permanently gas and water tight.

**Section 2. Vitrified pipe joints; concrete pipe joints; house sewers; combined sewers.** Joints in vitrified clay pipe shall conform to ASTM specification C425. Joints in concrete pipe shall conform to commercial standard C443. When it is necessary to use piping in other than standard lengths, hot poured joints may be used. Joints between cast iron pipe and vitrified clay pipe or concrete pipe shall be made either of hot poured bitumastic compound or by a preformed elastomeric ring. The ring shall completely fill the annular space between the cast iron spigot and the vitrified clay or concrete pipe hub. Joints in pipe and fittings of not more than two pipe sizes between vitrified clay, asbestos cement, acrylonitrile-butadiene-styrene or polyvinyl chloride to cast iron pipe and fittings or the joining of either material to the

other may be made with proper fittings by the use of a dispersion grade polyvinyl chloride ring conforming to ASTM C443, C425, C594, C564 and D1829 or elastomeric polyvinyl chloride coupling.

**Section 3. Caulked joints.** All caulk joints shall be firmly packed with oakum or hemp and shall have at least 1 inch of pure lead properly caulked. No paint, varnish or putty will be permitted until tests have been performed.

**Section 4.**

(1) **Screw joints.** All screw joints shall be American Standard screw joints and all burrs or cuttings shall be removed.

(2) **Mechanical joint couplings for hot and cold water.** Mechanical joint couplings for hot and cold water may be used above ground provided the couplings are galvanized and the gaskets conform to ASTM D735-61, grade N-R-615 BZ.

(3) **Mechanical joint couplings for storm water piping.** Mechanical joint couplings for storm water piping may be used above ground provided the couplings are either black iron or galvanized and the gaskets conform to ASTM D735-61, grade N-R-615 BZ.

(4) **Joints in PVC and ABS Schedule 40 or 80 pipe and fittings.** Joints in polyvinyl chloride Schedule 40 or 80 pipe and fittings shall be solvent welded joints and shall conform to ASTM D2665-69. Joints in acrylonitrile-butadiene-styrene pipe and fittings shall be solvent welded joints and shall conform to ASTM D2661-69. Acrylonitrile-butadiene-styrene and polyvinyl chloride sewer piping that conforms to ASTM 3033 and 3034 shall be joined by solvent cement conforming to ASTM C2665-69 for acrylonitrile-butadiene-styrene and ASTM D2661-69 for polyvinyl chloride or with an elastomeric joint conforming to D3212-73.

(5) **Copper pipe, brass and stainless steel tubing joints.** Copper pipe, brass and stainless steel tubing joints shall be soldered joints.

(6) **Expansion.** Every expansion joint shall be of approved type and its material shall conform with the type of piping in which it is installed.

(7) **Brazed joints.** Brazed joints shall be made by first cleaning the surfaces to be joined down to the base metal, applying flux approved for such joints and for the filler metal to be used, and making the joint by heating to a temperature sufficient to melt the approved brazing filler metal on contact.

(8) **Tapered couplings.** Every joint in bituminized fiber pipe shall be made with tapered type couplings of the same material as the pipe. Joints between bituminized fiber pipe and metal pipe shall be made by means of an approved adapter coupling properly caulked.

(9) **Elastomeric polyvinyl chloride coupling.** Elastomeric polyvinyl chloride couplings may be used for connecting cast iron, vitrified clay, concrete, cement asbestos or plastic pipe or the combination of these pipe materials. This coupling shall be provided with #305 stainless steel clamps.

(10) **Joints in corrugated polyethylene subsoil drainage tubing.** Joints in corrugated polyethylene subsoil drainage tubing shall be made by slip joints using appropriate fittings.

**Section 5. Cast iron soil pipe joints.**

(1) Joints in cast iron shall either be caulked, screwed, or joints made with the use of neoprene gaskets. Neoprene gaskets shall conform to either ASTM C564-70 or CS-301-72. Joints that conform to commercial standard 301-69T shall have a stainless steel clamp.

(2) Cast iron coupling for joining hubless cast iron pipe shall consist of neoprene gasket conforming to ASTM C564, cast iron clamps conforming to ASTM A48 and stainless steel bolts and nuts conforming to ANSI B18.2.1 and ANSI B18.2.2.

**Section 6. Borosilicate joints.** Joints and gaskets used for borosilicate pipe shall be made in a manner approved by the department.

**Section 7.**

(1) **Steel, brass and copper connections to cast iron pipe.** Steel, brass and copper joints when connected to cast iron pipe shall be either screwed or caulked joints. All caulked joints shall be made by the use of a caulking spigot.

(2) **PVC and ABS pipe and fitting connections to steel, brass, copper and cast iron pipe.** Polyvinyl chloride and acrylonitrile-butadiene-styrene pipe and fittings connections to steel, brass, copper or cast iron pipe shall either be a screwed or caulk joint. Joints between Schedule 40 PVC or ABS pipe and cast iron pipe may be made by the use of a neoprene gasket conforming to ASTM C564-70. All caulk joints shall be made with the use of either a polyvinyl chloride or acrylonitrile-butadiene-styrene or cast iron caulking spigot.

(3) **Stainless steel tubing to cast iron pipe, to galvanized steel pipe and to copper tubing.** Stainless steel tubing to cast iron pipe shall be made by caulking spigot. Stainless steel tubing to galvanized steel pipe or copper pipe shall be made by the use of an adaptor.

(4) **Joints in acid waste piping.** Joints in vitreous glazed piping shall be made in a manner and of a material approved by the department. Joints in polyethylene and polypropylene piping must be made by the heat fusion process. Joints in polypropylene may also be made with a union joint. Joints in borosilicate pipe may be a

stainless steel mechanical joint. Joints between silicon iron pipe may be either caulk joint or stainless steel mechanical joint.

**Section 8. Lead pipe.** Joints in lead pipe or between lead pipe and brass or copper pipes, ferrules, soldering nipples, or trap, shall be full wiped joints, with an exposed surface of the solder at each side of the joint of not less than ¾ of an inch. The minimum thickness of the thickest part of the joint shall be at least as thick as the material being used. In the event lead pipe is used for acid waste lines, the pipe may be joined by burning.

**Section 9. Lead pipe to cast iron, steel, or wrought iron pipe.** The joints between lead to cast iron, steel, or wrought iron shall be made by means of a caulking ferrule or a soldering nipple.

**Section 10. Wall or floor flange joints.** Wall or floor flange joints shall be made by using a lead ring or brass flange and shall be properly soldered.

**Section 11. Soil pipe, iron pipe, copper pipe, tubular trap joints.** Joints between soil pipe, iron pipe, copper pipe, and tubular traps shall be made by the use of heavy red cast brass adaptor. Tubular traps shall be soldered to the adaptor in a manner approved by the department.

**Section 12. Slip joints.** Slip joints shall be permitted only on the inlet side of a trap.

**Section 13. Unions.** Unions shall be ground faced and shall not be concealed or enclosed.

**Section 14. Roof joints.** The joint at the roof shall be made water tight by use of copper, lead or other approved flashing or flashing material. It shall extend not less than 6 inches from the pipe in all directions and shall extend upward 12 or more inches and turn down into the pipe. A hub flashing may be used provided it is constructed so it can be caulked into a hub above the roof.

**Section 15. Increasers and reducers.** When different size pipe or pipes and fittings are to be concealed, the proper size increaser or reducer pitched at an angle of 45 degrees between the two sizes, shall be used.

**Section 16. Prohibited joints and connections.** Any fitting or connection which has an enlargement chamber, or recess with a ledge shoulder, or reduction of the pipe area in the direction of the flow is prohibited.

**Section 17. Hangers and supports.** All piping and fixtures shall be adequately supported by hangers or anchors securely attached to the building construction.

**Section 18. Welded pipe for soil, waste and vent systems.** Mild steel pipe may be welded for a soil waste and vent system provided the welds are mechanically sound and the bore of the piping is smooth throughout its length. The welded piping shall be covered with a metallic continuous coating. Written permission shall be secured from the department for such a system.

## 20:110 TRAPS AND CLEANOUTS

**Section 1. Traps, kind and minimum size.** Every trap shall be self cleaning. Traps for bathtubs, lavatories, sinks and other similar fixtures shall either be tubular brass, tubular ABS or PVC conforming to ASTM F409, cast brass, cast iron, lead or Schedule 40 PVC (polyvinyl chloride) or ABS (acrylonitrile-butadiene-stryene) traps. Tubular or Schedule 40 PVC or ABS P-traps may be either the union joint or solvent welded type. Tubular brass traps shall be 17 gauge. No tubular brass, tubular PVC or tubular ABS traps shall be installed below the finished floor serving a fixture. Traps shall have a full bore, smooth interior waterway. The threads in cast brass and cast iron traps shall be tapped out of solid metal. Lead traps shall be extra heavy.

**Section 2. Traps, prohibited.** A trap which depends upon the action of movable parts or concealed interior partitions for its seal shall not be used.

**Section 3. Traps, where required.** Each fixture shall be separately trapped by a water seal trap placed as near to the fixture as possible not to exceed 10 inches from the bottom of the fixture to dip of the seal. In no case shall the waste from a bathtub or other fixture discharge into a water closet bend. No fixture shall be double trapped.

**Section 4. Water seal.** A fixture trap shall have a water seal of not less than 2 inches nor more than 4 inches.

**Section 5. Trap cleanouts.** Trap cleanouts are optional.

**Section 6. Trap levels and protection.** All traps shall be set true with respect to their water seals and shall be protected from frost and evaporation.

**Section 7. Pipe cleanouts.** The bodies of cleanout ferrules shall be made in standard pipe sizes, conforming in thickness to that of pipe and fittings, and shall extend not less than ¼ inch above the hub in which it is placed. The cleanout cap, or plug shall be heavy red brass not less than ⅛ inch thick and shall have a raised nut or recessed pocket for removal.

**Section 8. Pipe, cleanouts, where required.** A cleanout easily accessible shall be provided at the base of each vertical waste or soil stack. There shall be at least two cleanouts in the house drain, one at or near the base of the stack and the other with full size wye branch inside the building at a point not beyond 2 feet from the foundation wall. Cleanouts shall be of the same nominal size as the pipe it serves up to 4 inches, and not less than 4 inches for larger pipe.

**Section 9. Manholes.** All underground cleanouts in a building, except where cleanouts are flush with the floor or wall, shall be made accessible by a manhole or with a proper cover.

**Section 10. Cleanouts (equivalents).** Any floor or wall connection of a fixture trap whether bolted or screwed to the floor or wall, shall be regarded as a cleanout with the exception of the cleanout where the house drain enters a building.

**Section 11. Grease traps.** When a grease trap is installed, it shall be placed as near as possible to the fixture it serves and shall be approved by the department. All grease traps used inside a building shall have a sealed cover and shall be properly vented. Grease traps may be installed whenever a private sewage disposal system is used but must be installed to serve restaurants and food handling establishments.

**Section 12. Sand traps.** Sand traps shall be designed and located so as to be readily accessible and shall meet the requirements of the department.

**Section 13. Basement floor drains.** A basement floor drain shall connect into a trap so constructed that it can be readily cleaned and of a size to serve efficiently the purpose for which it is intended. When subject to backflow or back pressure, such drains shall be equipped with an adequate backwater valve. The trap seal shall be at least 4 inches above the flow line of the house drain.

**Section 14. Backwater valves.** A backwater valve shall be of noncorrosive metals and so constructed as to insure a positive mechanical seal except when discharging wastes.

**Section 15. Utility room floor drains.** A utility room floor drain with an individual waste shall be provided with a 2 inch vent increased to 3 inches before passing through the roof of a building.

**Section 16. Directional flow fittings and continuous waste.** Kitchen sink units, or fixtures with more than one unit may be connected with a continuous waste, provided a directional flow fitting is used. Continuous waste shall be either 17 gauge tubular brass or Schedule 40 ABS or PVC tubular ABS or PVC material.

## 20:120 WATER SUPPLY AND DISTRIBUTION

**Section 1. Quality.** The bacteriological and chemical quality of the water supply shall comply with the regulations of the department.

**Section 2. Distribution.** The water supply shall be distributed through a piping system entirely independent of any other piping system.

**Section 3. Water service.** The water service piping to any building shall be not less than ¾ inch but shall be of sufficient size to permit a continuous and ample flow of water to all fixtures on all floors at all times. The water service may be laid in the same trench with the house sewer provided the water piping is benched 18 inches above the sewer.

**Section 4. Water supply to fixtures.** Plumbing fixtures shall be provided with a sufficient supply of water for flushing to keep them in a sanitary condition. Every water closet or pedestal urinal shall be flushed by means of an approved tank or flush valve. The tank or valves shall furnish at least a 4 gallon flushing capacity for a water closet and at least a 2 gallon capacity for a urinal. When a water closet, urinal, or similar fixture is supplied directly from

the water supply system through a flushometer or other valve, such valves shall be set above the fixture in a manner so as to prevent any possibility of polluting the potable water supply by back siphonage. All such fixtures shall have a vacuum breaker. Plumbing fixtures, devices or appurtenances shall be installed in a manner that will prevent any possibility of a cross connection between the potable water supply system, drainage system or other water system.

**Section 5. Water supply to drinking fountains.** The orifice of a drinking fountain shall be provided with a protective cowl to prevent any contamination of the potable water supply system.

**Section 6. Sizing of water supply piping.**

(1) The minimum size water service from the property line to the water heater shall be ¾ inch. The hot and cold water piping shall extend ¾ inch in size to the first fixture branch regardless of the kind of material used. When galvanized iron pipe is used, the distribution piping shall be arranged so that no two ½ inch fixture branches are supplied from any ½ inch pipe.

(2) The following schedule shall be used for sizing the water supply piping to fixtures:

| Fixture branches | Size minimum inches |
|---|---|
| Sill cocks | ½ |
| Hot water boilers | ¾ |
| Laundry trays | ½ |
| Sinks | ½ |
| Lavatories | ⅜ |
| Bathtubs | ½ |
| Water closet tanks | ⅜ |
| Water closet flush valves | 1 |

**Section 7. Water supply pipes and fittings, materials.** Water supply piping for a potable water system shall be of galvanized wrought iron, galvanized steel, brass, Types K, L, and M copper, cast iron, Types R-K, R-L and R-M brass tubing standard high frequency welded tubing conforming to ASTM B586-73, fusion welded copper tubing conforming to ASTM B447-72 and ASTM B251, DWV welded brass tubing conforming to B587-73, seamless stainless steel tubing, Grade H conforming to CS A268-68, reinforced thermosetting resin pipe conforming to ASTM D2996 (red thread for cold water use and silver and green thread for hot and cold). Polyethylene plastic pipe conforming to ASTM D2239-69, PVC plastic pipe conforming to ASTM 1785, and CPVC plastic pipe conforming to CS D2846-70, PVC SDR 21 and SDR 26 conforming to ASTM D2241, polybutylene pipe conforming to ASTM D3309 with brass, copper or celcon fittings, Quicktite connection using celcon asetal copolymer, polybutylene cone and stainless steel ring. Plastic pipe and fittings shall bear the NSF seal of approval. Polybutylene hot

and cold water connectors to lavatories, sinks and water closets shall conform to ASTM 3309, and polybutylene plastic pipe conforming to ASTM 2662 for cold water applications only. Fittings shall be brass, copper or approved plastic or galvanized cast iron or galvanized malleable iron. Piping or fittings that have been used for other purposes shall not be used for the water distribution system. All joints in the water supply system shall be made of screw, solder, or plastic joints. Cast iron water pipe joints may be caulked, screwed, or machine drawn. When Type M copper pipe, Type R-M brass tubing, standard high frequency welded tubing or stainless steel tubing is placed within a concrete floor or when it passes through a concrete floor, it shall be wrapped with an approved material that will permit expansion or contraction. In no instance shall polyethylene, PVC or CPVC be used below ground under any house or building.

**Section 8. Temperature and pressure control devices for shower installations.** Temperature and pressure control devices shall be installed on all shower installations that will maintain an even temperature and pressure and will provide nonscald protection. Such devices shall be installed on all installations other than in homes or apartment complexes.

**Section 9. Water supply control.** A main supply valve shall be placed inside a foundation wall. Each fixture or each group of fixtures shall be valved and each lawn sprinkler opening shall be valved.

**Section 10. Water supply protection.** All concealed water pipes, storage tanks, cisterns, and all exposed pipes or tanks subject to freezing temperatures shall be protected against freezing. Water services shall be installed at least 30 inches in depth.

**Section 11. Temperature and pressure relief devices for water heaters.** Temperature and pressure relief devices shall be installed on all water heaters on the hot water side not more than 3 inches from the top of the heater. Temperature and pressure relief devices shall be of a type approved by the department. When a water heater is installed in a location that has a floor drain, the discharge from the relief device shall be piped to within 2 inches of the floor. When a water heater is installed in a location that does not have a floor drain, the discharge from the relief device shall be piped to the outside of the building with an ell turned down and piped to within 4 inches of the surface of the ground. Relief devices shall be installed on a pneumatic water system.

**Section 12. Protection of a private water supply or source.** Private water supplies or sources shall be protected from pollution in a manner approved by the department. Such approval shall be obtained before an installation is made.

**Section 13. Domestic solar water heaters.** Domestic solar water heaters may have a "single wall heat exchanger" provided the solar panel and the water heater exchanger use a nontoxic liquid such as propylene glycol or equal, and that the heat exchanger is pretested by the manufacturer to 450 psi,

that the water heater has a warning label advising that a nontoxic heat exchanger fluid must be used at all times, and that a pressure relief valve is installed at the highest point in the solar panel.

**Section 14. Domestic water heater preheating device.** A domestic water heater preheating device may be used and connected with the high pressure line from the compressor of a domestic home air conditioner. This device must be equipped with a temperature limit control that would actuate a pump that would circulate hot water from the water heater to the preheater device.

**Section 15. Water distribution and connections to mobile homes.**

(1) An adequate and safe water supply shall be provided to each mobile home conforming to the regulations of the department.

(2) All materials, including pipes and fittings used for connections, shall conform with the other sections of this code.

(3) An individual water connection shall be provided at an appropriate location for each mobile home space. The connection shall consist of a riser terminating at least 4 inches above the ground with 2¾ inch valve outlets with screw connection, one for the mobile home water system and the other for lawn watering and fire control. The ground surface around the riser pipe shall be graded so as to divert surface drainage. The riser pipe shall be encased in an 8 inch vitrified clay pipe or equal with the intervening space filled with an insulating material to protect it from freezing. An insulated cover shall be provided which will encase both valve outlets but not prevent connection to the mobile home during freezing weather. A shutoff valve may be placed below the frost depth on the water service line, but in no instance shall this valve be a stop and waste cock.

## 20:130 HOUSE SEWERS AND STORM WATER PIPING; METHOD OF INSTALLATION

**Section 1. Independent system.** The drainage and plumbing system of each new building and of new work installed in an existing building shall be separate from, and independent of, that of any other building except as provided below, and every building shall have an independent connection with either a public or private sewer or sewer system.

**Section 2. Exception.** Where a building stands in the rear of another building or on an interior lot, and a sewer connection cannot be made available to the rear building through an adjoining alley, court, yard or driveway, the sewer from the front building may be extended to the rear building and it will be considered as one sewer. This exception does not apply to corner lots where a sewer connection is available from the street or alley nor to a new or existing building which abuts a street or alley.

**Section 3. Connection with private sewage disposal system.** When a sewer is not available, the house drain from a building shall connect with an approved private sewage disposal system.

**Section 4. Excavations.** All excavations made for the installations of a house sewer shall be open trench work. All such trenches shall be kept open until the piping has been inspected and/or tested and approved.

**Section 5. Depth of sewer at the property line.**

(1) Where possible the sewer at the property line shall be at a sufficient depth to properly serve any plumbing connection that may be installed in the basement of any building unless restricted by another's authority.

(2) House sewers shall be laid on a grade of not less than ⅛ inch nor more than ¼ inch per foot. All sewers must have at least an 18 inch cover. Sewer piping under a superimposed load condition shall have at least 3 feet cover unless constructed of cast iron piping. Sewers shall be backfilled by hand and tamped 6 inches above the piping, or in lieu thereof may be filled with 6 inches grillage above the piping. All joints in cast iron, vitrified clay pipe and cement asbestos pipe shall be made in a manner to conform to other sections of this code.

**Section 6. New house sewer connections.** House sewers installed where a private sewerage system has been discarded may connect to the house drain, provided in the opinion of the department the existing plumbing system meets this code or a previous one.

**Section 7. Materials for house sewers.** House sewers or combined sewers, beginning 2 feet outside the foundation wall of a building shall be made of either extra heavy cast iron pipe, service weight cast iron, vitrified clay, concrete, cement asbestos, PVC or ABS plastic pipe Schedules 40 and 80, truss pipe and extra heavy SDR 35 pipe.

**Section 8. Material for storm sewers inside buildings.** Material for storm sewers inside of buildings to a point 2 feet outside a building in sizes 8 inches and smaller shall be cast iron pipe or Schedule 40 ABS or PVC DWV pipe. Storm sewers in sizes of 10 inches and larger may be either cast iron, vitrified clay or concrete conforming to appropriate commercial standards with approved joints.

**Section 9. Change of direction.** Change in direction of a sewer shall be made with long curves, ⅛ bends or wyes.

**Section 10. Size of house sewers and horizontal branches.** The minimum size of a house sewer shall not be less than 4 inches nor less than that of the house drain. House sewers receiving branches shall be sized in the same manner as house drains. (See 815 KAR 20:090).

**Section 11. Size of storm systems.** The required sizes of storm sewers shall be determined on the basis of the total drained areas in horizontal projection in accordance with the following table. No storm sewer shall be laid parallel to or within 2 feet of any bearing wall. The storm sewer shall be laid at a sufficient depth to protect it from freezing.

| Diameter of pipe inches | Maximum drained roof area square feet* | | Diameter of pipe inches | Maximum drained roof area square feet* | |
|---|---|---|---|---|---|
| | Slope, ⅛" fall to 1' | Slope, ¼" fall to 1' | | Slope, ⅛" fall to 1' | Slope, ¼" fall to 1' |
| 3 | 865 | 1,230 | 8 | 11,115 | 15,745 |
| 4 | 1,860 | 2,610 | 10 | 19,530 | 27,575 |
| 5 | 3,325 | 4,715 | 12 | 31,200 | 44,115 |
| 6 | 5,315 | 7,515 | 13 | 42,600 | 60,000 |

*The calculations in this table are based on a rate of rainfall of 4 inches per hour.

**Section 12. Combined storm and sanitary sewer systems.** Whenever a combined sewer system is used, the required size of the house drain or house sewer shall be determined by multiplying the total number of fixture units carried by the drain or sewer by the conversion factor (from the tables on Page 457) corresponding to the drained area and the total fixture units, adding the product to the drained area and applying the sum of the preceding table for storm water sewers. No combined house drain or house sewer shall be less than 5 inches in diameter, and no combined house drain or house sewer shall be smaller in size than that required for the same number of fixture units or for the same roof area in separate systems.

**Section 13. House sewer in undisturbed or made ground.** House sewers laid in undisturbed ground must be laid on at least 4 inches of pea gravel, sand or other approved grillage. House sewers laid in made or filled ground shall be embedded to the lower quadrant with at least a 4 inch concrete pad below the invert, or other support that may be approved by the department. Supports in filled or made ground shall be on 10 feet centers to a solid footing, either undisturbed earth or rock. House sewers constructed of flexible thermoplastic sewer piping must be installed with at least 6 inches of gravel on the bottom, top and sides of the piping.

**Section 14. Storm sewers in undisturbed or made ground.** Storm sewers laid in undisturbed ground will not require grillage. Storm sewers laid in made or filled grounds shall be embedded to the lower quadrant with at least a 4 inch concrete pad below the invert or other support that may be approved by the department. Supports in filled or made ground shall be on 10 feet centers to a solid footing, either undisturbed earth or rock.

**Section 15. Drainage below sewer level.** In buildings, in which the whole or part of the house drain and plumbing system thereof lies below the level of the main sewer, sewage and waste shall be lifted by an approved artificial means and discharged into the house sewer.

**Section 16. Drainage below sewer level (residential).** In homes where the house sewer level is above the basement floor, waste water shall be lifted by means of an approved sump pump. The sump pit shall be constructed of

## CONVERSION FACTORS FOR COMBINED STORM AND SANITARY SYSTEM

| Drained roof area in square feet | Number of fixture units on sanitary system: Up to 6 | 7 to 18 | 19 to 36 | 37 to 60 | 61 to 96 | 97 to 144 | 145 to 216 | 217 to 324 |
|---|---|---|---|---|---|---|---|---|
| Up to 120 | 180 | 105 | 60 | 45 | 30 | 22 | 18 | 15 |
| 121 to 240 | 160 | 98 | 57 | 43 | 29 | 21 | 17.6 | 14.7 |
| 241 to 480 | 120 | 75 | 50 | 39 | 27 | 20 | 16.9 | 14.3 |
| 481 to 720 | 75 | 62 | 42 | 35 | 24 | 18 | 15.4 | 13.2 |
| 721 to 1,080 | 54 | 42 | 33 | 29 | 20 | 15 | 13.6 | 12.1 |
| 1,081 to 1,620 | 30 | 18 | 16 | 15 | 12 | 11.5 | 11.1 | 10.4 |
| 1,621 to 2,430 | 15 | 12 | 11 | 10.5 | 9.1 | 8.8 | 8.6 | 8.3 |
| 2,431 to 3,645 | 7.5 | 7.2 | 7.0 | 6.9 | 6.6 | 6.5 | 6.4 | 6.3 |
| 3,646 to 5,460 | 2.0 | 2.4 | 3.0 | 3.3 | 4.1 | 4.2 | 4.3 | 4.4 |
| 5,461 to 8,190 | 0 | 2.0 | 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | 2.6 |
| 8,191 to 12,285 | 0 | 0 | 2.1 | 2.1 | 2.1 | 2.2 | 2.3 | 2.3 |
| 12,286 to 18,420 | 0 | 0 | 0 | 2.0 | 2.1 | 2.1 | 2.2 | 2.2 |
| 18,421 to 27,630 | 0 | 0 | 0 | 0 | 2.0 | 2.1 | 2.2 | 2.2 |
| 27,631 to 40,945 | 0 | 0 | 0 | 0 | 0 | 2.0 | 2.1 | 2.2 |
| 40,946 to 61,520 | 0 | 0 | 0 | 0 | 0 | 0 | 2.0 | 2.1 |
| Over 61,520 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2.0 |

| Drained roof area in square feet | Number of fixture units on sanitary system: 325 to 486 | 487 to 732 | 733 to 1098 | 1099 to 1644 | 1645 to 2466 | 2467 to 3702 | 3703 to 5556 | Over 5556 |
|---|---|---|---|---|---|---|---|---|
| Up to 120 | 12 | 10.2 | 9.2 | 8.4 | 8.2 | 8.0 | 7.9 | 7.8 |
| 121 to 240 | 11.8 | 9.9 | 9.1 | 8.3 | 8.1 | 8.0 | 7.9 | 7.8 |
| 241 to 480 | 11.5 | 9.7 | 8.8 | 8.2 | 8.0 | 7.9 | 7.8 | 7.7 |
| 481 to 720 | 10.8 | 9.2 | 8.6 | 8.1 | 7.9 | 7.9 | 7.8 | 7.7 |
| 721 to 1,080 | 10.1 | 8.7 | 8.3 | 8.0 | 7.8 | 7.8 | 7.7 | 7.6 |
| 1,081 to 1,620 | 9.8 | 8.4 | 8.1 | 7.9 | 7.7 | 7.7 | 7.6 | 7.5 |
| 1,621 to 2,430 | 8.0 | 7.9 | 7.8 | 7.7 | 7.6 | 7.5 | 7.4 | 7.4 |
| 2,431 to 3,645 | 6.2 | 6.3 | 6.4 | 6.4 | 6.8 | 7.0 | 7.1 | 7.2 |
| 3,646 to 5,460 | 4.5 | 4.7 | 5.0 | 5.1 | 6.1 | 6.4 | 6.9 | 6.9 |
| 5,461 to 8,190 | 2.8 | 3.2 | 3.7 | 4.6 | 5.0 | 5.6 | 6.2 | 6.4 |
| 8,191 to 12,285 | 2.4 | 2.5 | 2.6 | 2.7 | 3.5 | 4.5 | 5.2 | 5.6 |
| 12,286 to 18,420 | 2.3 | 2.3 | 2.4 | 2.4 | 2.6 | 3.2 | 4.2 | 4.7 |
| 18,421 to 27,630 | 2.2 | 2.3 | 2.3 | 2.3 | 2.4 | 2.5 | 2.8 | 3.1 |
| 27,631 to 40,945 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.3 | 2.4 |
| 40,946 to 61,520 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| Over 61,520 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |

either poured or precast concrete, approved fiberglass or polyethylene material with a tight fitting cover. The sump pit shall be provided with a 2 inch vent which may also act as a waste and vent for a laundry tray. The pump discharge piping shall discharge into a 2 inch waste pipe extended inside the building to a height at least 12 inches above the outside grade. The sump well shall be provided with a tight fitting concrete cover. On the outside of the building this waste piping shall connect into a 4 inch by 2 inch sanitary tee which shall connect into a 4 inch P trap and then into the sanitary sewer. The 4 inch by 2 inch sanitary tee shall be extended at least 2 inches above the finished grade

and shall be provided with a ventilated cap.

**Section 17. Sumps and receiving tanks.** All subsoil drains shall discharge into an air tight sump or receiving tank so located as to receive the sewage by gravity. The sewage shall be lifted and discharged into the house sewer by a pump, ejector or any equally efficient method. Such sumps shall automatically discharge.

**Section 18. Ejectors, vented.** All ejectors shall be vented with a 3 inch vent. Fixtures or appliances connected thereto shall be vented in accordance with other sections of this code.

**Section 19. Ejector power: motors, compressors, etc.** All motors, air compressors and air tanks shall be located where they are open for inspection and repair at all times. The air tanks shall be proportioned so as to furnish sufficient air at suitable pressure to the ejector to completely empty the sump or storage tank with the compressor not operating. The end pressure in the tank shall be not less than 2 pounds for each foot of height through which sewage is raised.

**Section 20. Ejectors for subsoil drainage.** When subsoil catch basins are installed below the sewer level, automatic ejectors, of an approved type, may be used. Such ejectors or any device raising subsoil water shall discharge into a properly trapped fixture or into a storm water drain.

**Section 21. Drainage of yards, areas and roofs.** All roofs, paved areas, courts, and courtyards shall be drained into a storm water system or a combined sewerage system, but not into sewers intended for sewage only. When drains are connected to a combined sewerage system, they shall be trapped. If roof leaders, conductors, or gutter openings are located more than 10 feet from a window, scuttle, or air shaft, a trap shall not be required. Traps shall be set below the frost line or on the inside of the building. Where there is a storm or combined sewer available, it may discharge into a drainage area unless otherwise prohibited by the proper authorities. When such drains are not connected to a combined sewer, a trap is not required.

**Section 22. Size of rain water leader.** No inside leader shall be less size than the following:

| Area of roof (in square feet) | Leader, diameter inches |
|---|---|
| Up to 90 | 1½ |
| 91 to 270 | 2 |
| 271 to 810 | 3 |
| 811 to 1,800 | 3½ |
| 1,801 to 3,600 | 4 |
| 3,601 to 5,500 | 5 |
| 5,501 to 9,600 | 6 |

**Section 23. Inside conductors or roof leaders.** When conductors and roof leaders are placed within the walls of any building, or in an interior court or ventilating pipe shaft, they shall be constructed of cast iron pipe, galvanized

wrought iron, galvanized steel, copper, Schedule 40 ABS/PVC DWV pipe or reinforced thermosetting resin pipe conforming to ASTM D2996 (red and silver threads). The vertical distance of PVC or ABS conductors shall not exceed 30 feet from the base through the terminous through the roof.

**Section 24. Outside conductors.** When outside sheet metal conductors or downspouts are connected to a house drain, they shall be connected by means of a cast iron pipe extending vertically at least 1 foot above the grade line. Along public driveways, without sidewalks, they shall be placed in niches in the walls, protected by wheel guards, or enter the building through the wall at a 45 degree slope at least 12 inches above the grade.

**Section 25. Defective conductor pipes.** When an existing sheet metal conductor pipe within the walls of any building becomes defective, such a conductor shall be replaced by one which conforms to this code.

**Section 26. Vent connections with conductors prohibited.** A conductor pipe shall not be used as a soil, waste or vent pipe, nor shall any soil, waste, or vent pipe be used as a conductor.

**Section 27. Overflow pipes.** Overflow pipes from cisterns, supply tanks, expansion tanks, or drip pans shall connect only indirectly with any house sewer, house drain, soil or waste pipe.

**Section 28. Subsoil drains, below sewer level.** Subsoil drains shall discharge into a sump or receiving tank. It shall be automatically lifted and discharged into the storm drainage system or upon the ground outside the building that it serves.

## 20:141 STANDARDS FOR SUBSURFACE SEWAGE DISPOSAL SYSTEMS

**Section 1. Citation of regulation.** This regulation may be cited as the "Kentucky Subsurface Sewage Disposal Regulation."

**Section 2. Permit required.** No person shall construct, install or alter a subsurface sewage disposal system or dispose of sewage below the surface of the earth without first having received a permit pursuant to this regulation. The permit may be obtained from the department or from a local board of health which has been authorized to act for the department.

**Section 3. Definitions.** As used in this regulation, the following terms shall have the meanings set forth below:

(1) "Approved percolation test" means a test conducted on a parcel of property at the location where the subsurface sewage system is to be installed and written results of which are given in the following manner:

(a) Four test holes at least 30 inches deep and 4 inches to 12 inches in diameter shall be dug to the bottom depth of the drain field.

(b) The sides and bottom of the holes shall be scarified to remove any smeared surfaces.

(c) All loose material shall be removed from the holes.

(d) The holes shall be presoaked by filling with water for at least 14 hours prior to the test.

(e) Prior to the commencement of readings, the water in the test holes shall be adjusted to a 6 inch depth to begin the test.

(f) A reading shall be taken each hour over a four hour period and the depth shall be readjusted to the 6 inch level after each hourly reading.

(g) A fixed point shall be established for evaluating each test hole (e.g., by placing a stake approximately 3 feet long in the test hole with two nails in the stake, one 4 and the other 10 inches from the bottom of the stake. The stake shall be driven into the ground with the first nail resting on the bottom of the hole. The first nail shall be used as a bench mark for each hourly reading and the second nail shall be used as a guide in adjusting the water level).

(h) The hourly rate of absorption shall be recorded and the average fourth hour rate shall be considered the equilibrium rate.

(i) Four rock sounding tests shall be conducted to detect the presence of rock formation at a depth of 6 feet or less.

(j) Test holes for determining the equilibrium rate and rock sounding tests shall be conducted in separate locations and shall be so spaced as to accurately reflect the general configuration of the proposed lateral system.

(k) Seasonal high water table within 6 feet of the surface shall be ascertained and reported whenever the percolation test is conducted in the months of May, June, July, August or September.

(l) Where soil maps are available, soil characteristics at the location of the proposed system shall be reported on the percolation test sheet.

(m) The percolation tests results shall be reported on a departmental form and certified by a person authorized to perform such a test. The report shall include, as a minimum, a sketch of the shape and dimensions of the lot lines, location of the test holes in relation thereto and proposed location of the building.

(n) The percolation tests shall be void if the area in which the percolation test was conducted is regraded, or if the system is not to be installed in the area where the test was conducted. If regrading of the area after a system is installed results in removal of any of the original soil, approval of the system shall be void. If an area is filled, the site shall not be utilized for subsurface disposal for a period of one year; this requirement may be waived after review and approval by the department of soil

compaction test results prepared and certified by a professional engineer registered in Kentucky.

(2) "Drain field" means a system of piping installed in a 2 foot wide trench approximately 30 inches deep. The piping shall be either 4 inch open joint or 4 inch perforated pipe. Six inches of number three rock shall be placed below the pipe, 6 inches of number three rock shall be placed over the (above the crown of the) pipe, with a total depth of 16 inches.

(3) "Subsurface disposal system" means an installation intended for the treatment and disposal of sewage by means of a septic tank, or other approved device, and includes the drain field into which the effluent will disperse (see Section 5).

(4) "Equilibrium rate" means the average fourth hour absorption rate of the test holes. However, if review of the data indicates that the rate of fall is not consistent, tests shall be continued until such time as a consistent absorption rate is obtained. This consistent absorption rate is the equilibrium rate.

**Section 4. Standards for issuing subsurface disposal permits.** No permit shall be issued for subsurface sewage disposal system unless:

(1) The rock sounding test indicated the absence of rock formation at a depth of at least 4 feet; and

(2) The seasonal high water table was not within 4 feet or the surface; and

(3) The septic tank (or other approved treatment device) and drain field are sized in accordance with Sections 5 and 6 of the regulation; and

(4) An approved percolation test was conducted and reported and the results thereof indicate that the equilibrium rate was at least 1 inch per hour; however, in the event the equilibrium rate is greater than ½ inch per hour the site may be approved provided:

(a) the parcel of property is of sufficient size to reconstruct the drain field in an alternate location should the initial installation malfunction; and

(b) that additional approved treatment is given the waste water before disposal to the drain field; and

(5) Plans for the proposed system have been submitted which, when taken together with the percolation tests reporting showing the following: the location of the building; the distances from the proposed system to the property line and nearby wells and streams; size and shape of lot lines, including length and width of the site; the location of the proposed system in relation to the percolation test holes; and elevations where the department or person authorized to conduct the percolation test deems it necessary to adequately evaluate the site.

(6) In the event a proposed site fails to meet the criteria set forth in this section, a permit shall be issued for an approved alternative system, other than a septic tank, which is appropriate to the individual characteristics of the site, or a variance shall be granted if the department or authorized local board of health finds that health standards and water quality criteria are not jeopardized.

(7) Any person who wishes a variance to the requirements of this section must petition the department or authorized board of health in writing. Such request shall be accompanied by a statement of the reasons for seeking the variance. Variances may be issued for any lot which can safely accommodate the proposed system.

**Section 5.**

**Table 1. SIZE OF SEPTIC TANK. MINIMUM CAPACITY FOR SEPTIC TANK AND OTHER SEWAGE TREATMENT DEVICES**

| Number of bedrooms | 2 or less | 3 | 4 | Each additional |
|---|---|---|---|---|
| Size in gallons | 750 | 900 | 1,000 | 250 |

**Section 6.**

**Table II. LENGTH OF DRAIN FIELD FOOTAGE OF DRAINAGE LINES REQUIRED**

| Equilibrium rate (greater than inches per hour) | 2 Bedrooms (feet) | 3 Bedrooms (feet) | 4 Bedrooms (feet) | 5 Bedrooms (feet) |
|---|---|---|---|---|
| ½ | 495 | 660 | 825 | 990 |
| 1 | 330 | 495 | 660 | 825 |
| 1⅛ | 320 | 480 | 640 | 800 |
| 1¼ | 315 | 475 | 630 | 790 |
| 1⅜ | 310 | 465 | 620 | 775 |
| 1½ | 300 | 450 | 600 | 750 |
| 1⅝ | 290 | 435 | 580 | 725 |
| 1¾ | 275 | 415 | 550 | 690 |
| 1⅞ | 260 | 390 | 520 | 650 |
| 2 | 250 | 375 | 500 | 625 |

**Section 7. Authorized local boards of health and persons approved to conduct percolation tests.**

(1) The commissioner of the Department of Housing shall, upon written request from a local board of health, authorize such board to serve as its agent to issue permits for on-site sewage disposal systems within that area of local board jurisdiction. Such request shall include a method of administering this regulation. As agent, the authorized local board of health shall act for the department in issuing permits and granting variances for on-site sewage disposal systems. Actions by the local board of health shall comply with the requirements of

KRS 318.134 and 318.160 and with the regulations established by the department for on-site sewage disposal systems. Whenever the local health board grants a subsurface sewage system permit, a copy of same shall be placed on file in the Department of Housing, Buildings and Construction, Division of Plumbing.

(2) All persons who propose to conduct percolation tests shall submit their name, occupation, registration number and address to the department.

(3) In the event the department finds that an authorized local board of health, professional engineer or land surveyor, registered sanitarian or other person authorized by the department to conduct and report percolation tests, is not complying with the terms of this regulation, the commissioner may suspend or revoke such authorization after a hearing thereon.

**Section 8. Effect on local regulation.** This regulation shall not supersede more stringent regulations of any local government body.

## 20:150 INSPECTION AND TESTS

**Section 1. Inspections and tests.** The water distribution system, the soil, waste and vent system, the fixtures and fixture traps, appurtenances and all connections thereto in a plumbing system shall be inspected and tested by the department to insure compliance with all the sections of this code. In buildings condemned by other authorities because of unsanitary conditions of the plumbing system, the alterations shall be considered as a new plumbing system.

**Section 2. Material and labor for tests.** All equipment, material and labor necessary for inspections and tests shall be furnished by the persons procuring the plumbing construction permits.

**Section 3. Systems of tests.**

(1) Test of the potable water supply system. The potable water supply system shall be tested and found without leaks under the normal working pressure under which the system will function.

(2) Tests for soil and/or waste and vent system. The soil and/or waste and vent system of a plumbing system shall be tested with water or other tests approved by the department, before it is concealed or covered within the floors or walls of a building. After the plumbing fixtures have been set and their traps filled with water and before the building is occupied, the entire system, other than the house sewer, shall be subjected to a final air pressure test. It shall be the responsibility of the person who secured the plumbing construction permit to notify the department representative and request a final inspection and air test upon completion of the installation. In the event only a portion of the plumbing fixtures are set, an air test shall be requested

and given prior to the time a building is occupied. After the plumbing system is finally completed, another inspection and test must be requested and given. The department may require the removal of any cleanouts to ascertain whether or not the pressure has reached all parts of the system.

(3) Tests of the house sewer. The house sewer shall be tested with either a water or a smoke test.

**Section 4. Methods of testing.**

(1) The potable water supply system as well as the water service shall be tested under a pressure of not less than the maximum working pressure under which it is to be used and be free from leaks.

(2) The entire soil and/or waste vent system shall be subjected to a water test or it may be tested in sections. When it is applied to the entire system, all openings shall be closed, except the highest opening and the system shall be filled with water to the point of overflow. If the system is tested in sections, each opening shall be tightly plugged, except the highest opening and it shall be tested with not less than a 10 feet head of water or with 5 pounds of air pressure. In testing successive sections, at least the upper 10 feet of the preceding section shall be retested.

(3) In lieu of a water test, an air pressure test may be used when the outside temperature is 20 degrees Fahrenheit or less, by attaching an air compressor or test apparatus to any suitable opening. All other inlets and outlets to the system shall be closed, forcing air into the system until there is a uniform pressure sufficient to balance a column of mercury 10 inches in height. The pressure shall be maintained for 15 minutes.

(4) The final air test shall test the entire soil and/or waste and vent system including the fixtures and appurtenances by connecting an air machine to any suitable opening or outlet and applying air pressure equivalent to a 1 inch water column. It shall be maintained for at least a 15 minute period. If there are no leaks or forcing of trap seals as may be indicated by the functioning of a drum, float, or water column, the system shall be deemed air tight.

(5) A garage drainage system shall be tested in the same manner as the soil, waste and vent system.

(6) The house sewer shall be tested by either a water or a smoke test. After the sewer trench has been back filled with at least 2 feet of earth cover, it shall be retested. A 4 inch test tee or wye connection shall be provided at the property line for testing.

**Section 5. Order of tests.** Tests may be made separately or as follows:

(1) The house sewer and its branches from the property line to the house

drain.

(2) The house drain including its branches.

(3) The soil, waste, and vent system as well as inside rain water conductors.

(4) The final inspection and air test which shall include the complete plumbing system as required by Section 4 (2), exclusive of the house sewer.

**Section 6. Tests of alterations, extensions or repairs.** Any alterations, extensions, or repairs that require more than 10 feet of soil, waste and or vent piping, shall be inspected and tested as required by Section 3 (2).

**Section 7. Covering of work.** No part of a plumbing system shall be covered until it has been inspected, tested, and approved as herein provided.

**Section 8. Uncovering of work.** If any part of a plumbing system is covered or concealed before being inspected, tested and approved, it shall be uncovered, or unconcealed and tested as required herein.

**Section 9. Defective work.** If an inspection or a test indicates defected work or material it shall be replaced and the inspection and the test repeated.

**Section 10. Testing defective plumbing.** An air test shall be used in testing the condition of a plumbing system where there is reason to believe it has become defective.

**Section 11. Inspections and tests not required for exhibition purposes.** Tests and inspections shall not be required where a plumbing system or a part thereof is to be used for exhibition purposes and is not directly connected to a sewerage system.

**Section 12. Inspections and tests for the replacement of old plumbing fixtures.** Inspections and tests shall not be required when old plumbing fixtures are replaced with new ones or where faucets or valves are replaced or where leaks are repaired.

**Section 13. Certificate of approval.** Upon the satisfactory completion and final test of the plumbing system, a certificate of approval may be issued by the department.

## 20:160 STANDARDS FOR SUBSURFACE SEWAGE DISPOSAL SYSTEMS OTHER THAN RESIDENTIAL

**Section 1.** Plans for all types of sewage systems must be submitted and approved prior to the time of installation. Such systems shall be designed in accordance with this regulation as well as regulation 815 KAR 20:141. Plans shall not be smaller than 11 by 17 inches and shall be of sufficient size to properly illustrate the proposed system. The plans shall locate the sewage system, the location of the percolation test holes and the rock soundings by dimensions to some reference point, building, etc. All plans shall include the results of an approved percolation test along with a complete soil study.

**Section 2.**

(1) Septic tanks. Septic tanks shall be designed in accordance with the standards of the department. They may be constructed of either poured or precast concrete, steel, fiberglass, polyethylene or other material approved by the department. They must receive prior approval before they are used.

(2) Sewage treatment plants. Sewage treatment plants shall be constructed of either poured or precast concrete, steel, fiberglass, polyethylene or other materials approved by the department and shall receive prior approval by the department before they are used.

**Section 3. Distribution boxes.** Distribution boxes may be constructed of poured or precast concrete, fiberglass, steel or polyethylene plastic. They must be so designed as to accomplish the desired elevations that are denoted in Section 5. They must have prior approval by the department.

**Section 4. Percolation tests and soil evaluations.** Percolation tests shall be conducted in a manner prescribed in regulation 815 KAR 20:141. A percolation test report shall include among other things the type of soil by name, seasonal high water table, and the earth cover over rock. Percolation tests shall be conducted at distances not to exceed 50 feet in all directions within the area where a proposed sewage system will be constructed.

**Section 5. Subsurface sewage disposal system (lateral system).** A subsurface sewage disposal system or lateral system shall be constructed by the use of trenches 2 feet wide and approximately 30 inches deep. Lateral lines shall not exceed 100 feet in length and not be closer than 8 feet on center. If the area in which the lateral system is to be installed has no more than 3 percent grade, it may be constructed by the use of one distribution box where at least three of the lateral lines are connected along the discharge piping from septic tank or treatment system. The invert of the discharge piping from the treatment plant or septic tank must be at least 2 inches above the invert piping from the lateral lines entering the distribution box. All lateral lines from the distribution box must be at the same elevation. There must be at least 2 feet of solid pipe laid on compacted earth between the distribution box and each section of the lateral system. When a lateral system is installed in an area that has more than a 3 percent grade, the lateral lines shall be placed not closer than 8 feet on center and each lateral line must be laid level. Distribution boxes shall be provided in the center of each lateral line. The lateral lines on each side of the distribution box must be on the same elevation while the invert elevation of the waste piping from the septic tank or treatment plant or from one distribution box to the other shall be at least 6 inches above the invert of the lateral line that enters the distribution box. The piping from the treatment plant and the space between the distribution boxes must be sealed piping as well as piping at a distance not to exceed 2 feet from each distribution box before connecting into the lateral system. The lateral system laid in an area with a grade 3 percent or less shall have each segment of the lateral system laid level. In the

area where the grade is greater than 3 percent, each parallel segment of the lateral system must be laid level. All lateral lines must be constructed in a 2 foot wide trench by placing 6 inches of #3 limestone rock beneath and above the distribution piping system. This distribution piping may be either glazed tile or concrete pipe in 1 foot sections, continuous perforated polyethylene piping, or other materials approved by the department.

**Section 6. Sizing of private sewage disposal systems - septic tank or treatment plant.**

(1) The minimum size of a private sewage disposal system shall consist of a 500 gallon septic tank or treatment plant followed by a minimum of 200 feet of lateral drainage system.

(2) A private sewage disposal system for homes shall conform to regulation 815 KAR 20:141.

(3) Notwithstanding subsection (1) of this section, sewage systems for buildings other than homes shall be sized by using the tables listed below which indicates the water usage relating to its use.

Table 1
QUANTITIES OF SEWAGE FLOWS

| Type of establishment | Gallons per person per day (unless otherwise noted) |
|---|---|
| Airports (per passenger) | 5 |
| Apartments (per bedroom) | 250 |
| Bathhouses and swimming pools | 10 |
| Bathhouses (others) | 20 |
| Camps: | |
| Campground with central comfort stations | 35 |
| With flush toilets, no showers | 25 |
| Construction camps (semipermanent) | 50 |
| Day camps (no meals served) | 15 |
| Resort camps (night and day) with limited plumbing | 50 |
| Luxury camps | 100 |
| Factories: | |
| (Per person, per shift, exclusive of industrial wastes) | 35 |
| Hospital (per bed space) | 250 |
| Surgicenters (per bed space) | 300 |
| Institutions other than hospitals | |
| Nursing homes and similar institutions | 125 |
| Mobile home parks (per space) | 250 |
| Motels (per room) | 125 |
| Picnic parks: | |
| With bathhouses, showers and flush toilets | 10 |
| Restaurants (per meal served) | 15 |
| Schools: | |
| Boarding (per student) | 100 |
| Elementary (per student) | 25 |
| High (per student) | 35 |
| College (per student) | 35 |
| Service stations (minimum) | 1000 |

Table 1 (cont'd.)
QUANTITIES OF SEWAGE FLOWS

| Type of establishment | Gallons per person per day (unless otherwise noted) |
|---|---|
| Theaters: | |
| Movie (per auditorium seat) | 5 |
| Drive in (per car seat) | 5 |
| Travel trailer parks: | |
| Without individual water and sewer hook ups (per space) | 75 |
| With individual water and sewer hook ups (per space) | 150 |
| Construction sites (per person) | 35 |

**Section 7. Length or footage of lateral system required.** The length or footage of the lateral system required shall be computed by the use of the following table.

Table 2
ALLOWABLE LOADING FOR SUBSOIL DRAINAGE SYSTEMS

| Time of water to drop 1 inch, expressed in minutes | Lineal footage of tile using 2 foot trench, per 100 gallons of sewage per day |
|---|---|
| 15 | 34.0 |
| 20 | 42.0 |
| 25 | 52.0 |
| 30 | 63.0 |
| 35 | 69.5 |
| 40 | 73.5 |
| 45 | 76.5 |
| 50 | 82.5 |
| 55 | 86.5 |
| 60 | 89.0 |

**Section 8. Location of septic tank or sewage treatment devices.**

(1) Septic tanks shall not be closer than 10 feet from a building, 5 feet from a property line or 50 feet from a well or cistern.

(2) Sewage treatment devices shall not be closer than 50 feet from a building, 15 feet from a property line nor 50 feet from a well or cistern.

**Section 9.**

(1) Lateral fields shall not be closer than 70 feet from a well or cistern.

(2) No sewer pipe shall be within 15 feet of a well or cistern. All sewer piping within a radius of 15 to 50 feet of a well or cistern must be of extra heavy or service weight cast iron pipe or Schedule 40 or 80 ABS or PVS plastic pipe.

## 20:170 MOBILE HOME PARK WASTE SYSTEMS AND CONNECTIONS

**Section 1. Materials.** All materials shall conform to other sections of this code.

**Section 2. Sewers.** The main and branch sewers for the connections of mobile homes shall be laid at a uniform grade and alignment and all joints shall be water tight. Cleanouts shall be provided at intervals not to exceed 100 feet for main and branch sewers in sizes 6 inches and smaller. They shall be extended to the grade with cast iron soil pipe and shall be provided with a brass cleanout plug. A 4 inch concrete pad, 18 inches square, shall be provided around each cleanout. All main and branch sewers 8 inches and larger will not require cleanouts but will require standard manholes at intervals not to exceed 400 feet as well as in all changes in direction. Each mobile home shall be provided with a 4 inch sewer. A 3 inch waste connection shall be provided and extended 1 inch above the grade with cast iron pipe using a cast iron ferrule with a 3 inch standard thread. A 4 inch concrete pad 24 inches square shall be provided around the waste opening. A 3 inch screw plug shall be fastened by a chain to the concrete pad which must be used when the mobile home opening is not in use. The waste pipe connection between the mobile home and the sewer waste opening shall be a waterproof connection constructed of either cast iron, Schedule 40 steel pipe, copper pipe or Schedule 40 ABS or PVC piping.

**Section 3. Individual residential mobile home waste system and connection.** An individual residential mobile home shall either be connected to a municipal sewer system or to an approved private sewage disposal system in accordance with other sections of this code. Each mobile home must be provided with at least a 3 inch cast iron soil pipe waste connection to the house sewer. All piping that does not have at least an 18 inch cover shall be cast iron pipe. Waste connections between the permanent cast iron piping and the mobile home waste connection must be a waterproof connection constructed of either cast iron, Schedule 40 steel pipe, copper pipe or Schedule 40 ABS or PVC piping.

## 20:180 SPECIAL CONNECTIONS

**Section 1. Commercial laundry wastes.** Waste from commercial and institutional washing machines and extractors may discharge into an open trench, provided the trench is drained into at least a 4 inch trap, with a full size vent. The trench shall be constructed of a material resistant to alkaline waste.

**Section 2. Semi-commercial laundries (automatic).** Waste from semi-commercial laundries shall discharge into a 4 inch waste line for washing machines only. The waste line shall have a full size vent and the base of the stack shall be washed by either a washing machine or starch sink. A 4 inch trap shall be provided in the waste line to serve not more than two washing machines. Floor drains may be placed in the waste line. If they are the pump type, a standpipe shall be provided to the height of the machine. Each 4 inch trap shall constitute four fixture units. In no instance shall such washing machines be permitted to discharge into a trench.

**Section 3. Washing machines, automatic, residential (new buildings).** When an automatic washing machine is installed in a new building, it shall

have a 2 inch trap and shall be vented in accordance with other sections of this code. The trap shall be installed 12 inches above the floor with a 2 inch standpipe extended to the height of the washer. If a washing machine discharges into a private disposal system, 50 feet additional lateral must be added to the sewage system.

**Section 4. Washing machines, automatic, residential (old buildings).** When an automatic washing machine is installed in an old building, it may be connected to the house sewer by the use of a 4 inch cast iron P-trap, placed on the outside of the building on the opposite side of the wall of the washing machine. The trap shall have a vented cover extending 3 inches above the grade line. A 4 inch by 2 inch tee shall be installed in the inlet side of the trap with a 2 inch waste pipe extending into the building through the floor to the height of the washing machine. All waste piping shall conform with other sections of this code.

**Section 5. Air conditioning equipment.** Air conditioning equipment installed with a water supply and waste shall conform with the other sections of this code.

**Section 6. Garage sand trap.** A garage sand trap shall be constructed of concrete with a heavy cover or grate. The minimum size shall be 2 feet by 4 feet and it shall have sufficient depth so that there is at least a 10 inch vertical distance between the bottom of the outlet ell and the bottom of the trap. Sand traps shall be provided with a 4 inch vent.

**Section 7. Inflammable waste.** Liquid waste from buildings using gasoline, benzine, naphtha or other inflammable oils or compounds shall discharge into a separator before it enters a sanitary sewer. The waste line receiving such waste must be trapped and vented in accordance with other sections of this code. The separator shall be provided with a 3 inch vent.

**Section 8. Hot water, steam blowoffs or exhaust.** Hot water or steam or exhaust blowoffs shall discharge into a tank or basin before entering the house drain or sewer. The tank or basin shall have an air tight cover and be provided with a 4 inch vent independent of any other venting system.

**Section 9. Stable manure pits.** All liquid waste from barns, stable manure pits and stable yard drains shall discharge through a separator before entering the house sewer.

## 20:191 MINIMUM FIXTURE REQUIREMENTS

**Section 1.** In buildings accommodating males and females it shall be presumed that the occupants will be equally divided between males and females unless otherwise denoted.

**Section 2.** All types of buildings shall be provided with toilet rooms on each level or floor; however, where the department determines that separate facilities on each level or floor are unnecessary, toilet rooms on every other level or floor shall be sufficient.

**Section 3.** Toilet rooms for males and females shall be clearly marked.

**Section 4. Toilet floor construction requirements.** Toilet room floors in all public buildings and places of employment shall be constructed of nonabsorbent materials. When more than one water closet and one lavatory is installed, such a toilet room shall have at least one floor drain and one accessible hose bibb.

**Section 5. Theaters, assembly halls, libraries, museums and art galleries:**

(1) A separate water closet and lavatory shall be provided for males and females in the stage area.

(2) A drinking fountain shall be provided in the stage and auditorium area and a drinking fountain shall be provided on each floor for each 200 persons or fraction thereof.

(3) Separate toilet rooms for males and females shall be provided as indicated in Section 2 as follows:

(a) One water closet for each 100 males or females or fraction thereof; two water closets for 101 to 200 males or females or fraction thereof; three water closets for 201 to 400 males or females or fraction thereof; over 400, add one water closet for each additional 500 males and one for each additional 300 females.

(b) One urinal for up to 200 males; two urinals for 201 to 400; three urinals for 401 to 600; add one urinal for each additional 300 males or fraction thereof.

(c) One lavatory for up to 100 males or females; two lavatories for 101 to 200; three lavatories for 201 to 400; four lavatories for 401 to 750; add one lavatory for each additional 500 or less over 750.

(d) One service sink or slop sink on each floor.

(e) The number of fixtures shall be based upon the maximum seating capacity or fixed seats. If fixed seats are not provided, the basis for determining the capacity shall be one person per each 15 square feet of area.

(4) In libraries, museums and art galleries, separate toilet facilities for males and females shall be provided as indicated in Section 2 as follows:

(a) One water closet and one lavatory for each 100 females or fraction thereof.

(b) One water closet and one lavatory for each 200 males or fraction thereof.

(c) One urinal for each 200 males or fraction thereof.

(d) One service sink or slop sink on each floor.

(e) A drinking fountain shall be provided for each 100 persons.

(f) The above number of fixtures shall be based upon the actual number of persons that can be accommodated.

(5) Urinals may be substituted for water closets for males, not to exceed one third of the required total number of water closets but in all cases the minimum number of urinals must be installed.

(6) Water closets in public restrooms shall be of the elongated bowl type with a split open front seat.

**Section 6. School buildings.** (Related also to 702 KAR 4:070 and 702 KAR 4:080)

(1) A drinking fountain shall be provided on each floor or wing or both of a building and an additional drinking fountain shall be provided for each 75 pupils or fraction thereof. The fountains shall be equipped with a protective cowl and the orifice shall be 1 inch above the overflow rim of the fountain.

(2) Elementary through secondary level school buildings shall be provided with the following:

(a) Water closets for males shall be installed in the following proportions:

1. One water closet for up to 25 pupils.
2. Two water closets for 26 to 100 pupils.
3. One water closet for each 100 pupils or fraction thereof in excess of 100.

(b) Urinals for males shall be installed in the following proportions:

1. One urinal for up to 25 pupils.
2. Two urinals for 26 to 50 pupils.
3. Four urinals for 51 to 100 pupils.
4. Six urinals for 101 to 200 pupils.
5. Eight urinals for 201 to 300 pupils.
6. Ten urinals for 301 to 400 pupils.
7. Twelve urinals for 401 to 500 pupils.
8. One urinal for each 50 pupils or fraction thereof in excess of 500.

(c) Water closets for females shall be installed in the following proportions:

1. Two water closets for up to 25 pupils.

2. Three water closets for 26 to 50 pupils.
3. Six water closets for 51 to 100 pupils.
4. Eight water closets for 101 to 200 pupils.
5. Ten water closets for 201 to 300 pupils.
6. Twelve water closets for 301 to 400 pupils.
7. Fourteen water closets for 401 to 500 pupils.
8. One water closet for each 40 pupils or fraction thereof in excess of 500.

(d) Lavatories for male and female pupils shall be installed in the following proportions:

1. One lavatory for each 25 pupils or fraction thereof.
2. Two lavatories for each 50 pupils or fraction thereof.
3. One lavatory for each 50 persons or fraction thereof over 50.
4. Twenty four inches of sink or 18 inches of circular basin, when provided with water outlet for each space, shall be considered equivalent to one lavatory.

(3) One service sink or slop sink shall be installed on each floor of a building.

(4) When detached relocatable classrooms are used, sanitary facilities will not be required, provided it is within a distance not to exceed 35 feet from the main structure and there are sufficient fixtures in the main structure to serve the entire capacity of the school including the relocatable classrooms.

(5) Water closets for use in the above facilities shall be of the elongated bowl type with a split open front seat.

**Section 7. Schools of higher education and similar educational facility.** In schools of higher education and similar institutions there shall be installed:

(1) One water closet for each 50 males or one water closet for each 25 females or fraction thereof.

(2) One lavatory for each 50 males or females or fraction thereof.

(3) One drinking fountain for each 75 persons or fraction thereof.

(4) Whenever urinals are provided, one water closet less than the number specified may be provided for each urinal installed except that the number of water closets in such cases shall not be reduced to less than two thirds of the minimum specified.

(5) Water closets for use in the above facilities shall be of the elongated bowl type with a split open front seat.

**Section 8. Public garages and service stations.** Separate toilet rooms with at least a water closet and lavatory for females and a water closet, lavatory and urinal for males shall be provided. Water closets shall be of the elongated bowl type with a split open front seat.

**Section 9. Churches.** Sanitary facilities shall be provided in churches as follows:

(1) One drinking fountain for each 400 persons or fraction thereof.

(2) One water closet for each 150 females or fraction thereof.

(3) One water closet for each 300 males or fraction thereof.

(4) One urinal for each 150 males or fraction thereof.

(5) One lavatory for each 150 persons or fraction thereof.

**Section 10. Transient facilities.** (Related also to 902 KAR 10:010.)

(1) Hotels and motels with private rooms shall have one water closet, one lavatory and one bathtub or shower per room.

(2) In the public and service areas there shall be:

(a) One water closet for each 25 males or fraction thereof.

(b) One water closet for each 15 females or fraction thereof.

(c) One lavatory for each 25 males or females or fraction thereof.

(d) One urinal for each 25 up to 100 males, then one for each additional 50 or fraction thereof.

(e) One bathtub or shower, if needed, for each ten males or females or fraction thereof.

(f) One drinking fountain for each 75 or fraction thereof on each floor.

(g) One service sink or slop sink on each floor.

(3) In residential type buildings there shall be one water closet, one lavatory and one bathtub or shower for each ten males and each ten females or fraction thereof.

(4) In rooming houses with private baths, they shall have one water closet, one lavatory and one bathtub or shower per room.

(5) In rooming houses without private baths, there shall be:

(a) One water closet for one to ten males and one for each additional 25 or fraction thereof.

(b) One water closet for one to eight females and one for each additional 20 or fraction thereof.

(c) One urinal for each 25 up to 100 males, then one for each additional 50 or fraction thereof.

(d) One lavatory for each ten males or females or fraction thereof.

(e) One bathtub or shower for each ten males or females or fraction thereof.

**Section 11. Dormitories: school, labor or institutional.** (Related also to 902 KAR 10:040.) In dormitories there shall be installed:

(1) One water closet for up to ten males or one water closet for up to eight females. Add one water closet for each additional 25 males or fraction thereof and one water closet for each additional 20 females or fraction thereof.

(2) (a) One urinal for each 25 males or fraction thereof. Over 150 males add one fixture for each additional 50 males or fraction thereof.

(b) Where urinals are provided for women, the same number shall be provided for men.

(c) Where urinals are provided, they may be substituted for water closets, not to exceed one third of the required total number of water closets.

(d) Trough urinals shall be figured on the basis of one urinal for each 24 inches of length.

(3) (a) One lavatory for one to 12 persons. Add one lavatory for each 20 males and each 15 females.

(b) Separate dental lavatories should be provided in community toilet rooms. A ratio of one dental lavatory to each 50 persons.

(4) One bathtub or shower for each eight persons. Over 150 persons add one fixture for each 20 persons. For women's dormitories, there shall be installed additional bathtubs at the ratio of one for each 30 women.

(5) One drinking fountain for each 75 persons.

(6) One laundry tray or clothes washer for each 50 persons.

(7) One service sink or slop sink for each 100 persons.

**Section 12. Hospitals, nursing homes and institutions.** (Related also to 902 KAR 20:031, 902 KAR 20:046, 902 KAR 20:056, 902 KAR 9:010.) Sanitary facilities shall be provided on each floor level and shall conform to the following:

(1) Hospitals:

(a) Wards:

1. One water closet for each ten patients.
2. One lavatory for each ten patients.
3. One tub/shower for each 15 patients.
4. One drinking fountain for each 100 patients.

(b) Individual rooms: One water closet, one lavatory and one tub/shower.

(c) Waiting rooms: One water closet and one lavatory.

(2) Nursing homes and institutions (other than penal):

(a) One water closet for each 25 males or fraction thereof.

(b) One water closet for each 20 females or fraction thereof.

(c) One lavatory for each ten persons or fraction thereof.

(d) One urinal for each 50 males.

(e) One tub or shower for each 15 persons or fraction thereof.

(f) One drinking fountain on each floor.

(g) One service sink or slop sink on each floor.

(3) Institutions, penal:

(a) Cell:

1. One prison type water closet.
2. One prison type lavatory.

(b) Day rooms and dormitories:

1. One water closet for each eight inmates or fraction thereof.
2. One lavatory for each eight inmates or fraction thereof.
3. One shower for each 15 inmates or fraction thereof.
4. One urinal may be substituted for each water closet but in no instance shall the water closets be reduced to less than one half the number required.
5. One drinking fountain per floor.
6. One service sink or slop sink per floor.

(d) Toilet facilities for employees shall be located in separate rooms from those in which fixtures for the use of inmates or patients are located.

(e) One drinking fountain on each floor.

(f) One service sink or slop sink per floor.

**Section 13. Workshops, factories, mercantile and office buildings.** Separate toilet facilities shall be provided for males and females on each floor unless otherwise denoted.

(1) Workshops and factories: Sanitary facilities shall be provided on each floor and shall conform to the following:

(a) One water closet for each 25 males or fraction thereof, up to 100.

(b) One lavatory for each 25 males or fraction thereof, up to 100.

(c) One urinal for 11 to 50 employees.

(d) Two urinals for 51 to 100 employees.

(e) One lavatory for each 25 females or fraction thereof, up to 100.

(f) One water closet for each 15 females or fraction thereof, up to 100.

(g) When in excess of 100 there shall be an additional water closet for each 30 males and each 30 females or fraction thereof; one lavatory for each additional 50 males and females or fraction thereof; one urinal for each 100 males or fraction thereof.

(h) One shower for each 15 persons exposed to skin contamination from irritating, infectious or poisonous materials.

(i) One drinking fountain on each floor for each 50 employees. In excess of 100 employees there shall be an additional drinking fountain on each floor for each additional 75 persons.

(j) One service sink or slop sink per floor.

(k) Individual sinks or wash troughs may be used in lieu of lavatories. Twenty four inches of sink or trough, when provided with water, or 18 inches of circular basin shall be deemed the equivalent of one lavatory.

(2) Mercantile:

(a) When in excess of five persons of different sexes are employed, separate facilities must be provided for the employees.

(b) Sanitary facilities shall be provided for customers when the building contains 5,000 square feet or more. In malls and/or shopping centers, the required facilities, based on one person per 50 square feet, may be installed in individual stores or in a central toilet room area or areas, if the distance from the main entrance of any store does not exceed 500 feet.

(c)
1. One water closet for one to 100 persons.
2. Two water closets for 101 to 200 persons.
3. Three water closets for 201 to 400 persons.
4. One water closet for each 500 males, or 300 females, in excess of 400.
5. One urinal for one to 200 males.
6. Two urinals for 201 to 400 males.
7. Three urinals for 401 to 600 males.
8. One urinal for each 300 males, or fraction thereof, over 600.
9. One lavatory for one to 200 persons.
10. Two lavatories for 201 to 400 persons.
11. Three lavatories for 401 to 700 persons.

12. One lavatory for each 500 persons, or fraction thereof, in excess of 700.
13. One drinking fountain on each floor for each 500 persons or fraction thereof.
14. One service sink or slop sink per floor.

(3) Office buildings:

(a) When in excess of five persons of different sexes are employed, separate facilities must be provided.

(b) Sanitary facilities shall be provided as indicated in Section 2 and shall conform as follows:

1. One water closet for one to 15 persons.
2. Two water closets for 16 to 35 persons.
3. Three water closets for 36 to 55 persons.
4. Four water closets for 56 to 80 persons.
5. Five water closets for 81 to 110 persons.
6. Six water closets for 111 to 150 persons.
7. One water closet for each 40 additional persons.
8. One lavatory for one to 15 persons.
9. Two lavatories for 16 to 35 persons.
10. Three lavatories for 36 to 60 persons.
11. Four lavatories for 61 to 90 persons.
12. Five lavatories for 91 to 125 persons.
13. One lavatory for each 45 additional persons.
14. Whenever urinals are provided, one water closet less than the number specified may be provided for each urinal installed except that the number of water closets in such cases shall not be reduced to less than 70 percent of the minimum specified.
15. One drinking fountain for each 75 persons or fraction thereof.

**Section 14. Swimming pool bathhouses.** (Related also to 401 KAR 6:030.)

(1) Bathhouses for public swimming pools shall be divided into two parts separately by a tight partition, one designated for "Males" or "Men" and the other "Females" or "Women."

(2) Sanitary facilities shall be provided in each bathhouse to serve the anticipated bather loading, as defined in 401 KAR 6:030, Section 7(5), and shall conform to the following:

(a) One water closet for each 75 males or fraction thereof.

(b) One water closet for each 50 females or fraction thereof.

(c) One urinal for each 75 males or fraction thereof.

(d) One lavatory for each 100 persons or fraction thereof.

(e) One shower per each 50 persons or fraction thereof.

(f) One drinking fountain per each 200 persons or fraction thereof.

(3) Fixtures schedules shall be increased for pools at schools or similar locations where bather loads may reach peaks due to schedules of use. Pools used by groups or classes on regular time schedules of one hour or less shall have one shower for each six swimmers, or one shower for each ten swimmers if the period is two hours.

(4) Satisfactorily designed and located shower facilities, including warm water and soap, shall be provided for each sex. Showers shall be supplied with water at a temperature of no less than 90° F., and at a flow rate of at 3 gallons per minute. Thermostatic, tempering or mixing valves shall be installed to prevent scalding of the bathers.

(5) The requirement relating to bathhouse toilet room and shower facilities may be waived when such facilities are conveniently available to pool patrons within 150 feet from the pool.

**Section 15. Park service buildings or bathhouses.** (Relates also to 902 KAR 15:020.)

(1) Except for self contained recreational vehicle parks, each park shall provide one or more central service buildings containing the necessary toilet and other plumbing fixtures specified.

(2) Except for self contained recreational vehicle parks, sanitary facilities shall be provided as follows:

(a) One to 15 vehicle spaces:

1. Males: One water closet, one urinal, one lavatory and one shower.

2. Females: One water closet, one lavatory and one shower.

(b) Sixteen to 30 vehicle spaces:

1. Males: One water closet, one urinal, two lavatories and two showers.

2. Females: Two water closets, two lavatories and two showers.

(c) Thirty one to 45 vehicle spaces:

1. Males: Two water closets, one urinal, three lavatories and three showers.

2. Females: Two water closets, three lavatories and three showers.

(d) Forty six to 60 vehicle spaces:

1. Males: Two water closets, two urinals, three lavatories and three showers.
2. Females: Three water closets, three lavatories and three showers.

(e) Sixty one to 80 vehicle spaces:

1. Males: Three water closets, two urinals, four lavatories and four showers.
2. Females: Four water closets, four lavatories and four showers.

(f) Eighty one to 100 vehicle spaces:

1. Males: Four water closets, two urinals, five lavatories and five showers.
2. Females: Five water closets, five lavatories and five showers.

(g) When over 100 vehicle spaces are provided there shall be one additional water closet and one additional lavatory for each sex per additional 30 spaces or fraction thereof; one additional shower for each sex per additional 40 vehicle spaces or fraction thereof; and one additional urinal for males per additional 100 vehicle spaces.

**Section 16. Residential and day camp sites.** (Related also to 902 KAR 10:040.)

(1) Each residential and day camp site shall be provided with sanitary facilities for each sex as specified.

(2) Sanitary facilities shall be provided as listed below, except, however, day camps shall not be required to provide shower facilities.

(a) One to 18 persons served:

1. Males: One water closet, one urinal, one lavatory and one shower.
2. Females: Two water closets, one lavatory and one shower.

(b) Nineteen to 33 persons served:

1. Males: Two water closets, one urinal, two lavatories and two showers.
2. Females: Two water closets, two lavatories and two showers.

(c) Thirty four to 48 persons served:

1. Males: Two water closets, two urinals, two lavatories and three showers.
2. Females: Three water closets, two lavatories and three showers.

(d) Forty nine to 63 persons served:

1. Males: Three water closets, two urinals, three lavatories and four showers.
2. Females: Four water closets, three lavatories and four showers.

(e) Sixty four to 79 persons served:

1. Males: Three water closets, three urinals, three lavatories and five showers.
2. Females: Five water closets, three lavatories and five showers.

(f) Eighty to 95 persons served:

1. Males: Four water closets, three urinals, four lavatories and six showers.
2. Females: Six water closets, four lavatories, and six showers.

(g) When over 95 persons are served, there shall be provided: One additional water closet and one additional lavatory for each 25 persons or fraction thereof served; one additional shower for each 20 persons, or fraction thereof, served; one urinal per 50 additional males or fraction thereof.

(h) Water closets may be substituted for urinals when facilities may be used by both sexes.

**Section 17. Retail food stores and restaurants.** Sanitary facilities shall be provided for employees. (Related to 902 KAR 10:020 and 902 KAR 45:005.)

(1) Food stores:

(a) When in excess of five persons of different sexes are employed, separate facilities must be provided for the employees.

(b) Sanitary facilities shall be provided for customers when the building contains 5,000 square feet or more. In malls and/or shopping centers, the required facilities, based on one person per 50 square feet, may be installed in individual stores or in a central toilet room area or areas, if the distance from the main entrance of any store does not exceed 500 feet.

(c)
1. One water closet for one to 100 persons.
2. Two water closets for 101 to 200 persons.
3. Three water closets for 201 to 400 persons.
4. One water closet for each 500 males or 300 females in excess of 400.
5. One urinal for one to 200 males.
6. Two urinals for 201 to 400 males.

7. Three urinals for 401 to 600 males.
8. One urinal for each 300 males or fraction thereof, over 600.
9. One lavatory for one to 200 persons.
10. Two lavatories for 201 to 400 persons.
11. Three lavatories for 401 to 700 persons.
12. One lavatory for each 500 persons or fraction thereof in excess of 700.
13. One drinking fountain on each floor for each 500 persons or fraction thereof.
14. One service sink or slop sink per floor as required.

(2) Restaurants:

(a) When in excess of five persons of different sexes are employed, separate facilities must be provided for the employees.

(b) In new establishments or establishments that are extensively altered or changed from another type occupancy to a restaurant, toilet facilities for each sex shall be provided and readily accessible for the use of both patrons and employees; provided, that carry out type food service operations shall be exempted from providing toilet facilities for the use of their patrons.

(c) 1. Two water closets for one to 100 persons.
2. Three water closets for 101 to 200 persons.
3. Four water closets for 201 to 300 persons.
4. One water closet for each additional 200 persons or fraction thereof over 300.

(d) 1. One urinal for one to 150 males.
2. One urinal for each additional 150 males or fraction thereof over 150.

(e) 1. One lavatory for one to 200 persons.
2. Two lavatories for 201 to 400 persons.
3. Three lavatories for 401 to 600 persons.
4. One lavatory for each additional 200 persons or fraction thereof over 600.

(f) 1. One drinking fountain for one to 100 persons.
2. Two drinking fountains for 101 to 500 persons or fraction thereof.

(g) When food is consumed indoors on premises, water stations may be substituted for drinking fountains.

(h) One service sink or slop sink on each floor as required.

(i) Lavatories for hand washing shall be provided in the kitchen area readily accessible to the employees.

**Section 18. Temporary facilities for construction projects.** Separate sanitary fixtures shall be provided as scheduled below for both males and females:

(1) One water closet per 30 males or fraction thereof.

(2) One urinal per 30 males or fraction thereof.

(3) One lavatory per 30 males or fraction thereof.

(4) One water closet per 20 females or fraction thereof.

(5) One lavatory per 20 females or fraction thereof.

(6) One drinking fountain per 100 persons or fraction thereof.

| Type of building occupancy | Water closets | Urinals | Lavatories | Bathtubs, showers | Drinking fountains | Other fixtures |
|---|---|---|---|---|---|---|
| Theaters, auditoriums<br><br>*see footnotes #1 and #5 | Separate toilet facilities for males and females.<br>No. of persons / No. of fixtures M / F<br>1-100 1 1<br>101-200 2 2<br>201-400 3 3<br>Over 400, add one fixture for each additional 500 males and one for each 300 females or fraction thereof. | No. of persons (Male) / No. of fixtures<br>1-200 1<br>201-400 2<br>401-600 3<br>Over 600, add one for each additional 300 males or fraction thereof.<br>*see footnote #2 | No. of persons / No. of fixtures<br>1-200 1<br>201-400 2<br>401-750 3<br>Over 750, add one for each additional 500 persons or fraction thereof. | | A drinking fountain shall be provided in the stage area and a drinking fountain shall be provided on each floor level for each 200 persons or fraction thereof. | A service sink or slop sink on each floor level as required. |
| Libraries, museums and art galleries<br><br>*see footnotes #1 and #5 | Separate toilet facilities for males and females.<br>No. of persons / No. of fixtures M / F<br>1-100 1 1<br>101-200 1 2<br>201-300 2 3<br>301-400 3 4<br>Over 400, add one fixture for each additional 500 males and one for each 300 females or fraction thereof. | No. of persons (Male) / No. of fixtures<br>1-200 1<br>201-400 2<br>401-600 3<br>Over 600, add one for each additional 300 males or fraction thereof.<br>*see footnote #2 | No. of persons / No. of fixtures M / F<br>1-100 1 1<br>101-200 1 2<br>201-300 2 3<br>301-400 2 4<br>Over 750, add one for each additional 500 or fraction thereof. | | A drinking fountain shall be provided for each 100 people. | A service sink or slop sink on each floor level as required. |

(Table continued on next page)

**MINIMUM NUMBER OF PLUMBING FIXTURES (cont'd.)**

| Type of building occupancy | Water closets | Urinals | Lavatories | Bathtubs, showers | Drinking fountains | Other fixtures |
|---|---|---|---|---|---|---|
| Schools (elementary through secondary level)<br>*see footnote #5 | No. of persons / No. of fixtures M / F<br>1- 25 / 1 / 2<br>26- 50 / 2 / 3<br>51-100 / 2 / 6<br>101-200 / 3 / 8<br>201-300 / 4 / 12<br>301-400 / 5 / 15<br>401-500 / 6 / 18<br>Over 500, add one water closet for each additional 100 males and each 40 females. | No. of persons (male) / No. of fixtures<br>1- 25 / 1<br>26- 50 / 2<br>51-100 / 4<br>101-200 / 6<br>201-300 / 8<br>301-400 / 10<br>401-500 / 12<br>Over 500, add one urinal for each additional 50 persons or fraction thereof.<br>*see footnote #2 | No. of persons / No. of fixtures M / F<br>1- 25 / 1 / 1<br>26- 50 / 2 / 2<br>51-100 / 3 / 3<br>Over 100, add additional one lavatory for each additional 50 pupils or fraction thereof.<br>*see footnote #3 | | One drinking fountain on each floor and one for each additional 75 persons or fraction thereof on each floor.<br>*see footnote #4 | One service sink or slop sink or each floor. |
| Schools of higher education and similar educational facilities<br>*see footnote #5 | Male 1-50 / Female 1-25 | Wherever urinals are provided, one water closet less than the number specified may be provided for each urinal installed except that the number of water closets in such case shall not be reduced to less than 2/3 of the minimum specified.<br>*see footnote #2 | 1-50 | | 1-75<br>*see footnote #4 | |

(Table continued on next page)

**MINIMUM NUMBER OF PLUMBING FIXTURES (cont'd.)**

| Type of building occupancy | Water closets | Urinals | Lavatories | Bathtubs, showers | Drinking fountains | Other fixtures |
|---|---|---|---|---|---|---|
| Public garages and service stations<br>*see footnote #5 | Male 1<br>Female 1 | 1 | Male 1<br>Female 1 | | 1 | |
| Churches<br>*see footnote #5 | No. of persons / No. of fixtures<br>Male<br>150 / 1<br>Female<br>300 / 1 | No. of persons / No. of fixtures<br>Male<br>300 / 1 | No. of persons / No. of fixtures<br>150 / 1 | | | |
| Transient facilities—Hotels, motels with private rooms | 1 | | 1 | 1 | | |
| Public and service areas<br>*see footnote #5 | Male 1-25<br>Female 1-15 | Male only<br>One for each 25 up to 100, then one for each additional 50. | Male 1-25<br>Female 1-15 | Male 1-10<br>Female 1-10<br>if needed | 1-75 | One service sink or slop sink on each floor as required. |
| Residential building | Male 1-25<br>Female 1-25 | | Male 1-25<br>Female 1-25 | Male 1-25<br>Female 1-25 | | |
| Rooming houses — With private bath | 1 | | 1 | 1 | | |
| Rooming houses — Without private bath | Male 1-10 One for additional 25.<br>Female 1-8 One for additional 20. | Same as for hotel, motel. | Same as for hotel, motel. | Same as for hotel, motel. | | |

(Table continued on next page)

**MINIMUM NUMBER OF PLUMBING FIXTURES (cont'd.)**

| Type of building occupancy | Water closets | Urinals | Lavatories | Bathtubs, showers | Drinking fountains | Other fixtures |
|---|---|---|---|---|---|---|
| Dormitories | Male<br>One for each 10 persons.<br>Female<br>One for each 8 persons.<br>Over 10 persons, add one fixture for each 25 additional males and one for each 20 additional females. | One for each 25 men. Over 150 persons, add one fixture for each additional 50 men. | One for each 12 persons. (Separate dental lavatories should be provided, one for each 50 persons is recommended.) Add one lavatory for each 20 males and one for each 15 females. | One for each 8 persons. In the case of women's dormitories, additional bathtubs should be installed at the ratio of one for each 30 females. | One for each 75 persons. | Laundry trays, one for each 50 persons. Slop sinks, one for each 100 persons. |
| Hospitals—<br>individual room<br>wards<br><br>waiting rooms<br>*see footnote #5 | 1<br>One for each 10 patients.<br>1 | | 1<br>One for each 10 patients.<br>1 | 1<br>One for each 15 patients. | One for each 100 patients. | One slop sink per floor as required. |
| Nursing homes and institutions—other than penal (on each occupied story)<br>*see footnote #5 | One for each 25 men.<br>One for each 20 women. | One for each 50 men. | One for each 10 persons. | One for each 15 persons. | One for each 50 persons. | One slop sink or one service sink per floor as required. |
| Institutions, penal | One in each cell. One for each 8 inmates in dayrooms and dormitories. | One urinal may be substituted for each water closet but in no instance shall the water closets be reduced to less than ½ the number required. | One in each cell. One for each 8 inmates in dayrooms or dormitories. | One for each 15 inmates in dayrooms or dormitories. | One for each cell block floor. One in each dayroom. | One slop sink per floor as required. |

(Table continued on next page)

## MINIMUM NUMBER OF PLUMBING FIXTURES (cont'd.)

| Type of building occupancy | Water closets | Urinals | Lavatories | Bathtubs, showers | Drinking fountains | Other fixtures |
|---|---|---|---|---|---|---|
| Workshops and factories | One water closet for each 25 males and each 15 females or fraction thereof in excess of 100 persons.<br>One additional water closet for each 30 persons or fraction thereof. | No. of persons / No. of fixtures<br>11- 50 / 1<br>51-100 / 2<br>101-200 / 3<br>201-300 / 4<br>301-400 / 5<br>401-500 / 6<br>One urinal for each additional 100 or fraction thereof. | One lavatory for each 25 persons or fraction thereof.<br>In excess of 100 persons there shall be one additional lavatory for each 30 persons or fraction thereof.<br>*see footnote #3 | One for each 15 persons exposed to skin contamination from irritating, infectious or poisonous materials. | One per 50 persons.<br>In excess of 100, there shall be one additional per each 75 persons or fraction thereof. | One service sink or slop sink per floor as required. |
| Mercantile<br><br>*see footnote #1 | No. of persons / No. of fixtures<br>1-100 / 1<br>101-200 / 2<br>201-400 / 3<br>Over 400, add one fixture for each additional 500 men; add one for each 300 women. | No. of persons / No. of fixtures<br>1-200 / 1<br>201-400 / 2<br>401-600 / 3<br>Over 600, add one fixture for each 300 men. | No. of persons / No. of fixtures<br>1-200 / 1<br>201-400 / 2<br>401-750 / 3<br>Over 750, add one fixture for each 500 persons. | | 1 per 100. | One service sink or slop sink per floor as required. |

(Table continued on next page)

**MINIMUM NUMBER OF PLUMBING FIXTURES (cont'd.)**

| Type of building occupancy | Water closets | Urinals | Lavatories | Bathtubs, showers | Drinking fountains | Other fixtures |
|---|---|---|---|---|---|---|
| Office or public buildings<br><br>*see footnote #1 | Separate toilet facilities for male and female.<br>No. of persons — No. of fixtures<br>1- 15 — 1<br>16- 35 — 2<br>36- 55 — 3<br>56- 80 — 4<br>81-110 — 5<br>111-150 — 6<br>One fixture for each 40 additional persons. | Whenever urinals are provided, one water closet less than the number specified may be provided for each urinal installed except that the number of water closets in such cases shall not be reduced to less than 2/3 of the minimum specified.<br>*see footnote #2 | No. of persons — No. of fixtures<br>1- 15 — 1<br>16- 35 — 2<br>36- 60 — 3<br>61- 90 — 4<br>91-125 — 5<br>One fixture for each 45 additional persons. | | One for each 75 persons. | |
| Swimming pool bath houses<br><br>*see footnote #5 | One per 75 males and one per 50 females or fraction thereof. | One per 75 males or fraction thereof. | One per each 100 males and females or fraction thereof. | One per each 50 males and females or fraction thereof. | One per each 200 persons or fraction thereof. | |

(Table continued on next page)

**MINIMUM NUMBER OF PLUMBING FIXTURES (cont'd.)**

| Type of building occupancy | Water closets | Urinals | Lavatories | Bathtubs, showers | Drinking fountains | Other fixtures |
|---|---|---|---|---|---|---|
| Park service buildings or bath houses<br>*see footnote #5 | No. of spaces / No. of fixtures M F<br>1- 15 1 1<br>16- 30 1 2<br>31- 45 2 2<br>46- 60 2 3<br>61- 80 3 4<br>81-100 4 5<br>Over 100 spaces add one additional water closet for each sex for each additional 30 spaces or fraction thereof. | No. of spaces / No. of fixtures<br>1- 15 1<br>16- 30 1<br>31- 45 1<br>46- 60 2<br>61- 80 2<br>81-100 2<br>Over 100 spaces add one additional urinal per each 100 additional spaces or fraction thereof. | No. of spaces / No. of fixtures M F<br>1- 15 1 1<br>16- 30 2 2<br>31- 45 3 3<br>46- 60 3 3<br>61- 80 4 4<br>81-100 5 5<br>Over 100 spaces add one additional lavatory for each sex for each additional 30 spaces or fraction thereof. | No. of spaces / No. of fixtures M F<br>1- 15 1 1<br>16- 30 2 2<br>31- 45 3 3<br>46- 60 3 3<br>61- 80 4 4<br>81-100 5 5<br>Over 100 spaces add one additional shower for each sex for each additional 40 spaces or fraction thereof. | One for each 50 spaces. | |
| Residential and day camp sites<br>*see footnote #5 | No. of persons / No. of fixtures M F<br>1-18 1 2<br>19-33 2 2<br>34-48 2 3<br>49-63 3 4<br>64-79 3 5<br>80-95 4 6<br>Over 95 persons add one additional water closet per each 25 persons or fraction thereof. | No. of persons / No. of fixtures<br>1-18 1<br>19-33 1<br>34-48 2<br>49-63 2<br>64-79 3<br>80-95 3<br>Over 95 persons add one additional urinal per each 50 persons or fraction thereof. Water closets may be substituted for urinals when facilities are used by both sexes. | No. of persons / No. of fixtures M F<br>1-18 1 1<br>19-33 2 2<br>34-48 2 2<br>49-63 3 3<br>64-79 3 3<br>80-95 4 4<br>Over 95 persons add one additional lavatory for each 25 persons or fraction thereof. | No. of persons / No. of fixtures M F<br>1-18 1 1<br>19-33 2 2<br>34-48 3 3<br>49-63 4 4<br>64-79 5 5<br>80-95 6 6<br>Over 95 persons add one additional shower for each 20 persons or fraction thereof. | One for each 200 persons or fraction thereof. | |

(Table continued on next page)

**MINIMUM NUMBER OF PLUMBING FIXTURES (cont'd.)**

| Type of building occupancy | Water closets | Urinals | Lavatories | Bathtubs, showers | Drinking fountains | Other fixtures |
|---|---|---|---|---|---|---|
| Food stores<br>*see footnote #5 | No. of persons / No. of fixtures M F<br>1-100 1 1<br>101-200 2 2<br>201-400 3 3<br>One water closet for each 500 males and 300 females or fraction thereof in excess of 400. | No. of persons / No. of fixtures<br>1-200 1<br>201-400 2<br>401-600 3<br>One for each additional 300 males or fraction thereof over 600. | No. of persons / No. of fixtures M F<br>1-200 1 1<br>201-400 2 2<br>401-700 3 3<br>One for each additional 500 persons in excess of 700. | | One on each floor for each 500 persons. | One service sink or slop sink per floor as required. |
| Restaurants<br>*see footnote #5 | No. of persons / No. of fixtures M F<br>1-100 1 1<br>101-200 1 2<br>201-300 2 2<br>301-500 2 3 | No. of persons / No. of fixtures<br>1-150 1<br>151-300 2<br>301-450 3<br>451-600 4 | No. of persons / No. of fixtures M F<br>1-200 1 1<br>201-400 1 1<br>401-600 2 2 | | 2<br>*see footnote #6 | One service sink or slop sink per floor as required. |
| Temporary facilities—working men or women<br>*see footnote #5 | One per each 30 working men or women. | One per each 30 working men. | One per each 30 working men or women. | | One fixture or equivalent for each 100 working men or women. | |

**Footnotes:**

*1. Building category not shown on this table will be considered separately by the Division of Plumbing administrative authority.
*2. Urinals may be substituted for water closets for males, not to exceed one third of the required total number of water closets but in all cases the minimum number of urinals must be installed.
*3. Twenty four lineal inches of wash sink or 18 inches of a circular basin shall be considered the equivalent of one lavatory when each such space is provided with water outlets.
*4. Drinking fountains shall not be installed as an integral part of a hand washing facility.
*5. Water closets to be elongated bowls with split open front seats.
*6. Where food is consumed indoors, water stations may be substituted for drinking fountains.

# ARTICLE 23

## PREFABRICATED CONSTRUCTION

### SECTION 2300.0 GENERAL

**2300.1 Scope:** The provisions of this article shall govern the materials and methods of construction of all prefabricated buildings, prefabricated sub-assemblies and prefabricated building units as herein defined.

**Note: Mass and industrialized production:** Prefabrication as herein used is not restricted to housing for buildings of Use Group R-3, but applies to all prefabricated forms of building elements and assembled construction units, intended for both structural and service equipment purposes in all buildings of all use groups. The provisions of this article are supplemental to the structural, mechanical and fireresistance rating requirements of this code. Prefabrication covers the precutting and assembling of individual elements either in the shop or at the site before erection in the building structure. Prefabricated shop assemblies may be shipped in structurally complete units ready for installation in the building structure, or in knock-down and packaged form for assembly at the site. There is not a distinction between the application of these code requirements for controlled or ordinary materials as defined in Sections 201.0, 919.0 and 1100.0, and either prefabricated or at-site construction. However, the use of controlled materials procedure permits greater latitude for the development of industrialized shop production methods.

**2300.2 Approved materials and methods:** The use of all materials or methods of construction which meet the specified strength, durability, sanitary and fireresistance rating requirements of this code shall be permitted.

**2300.3 New materials:** All new materials or assemblies not specifically provided for shall be tested and evaluated in accordance with the provisions of this code. The building official may accept duly authenticated research reports from Building Officials and Code Administrators International or other approved sources to assist him in his determination.

**2300.4 At-site construction:** The provisions of this article shall not be deemed to prohibit at-site construction and erection of buildings or structures when designed in compliance with the provisions of this code and the minimum requirements prescribed in this article.

**2300.5 Conflicting laws:** Nothing herein contained shall be deemed to nullify any provisions of the zoning laws or any other statute or legally adopted rule pertaining to building construction in respect to the location, use, height or area of a building and type of construction, except as may be specifically exempted in these provisions. Nor shall anything herein contained have the effect of increasing working stresses or reducing egress facilities and health provisions as prescribed in this code.

## SECTION 2301.0 PLANS AND SPECIFICATIONS

**2301.1 Application:** Complete legible dimensioned drawings to a scale of not less than ⅛ inch per foot (10 mm/m) and specifications covering every type of prefabricated construction complying with the provisions of Section 111.0 shall be submitted to the building official for approval. Such application shall describe all essential elements of the structure or assembly, identify such materials as the building official may designate with the name of manufacturer, trade name, commercial grade, manufacturing process or chemical composition when necessary, and shall include all required data of the physical properties of the component materials.

**2301.2 Plot diagram:** A plot plan complying with Article 1 shall be filed for each individual building or structure.

**2301.3 Mechanical plans:** Mechanical plans in sufficient detail for the installation of heating, cooking, electrical, ventilating, air conditioning, sanitary and all other service equipment, piping and accessories shall be submitted to the building official with the application for general approval of the design. If not included in the general application for approval, such information shall be furnished for each specific installation.

**2301.4 Piping, electric wiring and accessories:** The design shall include provision for all installations of piping, wiring and accessories for service equipment to be installed either in the shop or at the site.

**2301.5 Integral accessories:** When unit service equipment is furnished with and forms an integral part of the prefabricated subassembly, the construction shall be preformed to accommodate accessory conduits, piping, ducts, outlet boxes and fittings. Materials essential to the structural strength of the unit or assembly shall not be removed from structural elements during installation on the site.

**2301.6 Service equipment requirements:** All service equipment shall comply with the requirements of Article 15 for heating, Article 17 for fire protection, Article 20 for electrical, Article 22 for plumbing and the mechanical code listed in Appendix A for air conditioning and ventilating systems and equipment.

## SECTION 2302.0 TESTS OF PREFABRICATED ASSEMBLIES

**2302.1 General:** When not capable of design by approved engineering analy-

sis, all prefabricated assemblies or subassemblies constructed as in practice shall be subjected to the unit assembly tests prescribed in Articles 9, 10, 11, 12 and 13. All assembly tests shall meet the strength requirements of Section 1103.0 within the limits of deflection therein provided.

## SECTION 2303.0 EVALUATION AND FOLLOW UP INSPECTION SERVICES

**2303.1 Evaluation report:** Prior to the approval of a closed prefabricated assembly and issuance of a building permit, the building official shall require the submittal of an evaluation report of each prefabricated assembly, indicating the complete details of the assembly, including a description of the assembly and its components, the basis upon which the assembly is being evaluated, test results and similar information, and other data as necessary for the building official to determine conformance with this code.

**2303.2 Evaluation service:** The building official may designate the evaluation service of Building Officials and Code Administrators International or other approved agency as the evaluation agency, and review such agency's evaluation report for adequacy and conformance to this code.

**2303.3 Follow up inspection:** Except where all assemblies and subassemblies, service equipment and accessories are readily accessible for complete inspection at the site without disassembly or dismantling, the building official may designate the follow up inspection service of the Building Officials and Code Administrators International or another independent approved inspection agency to conduct the frequency of in-plant inspections necessary to reasonably assure conformance to the approved evaluation report. The inspection agency shall furnish the building official with the follow up inspection manual and a report of inspections upon request and the product shall have an identifying label permanently fixed to the product indicating that factory inspections have been performed.

**2303.4 Test and inspection records:** All required test and inspection records shall be accessible to the building official at all times during the fabrication of the unit or subassembly and the erection of the building; or such records as the building official may designate shall be filed with him.

**2303.5 Fees:** All fees associated with the evaluation and follow up inspection services shall be borne by the applicant.

## SECTION 2304.0 PREFABRICATED UNITS

**2304.1 General:** Approved prefabricated individual units for use in floor, roof, ceiling or wall construction which are designated to meet all prescribed structural provisions of Articles 9, 10, 11, 12 and 13, including connection and anchorage details, may be used in all at-site construction types and building use groups within the fireresistance, height and area limitations of Tables 401 and 505.

## SECTION 2305.0 EXISTING SYSTEMS AND APPROVALS

**2305.1 Existing approvals:** Any material, appliance, form or system of construction heretofore legally approved may be used for the purposes and within the limitations for which it was approved, provided such use is not detrimental to the safety of the public and is not specifically prohibited by the provisions of this code.

**2305.2 Materials already fabricated:** The use of any material already fabricated or of any construction already erected under a heretofore legally issued permit of the building official shall be permitted. Continuation of any construction erected in violation of any statute or legally adopted rule in force at the time of erection shall be prohibited.

## SECTION 2306.0 APPROVALS BASED ON DESIGN

**2306.1 Engineering analysis:** When capable of design by approved engineering analysis, any prefabricated structural element or combination of elements shall be approved by the building official when the design is based on the working loads and working stresses provided in Articles 9, 10, 11, 12 and 13.

**2306.2 Average working stress for ordinary material:** When the character of construction permits site inspection by the building official and all prefabricated assemblies and subassemblies are readily accessible for field inspection, the use of ordinary materials with the average working stresses prescribed in Appendix D shall be permitted in prefabricated construction.

**2306.3 Field inspection of ordinary materials:** When ordinary materials are used, field erection and installation of prefabricated units and service equipment at the site shall be inspected by the building official, or the building official may accept the report of a qualified licensed engineer or architect in respect thereto. All prefabricated subassembliles shall be certified by the authorized representative of the manufacturer for compliance with this code.

**2306.4 Expert services:** When a system of construction involves unusually intricate design analysis, the building official may require the submitter to retain a competent expert to assist in the building official's determination, or the building official may accept the recommendations of Building Officials and Code Adminstrators International, Inc., in respect thereto.

**2306.5 Check tests:** When there is reasonable doubt as to the adequacy of the construction or accessory details which are based on design, the building official may require check tests of assembled units as specified in Section 901.3 or accept certified reports of such tests from approved testing agencies.

## SECTION 2307.0 APPROVALS BASED ON TESTS

**2307.1 Tests required:** When not capable of design by approved engineering analysis, every system of prefabricated building subassembly and its connections shall be subjected to the tests and conditions of approval prescribed by Article 11, or to any other tests approved by the building official that simulate

the actual loads and conditions of application that the completed structure will be required to resist in normal use. Certified reports of such tests conducted by an approved testing agency shall be accepted by the building official, provided such tests meet the requirements of this code. The costs of all investigations and tests shall be paid by the submitter.

**2307.2 Field connections:** All field splices and structural connections of floor, wall, ceiling and roof subassemblies shall be of sufficient strength to transmit 2½ times the design live loads without failure, and shall be so constructed as to insure weather tightness in exterior wall and roof panels.

**2307.3 Weather resistance:** In the absence of reliable experience records, the building official may require tests on the prefabricated assemblies as prescribed by Article 11 to determine durability, weather tightness and weather resistance, or accept certified reports of approved testing agencies in respect thereto.

**2307.4 Comparative tests:** When not available from existing approved test data, the building official may require comparative tests of traditional standard construction of the dimensions and proportions required in this code for the proposed use.

## SECTION 2308.0 MATERIALS, DIMENSIONS AND METHODS OF FABRICATION

**2308.1 Accepted standards:** The provisions of Articles 9, 10, 11, 12 and 13 shall control the selection of materials and the design and fabrication of all prefabricated structures.

**2308.2 Below grade construction:** The prefabricated construction covered by these provisions shall not be permitted in a cellar, basement or part story below grade unless specifically approved by the building official. All such subsurface structures shall be constructed of approved masonry or reinforced concrete complying with Articles 10, 11, 12 and 13 or the subgrade walls and floors shall be constructed of approved durable, water resisting materials of adequate strength.

**2308.3 Exterior and interior finish:** When a fireresistance rating is specified, framed wall and partition assemblies shall be veneered, surfaced or constructed with approved materials to secure the specified fireresistance rating required by Articles 3 and 4 for the construction type and use group of the building or structure within the limitations of Tables 401 and 505. When not required to meet fireresistance rating requirements, interior wall and partition surfaces shall be constructed to comply with Section 1225.0.

**2308.4 Exterior protection:** All steel or other corrodible siding and weather boarding exposed to the weather shall be protected from corrosion or shall be manufactured from corrosion resistive metal to comply with Section 1225.0. In structures two stories or more in height, the weather boarding shall be constructed of noncombustible or approved fireresistance rated combustible materials as regulated by Tables 401 and 505.

**2308.5 Condensation and weather resistance:** Exterior walls of Type 4 of buildings shall be constructed or ventilated to avoid condensation and leakage of moisture to comply with Sections 1225.4 and 1225.9.

**2308.6 Roofing:** All roof covering shall be of approved types meeting the requirements of Sections 1426.3 and 1427.0.

**2308.7 Connections:** All connections and accessories shall be proportioned to transmit the loads and stresses imposed as provided in Section 2307.2.

**2308.8 Waterproofing, ratproofing and termite protection:** All installations shall comply with the provisions of Sections 1315.0 for waterproofing, 1316.0 for ratproofing and 1317.0 for termite protection.

## SECTION 2309.0 LIGHT GAGE STEEL FRAME CONSTRUCTION

**2309.1 General:** The fabrication of light gage steel structures shall comply with the requirements of Sections 1202.0 governing formed steel and 1203.0 governing steel joists.

## SECTION 2310.0 COMBUSTIBLE CONSTRUCTION

**2310.1 General:** The fabrication of combustible structures shall comply with the requirements of Section 1225.0.

## SECTION 2311.0 LIGHT REINFORCED CONCRETE CONSTRUCTION

**2311.1 General:** The fabrication of light reinforced concrete structures shall comply with the provisions of Sections 1215.0 through 1218.0 inclusive.

**2311.2 Shop procedure and test reports:** The design and manufacture of all precast concrete structural units and assemblies shall follow the procedures specified for ordinary or controlled materials. Tests shall be made at the place of manufacture to determine the water/cement ratio and the aggregate proportions required to maintain the design strength for every change in material and manufacturing conditions. The shop report shall cover the quality of concrete materials and the total amount of water used, the mixing and placing of concrete and the installation of reinforcement, together with a record of the temperatures and means of protection provided for the concrete while curing.

**2311.3 Test cylinders:** Not less than three compression specimens shall be tested at the age of shipment of the prefabricated member for each 100 cubic yards (76.5 $m^3$) of concrete. The test cylinders shall develop an average compressive strength at the age of shipment of the prefabricated member of not less than twice the compressive stress used in the design.

## SECTION 2312.0 LIGHT REINFORCED GYPSUM CONSTRUCTION

**2312.1 General:** The fabrication of light reinforced gypsum structures shall comply with the requirements of Section 1219.0.

**2312.2 Test cylinders:** Not less than three compression specimens for each 100 cubic yards (76.5 $m^3$) of gypsum concrete cured and stored under the same conditions as the prefabricated member shall be tested at the age of shipment. The test specimens shall develop an average compressive strength at the time of shipment not less than twice the stress used in the design.

**2312.3 Protection of units:** Continual protection from the weather and from contact with water shall be furnished for the prefabricated units or subassemblies during shipment and storage and after erection in the structure.

**2312.4 Handling and erection stresses:** All units shall be metal bound or otherwise reinforced for handling stresses, and precaution shall be observed to provide temporary anchorage to the structural frame during erection and to prevent damage or destruction from the weather and wind before final completion of the installation.

**2312.5 Grade construction:** The ventilated space underneath first floor construction shall be not less than 2 feet (610 mm) high and the underside of first floor construction shall be dampproofed with an approved protective covering.

## SECTION 2313.0 FIRERESISTANCE RATING AND FIRESTOPPING

**2313.1 General:** Provisions shall be made to comply with all the requirements of Section 1420.0 for fire protection and firestopping, and the provisions for fireresistance rated construction of Article 14.

## SECTION 2314.0 LIGHT AND VENTILATION

**2314.1 General:** Means of light and ventilation shall comply with the provisions of Article 7 governing habitable and occupiable rooms, bathrooms and toilet rooms, attics and crawl spaces.

## SECTION 2315.0 EGRESS FACILITIES

**2315.1 General:** The requirements of Article 8 shall control the number, size, and construction of all means of egress as specified therein for the use and occupancy of the building.

**2315.2 Fireresistance rating requirements:** Where fireresistance rated construction is required, the fireresistance ratings shall be regulated by Table 401 for the respective type of construction. Required exits, public hallways, and interior trim and finish shall be constructed to comply with Article 14.

## SECTION 2316.0 PLUMBING, PIPING AND SANITARY EQUIPMENT

**2316.1 General:** All installations of plumbing, drainage and gas piping systems shall comply with the provisions of Article 22 and the plumbing and the mechanical codes listed in Appendix A.

## SECTION 2317.0 HEATING AND AIR CONDITIONING

**2317.1 General:** The applicable provisions of Article 15 and the mechanical code listed in Appendix A shall control the construction and installation of chimneys, flues and heating appliances as therein provided for liquid, and solid fuel, gas fired heating equipment and service water heaters. Provisions of the mechanical code listed in Appendix A shall apply for air conditioning installations.

# ARTICLE 24

## LIGHT TRANSMITTING PLASTIC CONSTRUCTION

### SECTION 2400.0 GENERAL

**2400.1 Scope:** The provisions of this article shall govern the quality and methods of application of plastics for use as light transmitting materials in buildings and structures. When used as interior finish, plastic materials shall meet the requirements of Section 1421.0.

**2400.2 Approved materials:** The use of all plastics which meet the strength, durability, sanitary and fireresistive requirements of this code, ASTM D635, ASTM D1929, ASTM D2843 and ASTM E84 listed in Appendix A shall be permitted subject to the limitations of this article.

**2400.2.1 Approved plastic:** An approved plastic shall be any thermoplastic, thermosetting, or reinforced thermosetting plastic material which has a self ignition temperature of 650 degrees F. (343.33 degrees C.) or greater when tested in accordance with ASTM D1929 listed in Appendix A, a smoke density rating not greater than 450 when tested in the manner intended for use by ASTM E84 listed in Appendix A or not greater than 75 when tested in the thickness intended for use according to ASTM D2843 listed in Appendix A, and which meets one of the following combustibility classifications:

**Class C 1:** Plastic materials which have a burning extent of 1 inch (25 mm) or less when tested in nominal .060 inch thickness, or in the thickness intended for use, by ASTM D635 listed in Appendix A; or

**Class C 2:** Plastic materials which have a burning rate of 2.5 inches per minute (1.06 mm/s) or less when tested in nominal .060 inch thickness, or in the thickness intended for use, by ASTM D635 listed in Appendix A.

**2400.2.2 Application for approval:** Applicants for approval of a plastic material shall furnish, in accordance with Section 1104.0, all necessary technical data required by the building official. The data may include the chemical composition; pertinent physical, mechanical and thermal properties such as fireresistance, flammability, and flame spread; weather resistance; electrical properties; products of combustion and coefficients of expansion.

**2400.3 Identification:** All plastic materials approved for use under this code shall be identified by the trade formula number or name or other acceptable

identification. Each unit or package shall bear the approval number or other identification mark of the approving authority.

## SECTION 2401.0 DESIGN AND INSTALLATION

**2401.1 Structural requirements:** All plastic materials and their assemblies shall be of adequate strength and durability to withstand the loads and forces specified in Articles 9 and 10 for their approved use.

**2401.2 Connections and supports:** All fastenings, connections and supports shall be proportioned to safely transmit two and one half times the design live load. Adequate allowance shall be made in the fastenings and supports for differential expansion and contraction of the connected materials.

## SECTION 2402.0 GLAZING OF UNPROTECTED OPENINGS

**2402.1 Use in Type 4B construction:** Doors, sash and framed openings which are not required to be fireresistance rated may be glazed with approved plastic materials in buildings of Type 4B construction.

**2402.2 Use Group F:** In buildings of all types of construction of Use Group F, doors, sash and framed openings which are not required to be fireresistance rated may be glazed with approved plastic materials.

**2402.3 Other types of construction and use groups:** In other types of construction and use groups, such openings not required to be fireresistance rated by Section 1414.0 may be glazed or equipped with approved plastic materials subject to the requirements of Sections 2402.3.1 through 2402.3.4.

**2402.3.1 Area:** The area of such glazing shall not exceed 25 percent of the wall face of the story in which it is installed (see Section 2402.4).

**2402.3.2 Size:** The area of a unit or pane of glazing installed above the first story shall not exceed 16 square feet (1.49 $m^2$) and the vertical dimension of a unit or pane shall not exceed 4 feet (1219 mm). There shall be a minimum 3 feet (914 mm) vertical spandrel wall between stories.

**2402.3.3 Height:** Approved plastics shall not be installed more than 75 feet (22860 mm) above grade level.

**2402.3.4 Protection:** Approved thermoplastic materials may be installed in areas up to 50 percent of the wall area of each story in structures less than 150 feet (45720 mm) in height which are provided on each floor above the first floor with continuous architectural projections constituting an effective fire canopy extending at least 3 feet (914 mm) from the surface of the wall in which the glazing is installed. The size and the dimensions of individual units shall not be limited in such installations except as required to meet structural loading requirements.

**2402.4 Automatic fire suppression:** When a complete approved automatic fire suppression system is provided in the building, the permissible area of glazing permitted by Section 2402.3.1 may be increased 100 percent.

## SECTION 2403.0 EXTERIOR PANEL WALLS

**2403.1 General:** Approved plastic materials may be used as wall panels, in exterior walls not required to have a fireresistance rating in other than buildings of Use Groups A-1, A-2, H and I subject to the requirements listed in the following Sections 2403.1.1 through 2403.3.

**2403.1.1 Installation:** Exterior wall panels installed as provided herein shall not alter the type of construction classification of the building.

**2403.1.2 Height limitation:** Approved plastics shall not be installed more than 75 feet (22860 mm) above grade level, except as allowed by Section 2403.2.

**2403.1.3 Area limitation and separation:** Area limitation and separation requirements of exterior wall panels shall be as provided in Table 2403.

**Table 2403**
**AREA LIMITATION AND SEPARATION REQUIREMENTS FOR PLASTIC WALL PANELS[a]**

| Fire separation (ft.) | Class of plastic | Max. % area of ext. wall in plastic panels | Max. sq. ft. single area | Minimum separation of panels (ft.) | |
|---|---|---|---|---|---|
| | | | | Vertical | Horizontal |
| Less than 6 ft. | — | NP[c] | NP | — | — |
| 6 ft. or more but less than 11 ft. | C1 | 10 | 50 | 8 | 4 |
| | C2 | NP | NP | — | — |
| 11 ft. or more but less than 30 ft. | C1 | 25 | 90 | 6 | 4 |
| | C2 | 15 | 70 | 8 | 4 |
| Over 30 | C1 | 50 | Not limited | 3[b] | 0 |
| | C2 | 50 | 100 | 6[b] | 3 |

**Note a.** See Section 2403.3 for combination of glazing and wall panel areas permitted.
**Note b.** See Section 2403.1.5.
**Note c.** Not permitted.
**Note d.** 1 foot = 304.8 mm; 1 square foot = 0.093 m².

**2403.1.4 Spandrel separation:** Vertical spandrel wall separation between stories shall be 3 feet (914 mm) for Class C1 plastic wall panels and 4 feet (1219 mm) for Class C2 plastic wall panels.

**2403.1.5 Fire canopies:** In structures which are provided on any floor above the first with continuous architectural projections constituting an effective fire canopy extending at least 36 inches (914 mm) from the surface of the wall in which plastic wall panels are installed, there need not be vertical separation at that floor except that provided by the vertical thickness of the projection.

**2403.2 Automatic fire suppression:** When a complete approved automatic fire suppression system is provided in the building, the maximum percent area of exterior wall in plastic panels and the maximum square feet of single area given in Table 2403 may be increased 100 percent but the area of plastic wall panels shall not exceed 50 percent of the wall area. These uses shall be exempt from height limitations.

**2403.3 Combinations of glazing and wall panels:** Combinations of plastic glazing and plastic wall panels shall be subject to the area, height, percentage limitations and separation requirements applicable to the class of plastic as prescribed for wall panel installations

## SECTION 2404.0 ROOF PANELS

**2404.1 General:** Approved plastic roof panels may be installed in other than buildings of Use Groups A-1, A-2, A-3, H and I as follows:

1. In roofs of buildings protected by a complete approved automatic fire suppression system;
2. Where the roof is not required to have a fireresistance rating by Table 401; or
3. Where the roof panels meet the requirements for roof coverings of the particular use group.

**2404.2 Separations:** Individual roof panels shall be separated from each other by a distance of not less than 4 feet (1219 mm) measured in a horizontal plane.

**2404.3 Location:** Where exterior wall openings are required to be fireresistance rated by Section 1414.0, a roof panel or unit shall not be installed within 6 feet (1829 mm) of such exterior wall.

**2404.4 Area limitations:** Roof panels or units shall be limited in area and the aggregate area of panels shall be limited by a percentage of the floor area of the room or space sheltered in accordance with Table 2404.

**Table 2404**
**AREA LIMITATIONS FOR ROOF PANELS**

| Class of plastic | Maximum area individual unit of panel (sq. ft.) | Maximum aggregate area (% of floor area) |
|---|---|---|
| C1 | 300 | 30 |
| C2 | 100 | 25 |

**Note a.** 1 square foot = 0.093 $m^2$.

**2404.5 Exceptions:** The uses listed in Sections 2404.5.1 through 2404.5.3 shall be exempt from the requirements of Section 2404.4.

**2404.5.1 One story buildings:** One story buildings not more than 16 feet (4877 mm) in height and not exceeding 1200 square feet (111.6 $m^2$) in area and not closer than 11 feet (3353 mm) to another building are exempt from the limitations of Section 2404.4.

**2404.5.2 Low hazard use buildings:** Low hazard use buildings such as swimming pool shelters and greenhouses are exempt from the area limitations of Section 2404.4 provided the buildings do not exceed 5000 square feet (465 $m^2$) in area and are not closer than 11 feet (3353 mm) to the property line or adjacent buildings.

**2404.5.3 Terraces and patios:** Roof coverings over terraces and patios of buildings of Use Group R-3 shall be permitted with approved plastics.

## SECTION 2405.0 SKYLIGHT ASSEMBLIES

**2405.1 Skylight assemblies:** Skylight assemblies may be glazed with approved plastic materials except in buildings of Use Group H in accordance with the following provisions.

**Exceptions**

1. This section shall not apply to a skylight on a building which is not more than one story in height, has a fire separation of at least 30 feet (9144 mm) and the room or space sheltered by the roof is not classified as Use Group H or I or a means of egress.
2. This section shall not apply to skylights in which the plastic material meets the fireresistive requirements of the roof.

**2405.2 Mounting:** The plastic shall be mounted above the plane of the roof on a curb constructed consistent with the requirements for the type of construction classification, but at least 4 inches (102 mm) above the plane of the roof. Edges of plastic skylights or domes shall be protected by metal or other noncombustible material.

**2405.2.1 Dome shape:** Dome shape skylights shall rise above the mounting flange a minimum distance equal to 10 percent of the maximum span of the dome, but not less than 5 inches (127 mm).

**2405.3 Maximum area of skylight units:** Each skylight unit shall have a maximum area within the curb of 100 square feet (9.30 $m^2$).

**2405.4 Aggregate area of skylights:** The aggregate area of skylights shall not exceed 33 percent when Class C1 materials are used, and 25 percent when Class C2 materials are used, of the floor area of the room or space sheltered by the roof in which they are installed.

**Exception:** Except for buildings of Use Group H and I, the aggregate area of approved plastic skylights may be increased 100 percent beyond the limitations set forth above if the skylights are used as a fire venting system, or if the building is equipped with an approved automatic fire suppression system.

**2405.5 Separation:** Skylights shall be separated from each other by a distance of not less than 4 feet (1219 mm) measured in a horizontal plane.

**2405.6 Location:** Where exterior wall openings are required to be fireresistance rated by Section 1414.0, a skylight shall not be installed within 6 feet (1829 mm) of such exterior wall.

**2405.7 Combinations of roof panels and skylights:** Combinations of plastic roof panels and skylights shall be subject to the area and percentage limitations and separation requirements applicable to roof panel installations.

## SECTION 2406.0 LIGHT DIFFUSING SYSTEMS

**2406.1 General:** Light diffusing systems shall not be installed in buildings of Use Groups H or I, nor in exits, unless protected with an approved automatic fire suppression system. Plastic diffusers shall be supported directly or indirectly from ceiling or roof construction by use of noncombustible hangers. Hangers shall be at least No. 12 Steel Wire Gage (0.106 inch) galvanized wire or equivalent.

**2406.2 Installation:** Approved plastic diffusers shall comply with Section 1421.0 unless the plastic panels will fall from their mountings before igniting and at an ambient temperature of at least 200 degrees F. (93.33 degrees C.) below their ignition temperature. The panels must, however, remain in place at an ambient room temperature of 175 degrees F. (79.44 degrees C.) for a period of not less than 15 minutes.

**2406.3 Size limitations:** Individual panels or units shall not exceed 10 feet (3048 mm) in length nor 30 square feet (2.79 $m^2$) in area.

**2406.4 Fire suppression system:** In buildings having a complete approved automatic fire suppression system, plastic light diffusing systems shall have sprinklers both above and below unless the system has been specifically approved for sprinkler installation only above the system. Areas of light diffusing systems shall not be limited if properly protected by an approved fire suppression system.

**2406.5 Electrical lighting fixtures:** Plastic light transmitting panels and light diffuser panels installed in approved electrical lighting fixtures shall comply with Section 1421.0 unless the plastic panels meet the requirements of Section 2406.2. The area of approved plastic materials when used in required fire exits or corridors shall not exceed 30 percent of the aggregate area of the ceiling in which they are installed, unless the building is protected by an approved automatic fire suppression system.

## SECTION 2407.0 PARTITIONS

**2407.1 General:** Approved light transmitting plastics may be used in or as partitions provided the requirements of Section 1421.0 are met. Such partitions may be installed as provided in Section 1409.3.

## SECTION 2408.0 BATHROOM ACCESSORIES

**2408.1 Use of plastics:** Approved plastics shall be permitted as glazing in shower stalls, shower doors, bathtub enclosures and similar accessory units (see Section 1301.5.6).

## SECTION 2409.0 AWNINGS AND SIMILAR STRUCTURES

**2409.1 General:** Approved light transmitting plastics may be used on awnings and similar structures in conformance with general performance provisions of other sections of the code.

## SECTION 2410.0 GREENHOUSES

**2410.1 General:** Approved light transmitting plastics may be used in lieu of plain glass in greenhouses.

# ARTICLE 25

## ENERGY CONSERVATION

### SECTION 2500.0 GENERAL

**2500.1 Scope:** The provisions of this article regulate the design and construction of the exterior envelopes and selection of HVAC, service water heating, electrical distribution and illuminating systems and equipment required for the purpose of effective use of energy, and shall govern all buildings and structures, or portions thereof, hereafter erected that provide facilities or shelter for human occupancy.

**Exceptions**

1. Buildings and structures, or portions thereof, which are neither heated nor cooled.
2. Buildings and structures, or portions thereof, whose peak design rate of energy usage is less than 1 watt per square foot (10.75 W/m$^2$) or 3.4 Btuh per square foot (10.75 W/m$^2$) of floor area for all purposes.
3. Buildings of Use Groups F and T whose peak design rate of annual energy usage is less than 29,784 Btu per square foot (94 kW/m$^2$) or 8.76 kW hours per square foot (94. kW/m$^2$) of floor area.
4. Buildings and structures shall comply with this code or with the *Code for Energy Conservation in New Building Construction* listed in Appendix A.

**2500.2 Other standards:** Compliance with the applicable provisions of ASHRAE 90 listed in Appendix A shall be deemed to meet the requirements of this article, unless otherwise specifically provided herein.

### SECTION 2501.0 PLANS AND SPECIFICATIONS

**2501.1 General:** Plans, specifications and necessary computations shall be submitted to indicate conformance with this section and other applicable sections of this code, and the mechanical and plumbing codes listed in Appendix A.

**2501.2 Details:** The plans and specifications shall show in sufficient detail all pertinent data and features of the building and the equipment and systems as herein governed, including but not limited to exterior envelope, component materials, *U* values of the respective elements including insulation, *R* values

of insulating materials, size and type of apparatus and equipment, equipment and system controls and other pertinent data to indicate conformance with the requirements herein.

## SECTION 2502.0 EXTERIOR ENVELOPE REQUIREMENTS

**2502.1 General:** The intent of this section is to provide minimum requirements for exterior envelope construction in the interest of energy conservation. Calculation and measurement procedures and information contained in ASHRAE 90 listed in Appendix A shall be used, except where otherwise noted, to determine conformance with the requirements herein.

In addition to the criteria set forth in this article, the proposed design may take into consideration the thermal mass of the building in considering energy conservation.

**2502.1.1 Thermal performance:** All buildings and structures that are heated or mechanically cooled shall be constructed so as to provide the required thermal performance of the various components.

The required thermal transmittance values ($U_o$) of any one component, such as roof/ceiling, wall or floor may be increased and the $U_o$ value for other components decreased provided that the overall heat gain or loss for the entire building envelope does not exceed the total resulting from conformance to the required $U_o$ values.

**2502.1.2 Different requirements:** A building that is designed to be both heated and cooled shall meet the more stringent of the heating or cooling requirements for the exterior envelope as provided in this section when requirements differ.

**2502.1.3 Exterior walls:** For the purpose of this article the gross area of exterior walls consists of all opaque wall areas, including foundation walls above grade, peripheral edges of floors, window areas including sash, and door areas, where such surfaces are exposed to outdoor air and enclose a heated or mechanically cooled space.

**2502.1.4 Roof assembly:** For the purpose of this article a roof assembly shall be considered as all components of the roof/ceiling envelope through which heat flows, thereby creating a building transmission heat loss or gain, where such assembly is exposed to outdoor air and encloses a heated or mechanically cooled space.

**2502.1.4.1 Gross roof area:** The gross area of a roof assembly consists of the total interior surface of such assembly, including skylights, exposed to the heated or mechanically cooled space.

**2502.1.4.2 Ceiling plenums:** Where air ceiling plenums are employed, the roof/ceiling assembly shall for thermal transmittance purposes not include the ceiling proper nor the plenum space as part of the assembly and for gross area purposes shall be based upon the interior face of the upper plenum surface.

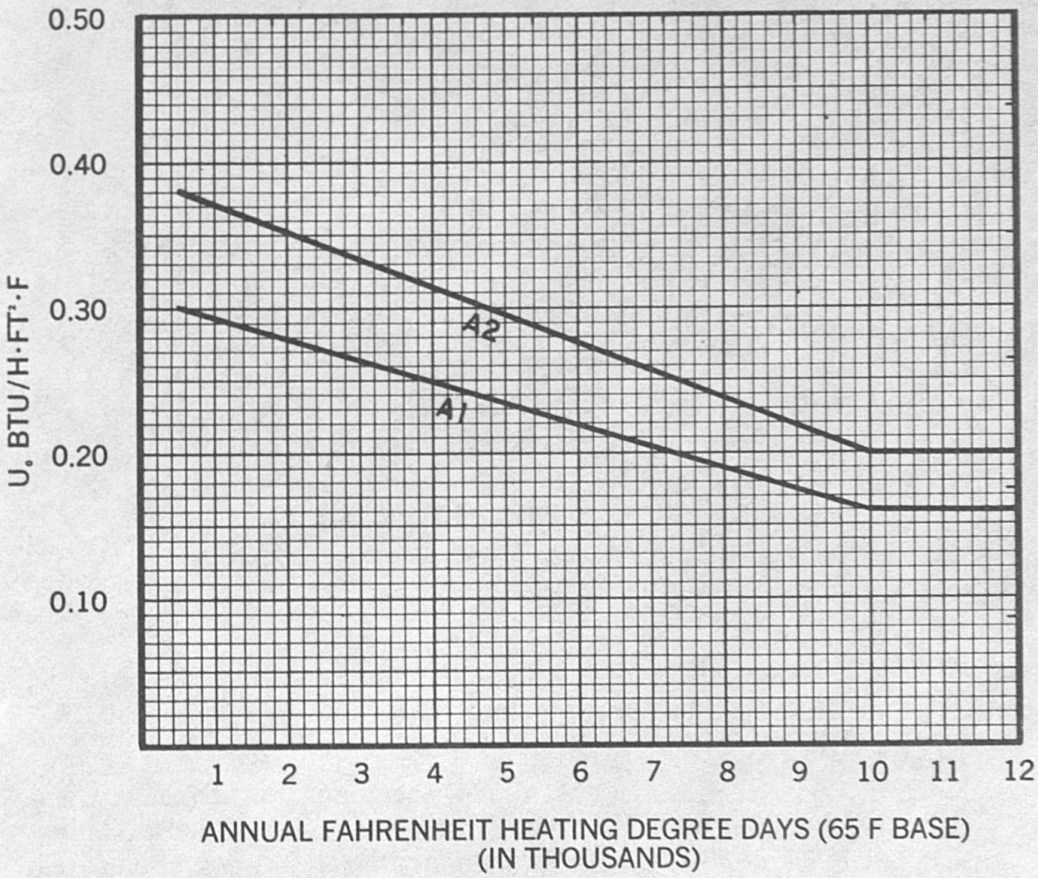
**2502.2 Criteria for residential buildings:** The requirements herein shall apply to all buildings and structures or portions thereof of Use Group R that are heated or mechanically cooled when not more than three stories in height.

**2502.2.1 Walls:** The gross area of exterior walls above grade, including foundation walls, shall have a combined thermal transmittance ($U_o$) value not exceeding those specified in the following Figure 2502.2.1a.

**Exceptions**

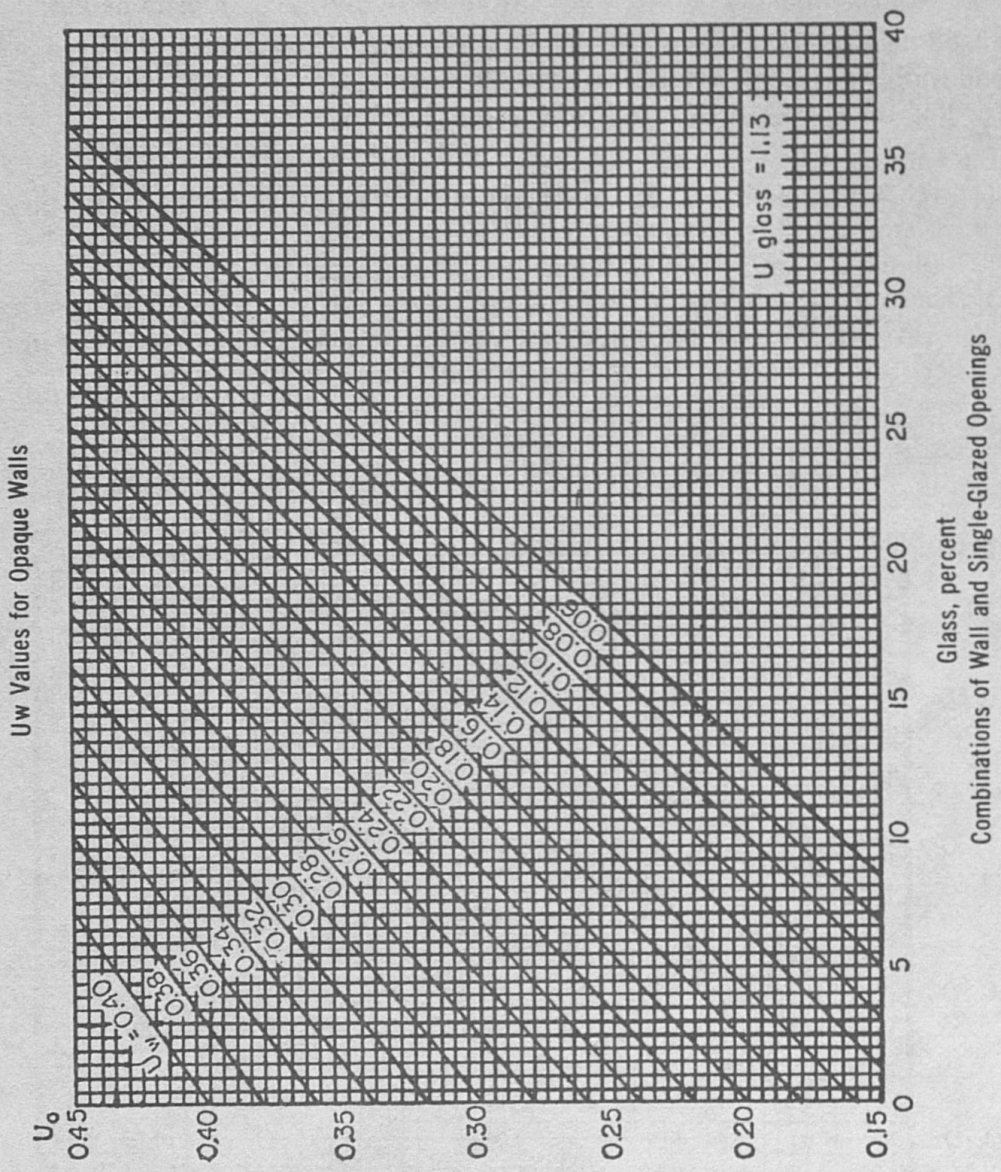
1. In locations with less than 500 heating degree days, there shall not be a maximum $U_o$ requirement if only heating is provided and the $U_o$ shall be 0.30 maximum if the building is mechanically cooled.
2. The opaque exterior wall areas may be constructed having thermal transmittance $U_o$ values in conjunction with glazed openings areas in accordance with Figures 2502.2.1b and 2502.2.1c.

**Figure 2502.2.1a**
**MAXIMUM ALLOWABLE $U_O$ VALUES FOR GROSS EXTERIOR WALL ASSEMBLIES**




*As specified in Chapter 43 of the ASHRAE Handbook-Systems listed in Appendix A.
**Note 1.** Line A1 inside graph denotes detached one and two family dwellings.
**Note 2.** Line A2 inside graph denotes all other residential buildings not more than three stories in height.

Figure 2502.2.1b
SINGLE GLAZED OPENINGS

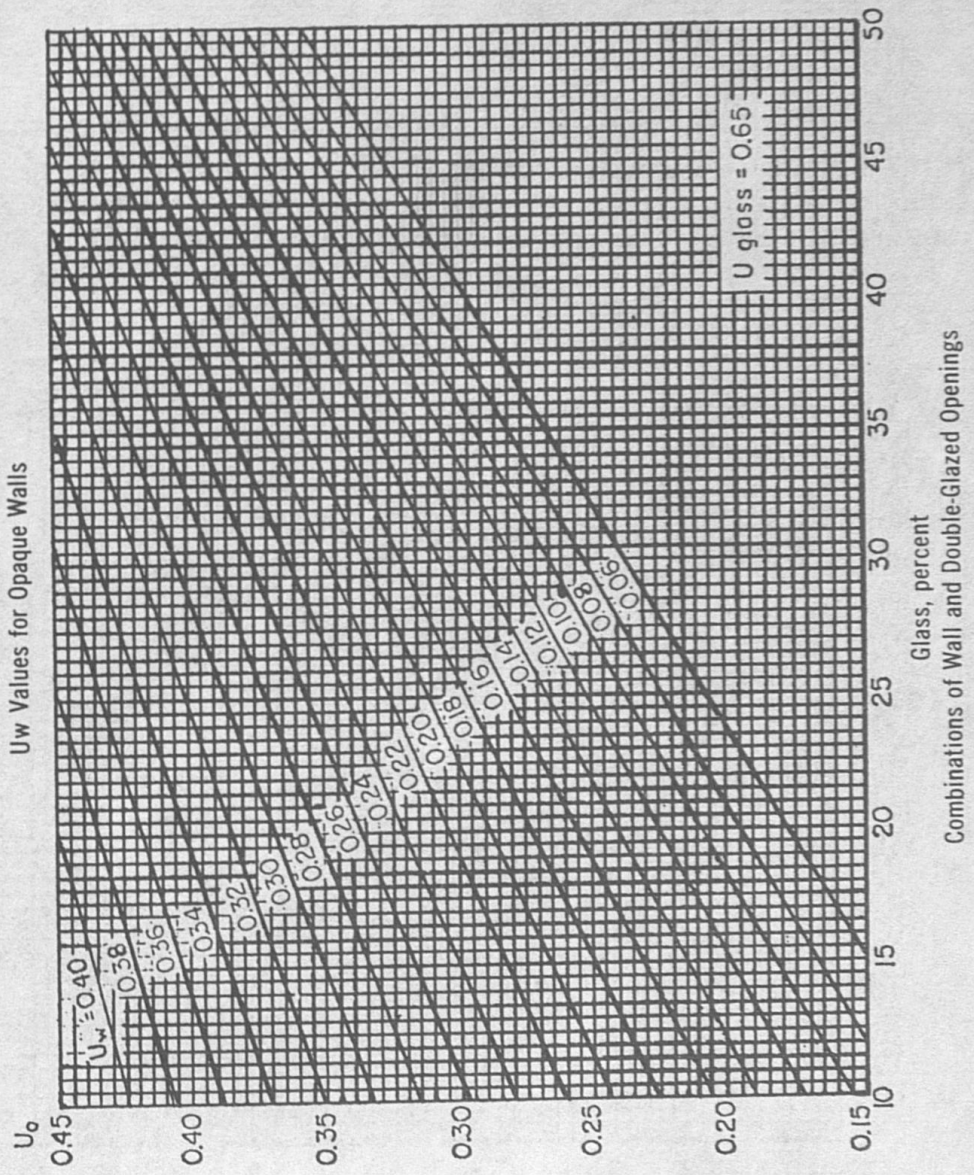



**2502.2.2 Roof/ceiling:** The roof/ceiling assemblies shall have a combined thermal transmittance value $U_o$ as specified in the following Table 2502.2.2.

**Exceptions**

1. Roof/ceiling assemblies in which the finished interior surface is essentially the underside of the roof deck, such as a wooden cathedral ceiling, may have a $U_o$ value not to exceed 0.08 for any heating degree day area.
2. Where domed skylights are used the domed skylight area is exempt from the roof/ceiling $U_o$ value computation, provided all the following conditions are met.

Figure 2502.2.1c
DOUBLE GLAZED OPENINGS



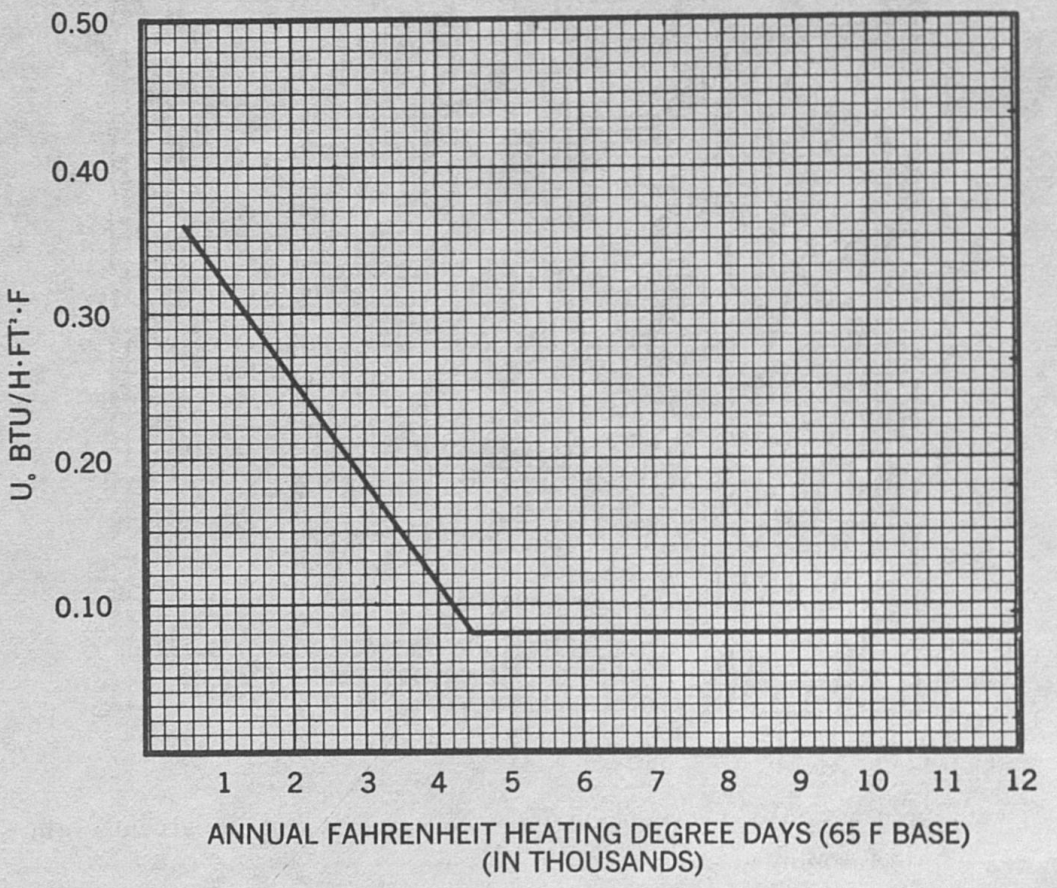

a. The area of the domed skylights does not exceed 10 percent of the roof/ceiling area.
b. Double domed units are used when heating degree days exceed 2500.
c. Curbs are insulated to a $U_o$ value of 0.21 maximum.
d. The infiltration coefficient of the skylight units does not exceed 0.05 Btu per hour per square foot per degree F. (0.28 W/m$^2$ · K).
e. If domed skylights exceed 10 percent of the roof/ceiling area, energy balance calculations made in accordance with AAMA Standard 1602.1 listed in Appendix A shall be used to calculate the percentage of skylights permitted.

Table 2502.2.2
MAXIMUM ALLOWABLE $U_O$ VALUES
FOR ROOF/CEILING ASSEMBLIES

| Annual heating degree days | Maximum $U_O$ |
|---|---|
| 8,000 or Less | 0.05 |
| More than 8,000 | 0.04 |

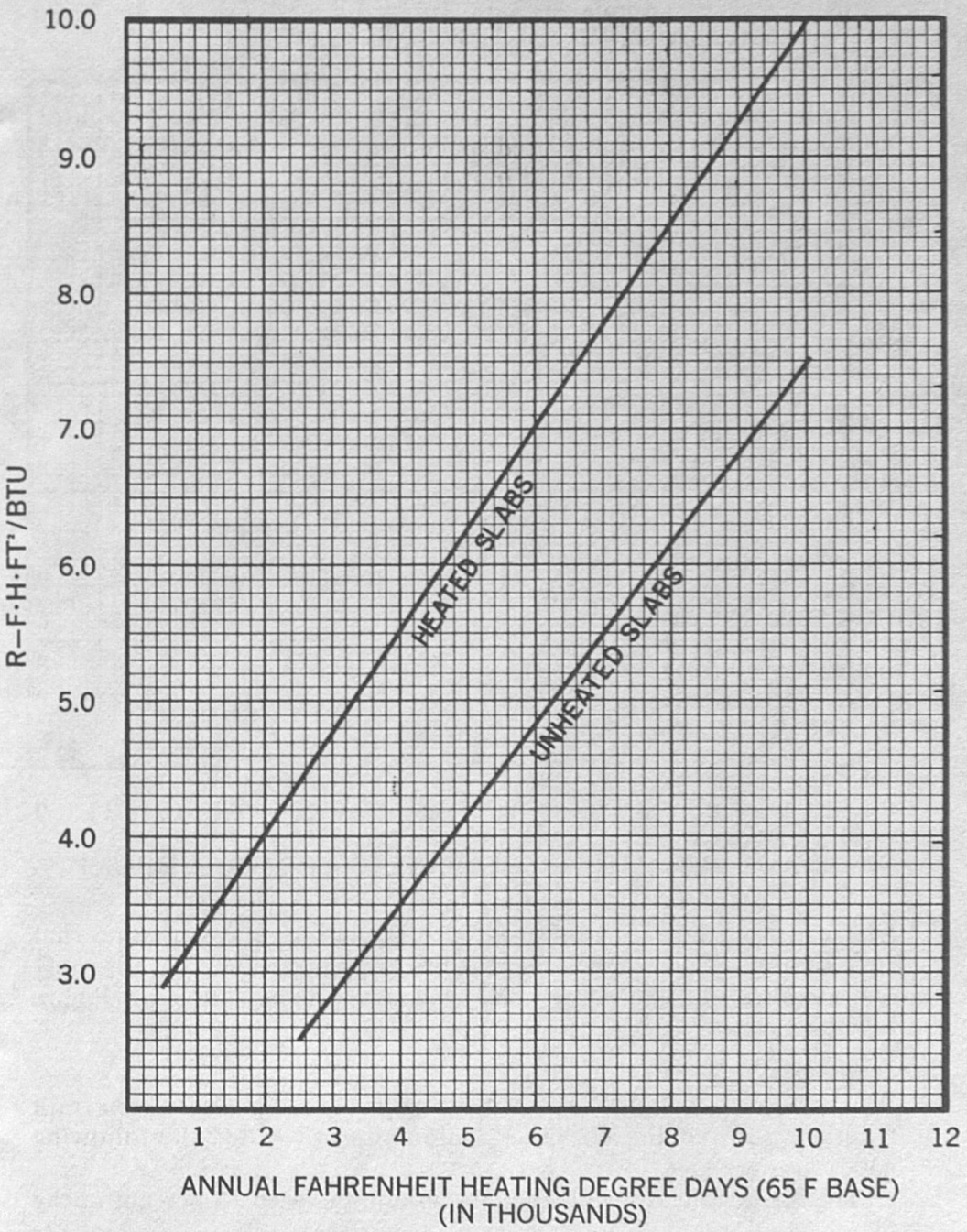
**2502.2.3 Floors over unheated spaces:** The floor of a heated or mechanical cooled space located over an unheated space shall have a combined thermal transmittance value ($U_o$) as specified in the following Figure 2502.2.3.

Figure 2502.2.3
MAXIMUM ALLOWABLE $U_o$ VALUES
FOR FLOORS OVER UNHEATED SPACES




**2502.2.4 Slab on grade floors:** For slab on grade floors, the perimeter of the floor shall be insulated with a material having a thermal resistance value ($R$) not less than those specified in the following Figure 2502.2.4. The insulation shall extend downward from the top of the slab for a minimum distance of 24 inches (610 mm), or downward to the bottom of the slab then horizontally beneath the slab for a minimum total distance of 24 inches (610 mm).

Figure 2502.2.4
MINIMUM ALLOWABLE *R* VALUES
FOR PERIMETER INSULATION FOR SLAB ON GRADE FLOORS

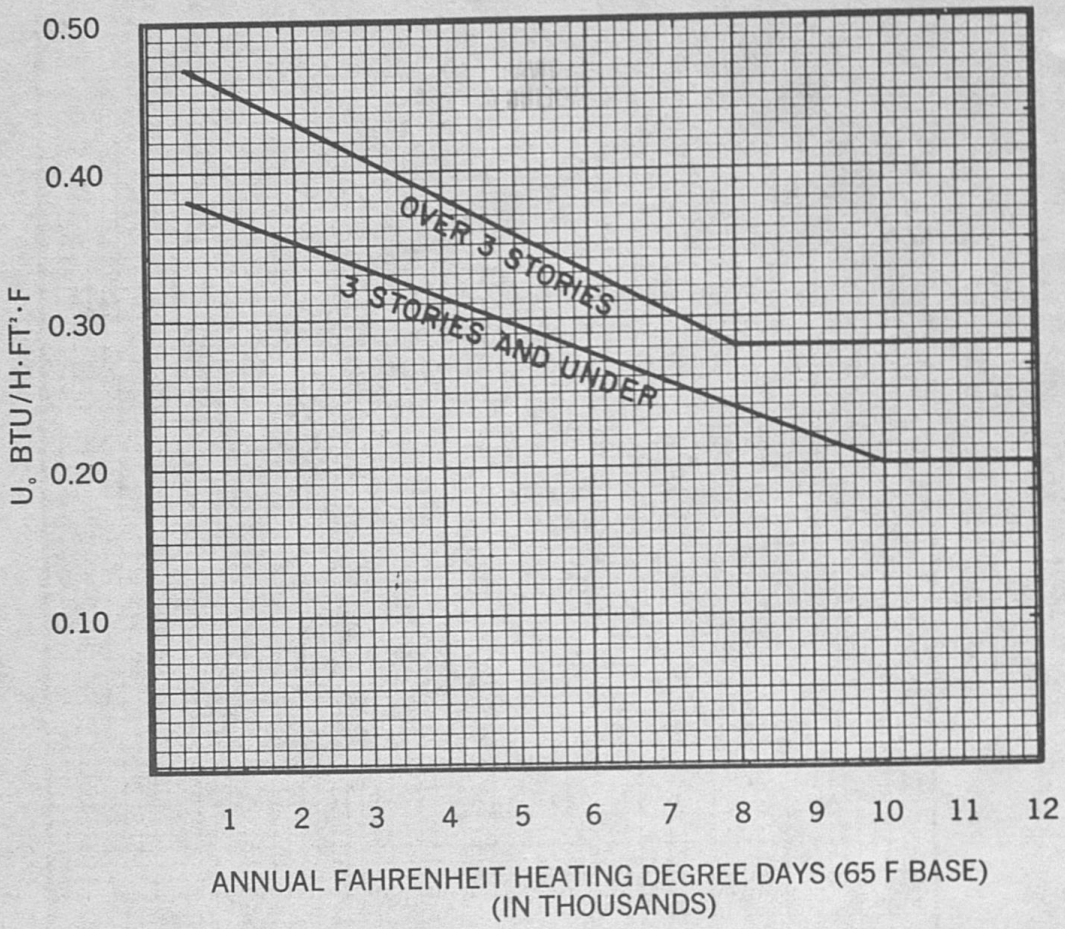



**2502.3 Other buildings:** The requirements herein shall govern all buildings and structures or portions thereof other than defined by Section 2502.2.

**2502.3.1 Heating criteria for walls:** All buildings and structures included in this section that are heated shall have a combined thermal transmittance

value ($U_o$) for the gross area of exterior walls not exceeding those specified in the following Figure 2502.3.1.

Figure 2502.3.1
MAXIMUM ALLOWABLE $U_o$ VALUES
FOR GROSS EXTERIOR WALL ASSEMBLIES



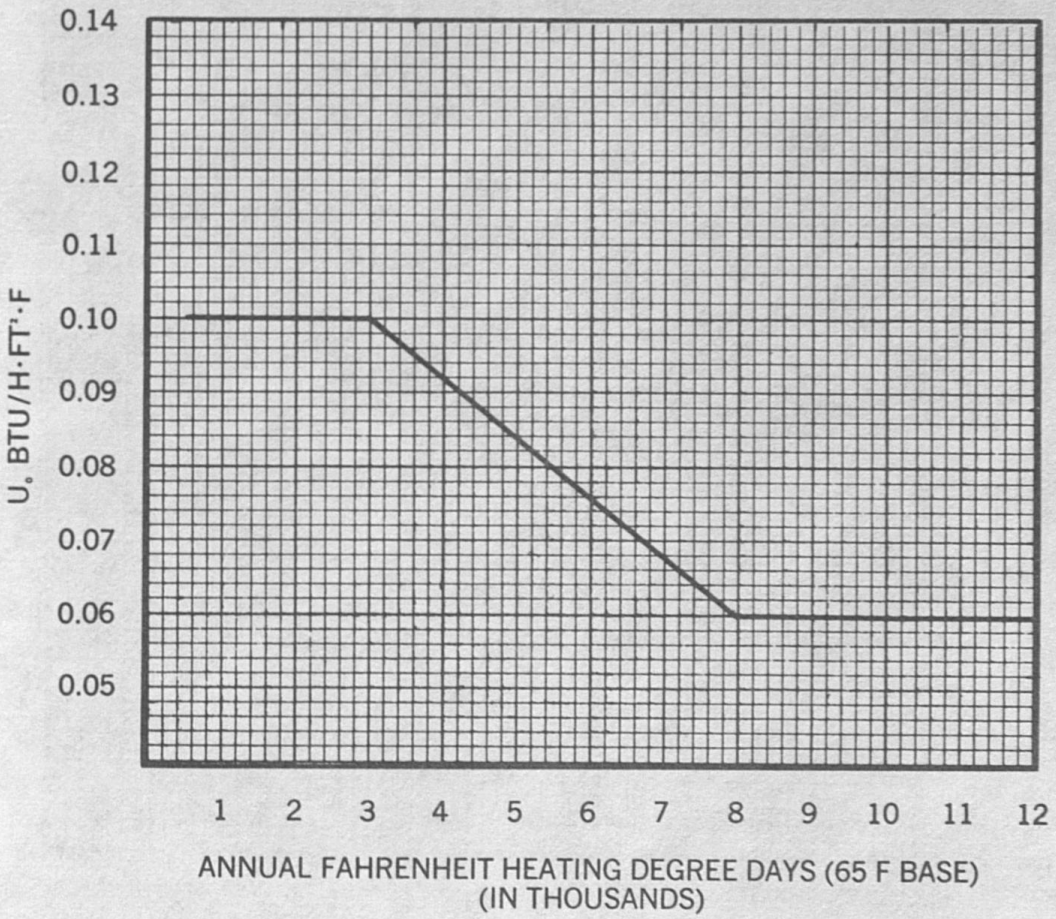

**2502.3.2 Heating criteria for roof/ceiling:** All buildings and structures that are heated shall have a combined thermal transmittance value ($U_o$) for roof/ceiling assemblies not exceeding those specified in the following Figure 2502.3.2.

**Exceptions**

1. Where domed skylights are used, the domed skylight area is exempt from the roof/ceiling $U_o$ value computation provided the following conditions are met.
   a. The area of the domed skylights does not exceed 10 percent of the roof/ceiling.
   b. Double domed units are used when heating degree days exceed 2500.
   c. Curbs are insulated to a $U_o$ value of 0.21 maximum.
   d. The infiltration coefficient of the skylights units does not exceed 0.05 Btu per hour per square foot per degree F. (0.28 W/m² · K).

e. If domed skylights exceed 10 percent of the roof/ceiling area, energy balance calculations made in accordance with AAMA Standard 1602.1 listed in Appendix A shall be used to calculate the percentage of skylights permitted.

Figure 2502.3.2
MAXIMUM ALLOWABLE $U_O$ VALUES
FOR ROOF/CEILING ASSEMBLIES

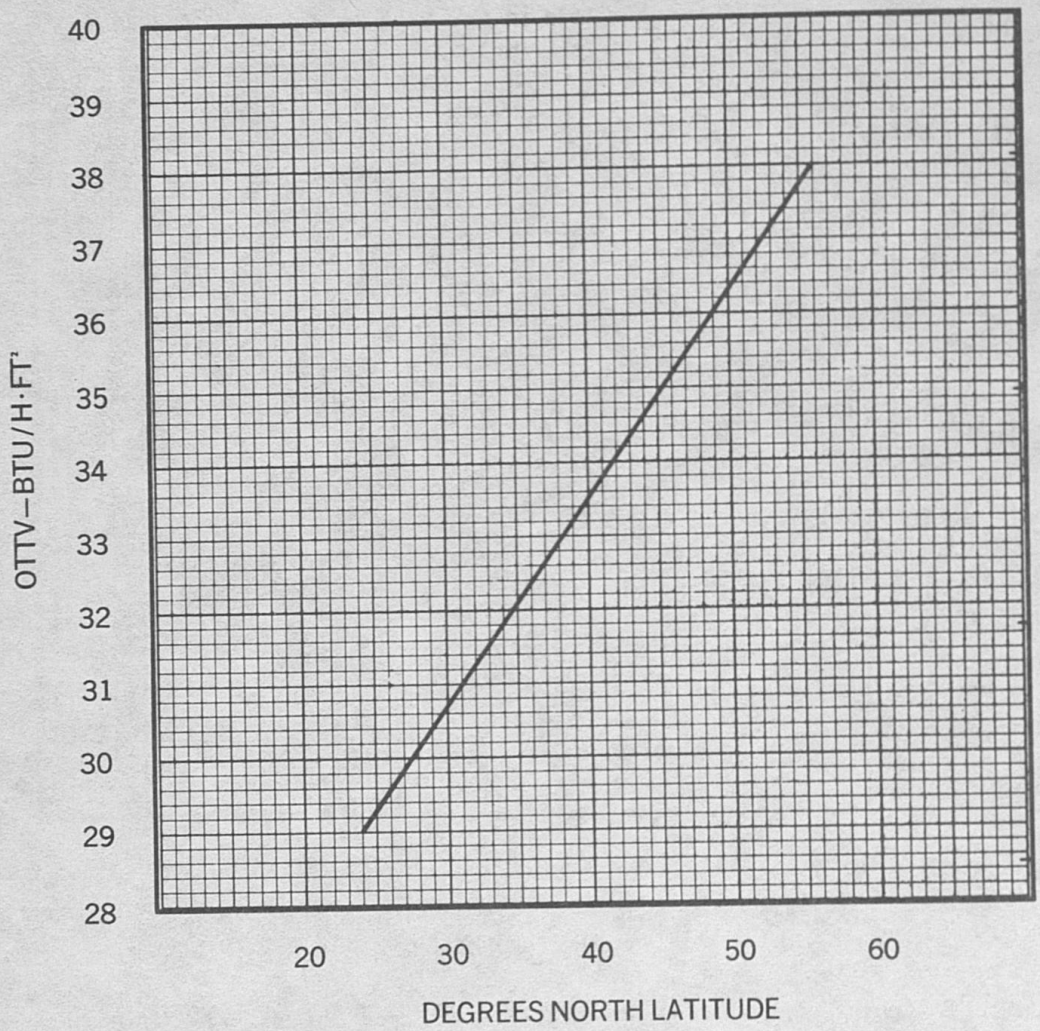



**2502.3.3 Heating criteria for floors over unheated spaces:** The floor of a heated space located over an unheated space shall have a thermal transmittance value ($U_o$) not exceeding those specified in Figure 2502.2.3.

**2502.3.4 Heating criteria for slab on grade floors:** For slab on grade floor, the perimeter of the floor shall be insulated with a material having a thermal resistance value ($R$) not less than those specified in Figure 2502.2.4. The insulation shall extend downward from the top of the slab for a minimum distance of 24 inches (610 mm), or downward to the bottom of the slab then horizontally beneath the slab for a minimum total distance of 24 inches (610 mm).

**2502.3.5 Cooling criteria for walls:** All buildings and structures, or portions thereof, that are mechanically cooled shall have an overall thermal transfer value for the gross area of exterior walls not exceeding those specified in the following Figure 2502.3.5.

Figure 2502.3.5
MAXIMUM OVERALL THERMAL TRANSFER VALUES
FOR GROSS EXTERIOR WALLS




**2502.3.6 Cooling criteria for roof/ceiling:** All buildings and structures, or portions thereof, that are mechanically cooled shall have a combined thermal transmittance value ($U_o$) for roof/ceiling assemblies the same as specified in Figure 2502.3.2 for heating.

**Exceptions**

1. Where domed skylights are used, the domed skylight area is exempted from the roof/ceiling $U_o$ value computation provided the following conditions are met.

a. The area of the domed skylights does not exceed 10 percent of the roof/ceiling area.
b. Double domed units are used when heating degree days exceed 2500.
c. Curbs are insulated to a $U_o$ value of 0.21 maximum.
d. The infiltration coefficient of the skylight units does not exceed 0.05 Btu per hour per square foot per degree F. (0.28 W/m$^2$ · K).
e. If domed skylights exceed 10 percent of the roof/ceiling area, energy balance calculations made in accordance with AAMA Standard 1602.1 listed in Appendix A shall be used to calculate the percentage of skylights permitted.

**2502.4 Air leakage:** The requirements of this section shall apply to all buildings and structures and apply only to those locations separating outdoor ambient conditions from interior spaces that are heated or mechanically cooled and are not applicable to separation of interior spaces from each other.

**2502.4.1 Standard:** Compliance with the criteria for air leakage shall be determined by ASTM E283 listed in Appendix A at a pressure differential of 1.567 lb/ft$^2$ (75.03 Pa).

**2502.4.2 Acceptance criteria:** The air infiltration rate for windows shall not exceed 0.5 cfm per foot (0.00077 m$^3$/s · m) of sash crack.

**2502.4.2.1 Sliding doors:** The air infiltration rate for sliding glass doors in buildings of Use Group R shall not exceed 0.5 cfm per square foot (0.0025 m$^3$/s · m$^2$) of door area.

**2502.4.2.2 Swinging doors:** The air infiltration rate for swinging doors in buildings of Use Group R shall not exceed 1.25 cfm per square foot (0.0063 m$^3$/s · m$^2$) of door area.

**2502.4.2.3 Other doors:** The air infiltration rate for swinging, revolving or sliding doors in other than buildings of Use Group R shall not exceed 11 cfm per lineal foot (0.017 m$^3$/s · m) of door crack.

**2502.4.3 Caulking and sealants:** Exterior joints around windows and door frames, between wall cavities and window or door frames, between wall and foundation, between wall and roof, between wall panels, at penetrations or utility services through walls, floors and roofs, and all other openings in the exterior envelope shall be sealed in an approved manner.

## SECTION 2503.0 ENERGY CONSERVATION IN ELECTRICAL DISTRIBUTION SYSTEMS

**2503.1 Power factor:** The power factor of the overall electric distribution system in a building shall be not less than 90 percent under rated design installed load of the building, either by utilization equipment design or by the use of power factor corrective devices. The power factor corrective devices may be installed on individual equipment rated greater than 1,000 watts and switched therewith, regionally grouped, located at the service equipment or power factor correction achieved by other equivalent means. The choice among these corrective methods should be made based upon an engineering evaluation of each distribution system.

**2503.2 Service voltage:** Where a choice of service voltages is available, the voltage resulting in the least energy loss shall be used.

**2503.3 Voltage drop:** In any building, the maximum total voltage drop shall not exceed 3 percent in branch circuits or feeders, for a total of 5 percent to the farthest outlet based on steady state design load conditions.

**2503.4 Lighting switching:** Switching shall be provided for each lighting circuit, or for portions of each circuit, so that the partial lighting required for custodial or for effective complementary use with natural lighting may be operated selectively.

**2503.5 Separate metering:** In all buildings of Use Group R-2, provisions shall be made to determine the electrical energy consumed by each tenant.

## SECTION 2504.0 MECHANICAL SYSTEMS

**2504.1 General:** Heating, ventilating and air conditioning equipment and systems shall comply with the energy conversation provisions of the mechanical code listed in Appendix A.

## SECTION 2505.0 SERVICE WATER HEATING

**2505.1 General:** Hot water heating systems and equipment shall comply with the energy conservation provisions of the plumbing code listed in Appendix A.

## SECTION 2506.0 ALTERNATIVE SYSTEMS

**2506.1 General:** Alternative building systems and equipment design may be approved by the building official when they can be shown to have energy consumption not greater than that of a similar building with similar forms of energy requirements, designed in accordance with the provisions of this article.

**2506.1.1 Nondepletable sources:** When such alterative systems utilize solar, geothermal, wind or other nondepletable energy sources for all or part of its energy sources, such nondepletable energy supplied to the building shall be excluded from the total energy chargeable to the proposed alternative design.

**2506.2 Documentation:** Proposed alternative designs, submitted as requests for exception to the standard design criteria, must be accompanied by an energy analysis prepared in accordance with ASHRAE 90 listed in Appendix A.

# GENERAL NOTES CONCERNING STANDARDS CITED IN THE KENTUCKY BUILDING CODE

The appendices of the *Kentucky Building Code* contain listings of the many standards which are referenced in the text, many other standards that are not referenced in the text but are related in subject matter, and other sources of information which are useful in the compliance process.

Appendix A contains a listing of standards which are directly referenced in the code text. The listing of the standards includes the standard title and number, the issuing agency as well as the effective date of the standard. In addition, each section of the code which references the standard is identified. These standards are intended to serve as criteria for compliance with the *Kentucky Building Code* and the text of the code specifically indicates their applicability.

Appendix B contains a general listing of standards which are not directly referenced in the text of the code but which are related in subject matter. These standards are intended to be a general source of information only and do not have a direct impact on code compliance. An effort has been made to group the standards in Appendix B according to the principal subjects to which they apply. For example, one standard may be both a test standard and a material specification, or other combinations of subject matter. In such cases a given standard may appear more than once in Appendix B as a matter of convenience.

Appendices C, D, E and F contain information that is potentially useful to a designer, engineer or building official seeking information related to dead loads of various building materials and systems, unit working stresses for ordinary materials, recommended fastening methods and metric unit conversion factors.

Wherever possible, the standards in Appendices A and B have been listed under the designation of the principal authoring agency. Many of these standards are reissued by one or more agencies, in addition to the authoring agency, under their own designations. While there may be some variation in details in the various versions of the same standard issued by several agencies, these differences are generally of such minor nature that any of the versions is acceptable even though not specifically listed herein.

For example, the standard fire test procedure for building construction and materials originating in a committee of the American Society for Testing Materials and issued as ASTM E119 *Methods of Fire Tests of Building Construction and Materials,* is also published by the National Fire Protection Association and issued as NFiPA 251 *Standard Methods of Fire Tests of Building Construction and Materials,* and by Underwriters Laboratories, Incorporated, which issues it as UL 263 *Standards for Fire Tests of Building Construction and Materials.*

# APPENDIX A

## REFERENCED STANDARDS

The following is a listing of the standards referenced in this code, the effective date of the standard, the promulgating agency of the standard and the section(s) of this code that refer to the standard.

**AA** Aluminum Association
818 Connecticut Avenue, N.W.
Washington, D.C. 20006

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| ABS 32—69 | Aluminum Formed Sheet Building Sheathing Design Guide | 1208.1 |
| ASM 35—80 | Aluminum Sheet Metal Work in Building Construction—Specifications for | 1208.1 |
| SAS 30—76 | Aluminum Structures—Specifications for | 1208.1 |

**AAMA** Architectural Aluminum Manufacturers Association
35 East Wacker Drive, Room 3200
Chicago, Illinois 60601

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| 1402.3—75 | Aluminum Siding and High Performance Coatings for Aluminum Siding—Specifications for | Table 1225.4, Table 1304 |
| 1602.1—77 | Calculating Skylight Manual Energy Balance—Voluntary Standard Procedure for | 2502.2.2 2502.3.2, 2502.3.6 |

**AASHTO** American Association of State Highway and Transportation Officials
444 North Capital Street, N.W.
Suite 225
Washington, D.C. 20001

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| HB-12—80 | Standard Specification for Highway Bridges | Table 906 |

## ACI

American Concrete Institute
P.O. Box 19150
Redford Station
Detroit, Michigan 48219

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| 318—77 | Reinforced Concrete—Building Code Requirements for | 1009.2, 1012.2.1, 1012.2.2, 1117.1, 1204.1, 1216, 1216.4 |
| 322—72 | Structural Plain Concrete—Building Code Requirements for | 1215.4 |
| 531—79 | Concrete Masonry Structures—Building Code Requirements for | 1204.1, 1209.1, 1210.1, 1211.1, 1220.3, 1221.1, 1310.2, 1407.3 |

## AISC

American Institute of Steel Construction, Inc.
Wrigley Building, 8th Floor
400 N. Michigan Avenue
Chicago, Illinois 60611

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| S326—78 | Design, Fabrication and Erection of Structural Steel for Buildings—Specification for | 1201.1, 1201.6, 1205.1 |
| SJI/AISC—78 | Open Web Steel Joists, H-Series —Standard Specification for | 1203.1 |
| SJI/AISC—78 | Longspan Steel Joists, LH Series, and Deep Longspan Steel Joists, DLH Series— Standard Specifications for | 1203.1 |

## AISI

American Iron and Steel Institute
1000 Sixteenth Street, N.W.
Washington, D.C. 20036

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| AISI—77 | Design of Cold Formed Steel Structural Members —Specification for | 1202.1 |
| AISI—74 | Design of Cold Formed Stainless Steel Structural Members—Specification for | 1202.1 |
| AISI—73 | Structural Applications of Steel Cables for Buildings —Criteria for | 1207.2 |

# AITC

American Institute of Timber Construction
333 W. Hampden Avenue
Englewood, Colorado 80110

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| 102—78 | Structural Timber Framing —Standard for the Design of | 1224.1 |
| 108—80 | Heavy Timber Construction—Standard for | 1224.1 |
| 109—79 | Structural Timber Framing—Treating Standard for | 1227.2 |
| 112—77 | Tongue and Groove Heavy Timber Roof Decking —Standard for | 1224.1 |
| 117—79 | Structural Glued Laminated Timber of Softwood Species—Design Standard Specifications for | 1224.1 |
| 119—76 | Hardwood Glued Laminated Timber —Standard Specifications for | 1224.1 |

# ANSI

American National Standards Institute, Inc.
1430 Broadway
New York, New York 10018

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| A10.5—76 | Material Hoists—Safety Requirements for | 2115.5 |
| A12.1—73 | Floor and Wall Openings, Railings, and Toe Boards —Safety Requirements for | 1813.4 |
| A17.1—78 | Elevators, Dumbwaiters, Escalators and Moving Walks— Safety Code for | 908.2<br>2100.2, 2102.4.2, 2102.5.1, 2103.3.2, 2104.3, 2105.8.2, 2105.8.3, 2105.8.5, 2105.9.2, 2105.9.3, 2105.9.5, 2106.1, 2107.2, 2107.3.2, 2110.1, 2111.1, 2113.1, 2118.1 |
| ANSI/NBS 211—70 (A41.1) | Masonry—Building Code Requirements for | 1012.2.1<br>1209.1, 1210.1, 1211.1, 1222.1, 1309.1, 1407.3 |
| ANSI/NBS Handbook H74—60 (A41.2) | Reinforced Masonry— Building Code Requirements for | 1204.1<br>1209.1, 1210.1, 1211.1, 1221.1, 1310.2, 1407.3 |
| A58.1—72 | Loads, Minimum Design in Buildings and other Structures—Building Code Requirements for | 625.4<br>904.1 |
| A60.1—49 | Signs and Outdoor Display Structures—Building Code Requirements for | 1900.3 |
| A90.1—76 | Manlifts—Safety Standard for | 2100.1<br>2102.5.3 |
| A108.4—76 | Tile, Ceramic, Installed with Water Resistant Organic Adhesives | 1115.7 |
| A108.5—76 | Tile, Ceramic, Installed with Dry Set Portland Cement Mortar | 1115.6.1<br>1115.6.2 |
| A108.6—76 | Tile, Ceramic, Installed with Grouting Epoxy | 1115.8 |

**ANSI (cont'd.)**

| | | |
|---|---|---|
| A108.7—76 | Tile, Electrically Conductive Ceramic, Installed with Conductive Dry Set Portland Cement Mortar | 1115.6.1<br>1115.6.2 |
| A118.1—76 | Dry Set Portland Cement Mortar —(For Ceramic Tile) | 1115.6.1 |
| A118.2—76 | Conductive Dry Set Portland Cement Mortar, Standard Specification for (Ceramic Tile) | 1115.6.2 |
| A118.3—76 | Epoxy, Chemical Resistant, Water Cleanable Tile Setting and Grouting— Standard Specifications for | 1115.8 |
| A118.4—76 | Latex Portland Cement Mortar—Standard Specification for (Ceramic Tile) | 1115.6.1 |
| A136.1—76 | Adhesives, Organic, for Installation of Ceramic Tile Types I and II—Standard for | 1115.7 |
| A208.1—79 | Mat Formed Wood Particle Board | 1124.1 |
| B20.1—76 | Conveyors and Related Equipment —Safety Standard for | 2117.3 |
| B153.1—74 | Construction, Care and Use of Automotive Lifts —Safety Requirements for | 2116.1 |
| Z49.1—73 | Safety in Welding and Cutting | 1818.5 |
| Z97.1—75 | Safety Glazing Material Used in Buildings—Performance Specifications and Methods of Test for | 1301.5.6 |

## APA

American Plywood Association
7011 S. 19th Street
Tacoma, Washington, 98466

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| D860—79 | Plywood Lumber Components—Design and Fabrication Specifications for | 1226.1<br>1227.3 |
| E30—80 | Plywood Construction Guide | 1123.1 |
| Y510—80 | Plywood Design Specifications | 1123.1 |

## ASHRAE

American Society of Heating,
Refrigerating and Air Conditioning Engineers
1791 Tullie Circle, N.E.
Atlanta, Georgia 30329

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| 90—75 | Energy Conservation in New Building Design | 2500.2<br>2502.1; 2506.2 |
| ASHRAE—80 | Handbook—Systems Volume | Figure 2502.2.1a |

# ASME

American Society of Mechanical Engineers
United Engineering Center
345 East 47th Street
New York, New York 10017

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| ASME—77 | Boiler Code and Unfired Pressure Vessel Code | 2115.4 |

# ASTM

American Society for Testing and Materials
1916 Race Street
Philadelphia, Pennsylvania 19103

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| A36—77a* | Structural Steel—Specifications for | 1015.1 |
| A48—76* | Gray Iron Castings—Specifications for | 1206.1 |
| A252—77a* | Welded and Seamless Steel Pipe Piles —Specifications for | 1015.1<br>1016.1 |
| A256—76* | Cast Iron—Compression Testing of | 1206.1 |
| A283—78* | Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars—Specifications for | 1015.1<br>1016.1 |
| A416—74* | Uncoated Seven Wire Stress Relieved Strand for Prestressed Concrete—Specifications for | 1018.3.2 |
| A572—78* | High Strength Low Alloy Columbium Vanadium Steels of Structural Quality—Specifications for | 1015.1 |
| A588—77a* | High Strength Low Alloy Structural Steel with 50,000 psi Minimum Yield Point to 4 in. Thick— Specifications for | 1015.1 |
| A690—77 | High Strength Low Alloy Steel H-Piles and Sheet Piling for Use in Marine Environments —Specifications for | 1015.1 |
| C5—74* | Quicklime for Structural Purposes —Specifications for | 1120.2 |
| C6—74* | Normal Finishing Hydrated Lime —Specifications for | 1120.2 |
| C28—76a* | Gypsum Plasters—Specifications for | 1120.4 |
| C33—78 | Concrete Aggregates—Specifications for | 1116.1 |
| C34—75* | Structural Clay Loadbearing Wall Tile —Specifications for | 1107.1 |
| C35—76* | Inorganic Aggregates for Use in Gypsum Plaster —Specifications for | 1120.5 |
| C36—78 | Gypsum Wallboard—Specifications for | 1124.1 |
| C37—76* | Gypsum Lath—Specifications for | 1121.2 |
| C56—76* | Structural Clay Nonloadbearing Tile —Specifications for | 1107.1 |
| C59—76* | Gypsum Casting and Molding Plaster —Specifications for | 1120.1 |

* This standard may be obtained from ASTM as indicated or from ANSI with the prefix ANSI/ASTM. All numbers and titles remain the same.

**ASTM (cont'd.)**

| | | |
|---|---|---|
| C61—76* | Gypsum Keene's Cement—Specifications for | 1120.1 |
| C62—75a | Building Brick (Solid Masonry Units made from Clay or Shale)—Specifications for | 1106.1 |
| C64—77 | Refractories for Incinerators and Boilers —Specifications for | 1507.2 |
| C67—78 | Brick and Structural Clay Tile— Sampling and Testing | 1209.2 |
| C73—75 | Calcium Silicate Face Brick (Sand Lime Brick) —Specifications for | 1106.1 |
| C79—78 | Gypsum Sheathing Board—Specifications for | 1124.1 |
| C105—76* | Ground Fire Clay as a Refractory Mortar for Laying Up Fireclay Brick—Specifications for | 1507.2 |
| C126—76* | Ceramic Glazed Structural Clay Facing Tile, Facing Brick and Solid Masonry Units—Specifications for | 1108.1 |
| C144—76* | Aggregate for Masonry Mortar—Specifications for | 1115.2 |
| C206—76* | Finished Hydrated Lime—Specification for | 1120.2 |
| C208—72 | Insulating Board (Cellulosic Fiber) Structural and Decorative—Specifications for | 1122.1<br>1124.1 |
| C212—75* | Structural Clay Facing Tile—Specification for | 1107.1 |
| C216—77* | Facing Brick (Solid Masonry Units Made from Clay or Shale)—Specification for | 1106.1 |
| C270—73 | Mortar for Unit Masonry—Specification for | 1115.1 |
| C317—76* | Gypsum Concrete—Specification for | 1219.1 |
| C330—77* | Lightweight Aggregates for Structural Concrete —Specification for | 1116.1 |
| C332—77a* | Lightweight Aggregates for Insulating Concrete —Specification for | 1116.1 |
| C404—76* | Aggregates for Masonry Grout —Specification for | 1115.2 |
| C476—76 | Mortar and Grout for Reinforced Masonry —Specification for | 1115.1 |
| C532—74* | Structural Insulating Formboard (Cellulosic Fiber) —Specification for | 1121.1<br>1122.1 |
| C587—78 | Gypsum Veneer Plaster—Specification for | 1120.4 |
| C588—78 | Gypsum Base for Veneer Plasters—Specification for | 1121.2 |
| C630—78 | Water Resistant Gypsum Backing Board —Specification for | 1124.2 |
| C652—77 | Hollow Brick (Hollow Masonry Units Made from Clay or Shale)—Specification for | 1106.1 |
| C841—76* | Installation of Interior Lathing and Furring —Specification for | 1118.1 |
| C842—76* | Application of Interior Gypsum Plaster —Specification for | 1120.4 |
| C843—76* | Application of Gypsum Veneer Plaster —Specification for | 1120.4 |
| C844—79 | Application of Gypsum Base to Receive Gypsum Veneer Plaster—Specification for | 1121.2 |
| C847—77* | Metal Lath—Specification for | 1121.4 |
| D25—73 | Round Timber Piles—Specification for | 1019.1 |
| D56—79 | Flash Point by Tag Closed Tester—Test for | Table 305.2<br>612.2.1 |

* This standard may be obtained from ASTM as indicated or from ANSI with the prefix ANSI/ASTM. All numbers and titles remain the same.

## ASTM (cont'd.)

| | | |
|---|---|---|
| D635—77* | Rate of Burning and/or Extent and Time of Burning of Self Supporting Plastics in a Horizontal Position —Test for | 2400.2, 2400.2.1 |
| D1143—74 | Piles under Axial Compressive Load—Testing | 1014.4 |
| D1929—77* | Ignition Properties of Plastics—Test for | 1319.2, 2400.2, 2400.2.1 |
| D2277—75 | Fiberboard Nail Base Sheathing —Specification for | 1124.1 |
| D2843—77* | Density of Smoke from the Burning or Decomposition of Plastics—Test for | 2400.2, 2400.2.1 |
| D2898—77 | Accelerated Weathering of Fire-Retardant Treated Wood for Fire Testing | 1403.5.2 |
| D3689—78* | Individual Piles under Static Axial Tensile Load —Testing | 1014.7 |
| E72—77* | Strength Tests of Panels for Building Construction —Conducting | 1221.2, 1222.2, 1225.2.3 |
| E84—77a* | Surface Burning Characteristics of Building Materials —Test for | 1319.1, 1319.2, 1319.3, 1319.3.9.2, 1403.4.1.2, 1403.5.1, 1404.2, 1421.3, Table 1421.5, 2400.2, 2400.2.1 |
| E90—75 | Airborne Sound Transmission Loss of Building Partitions—Laboratory Measurements of | 718.2 |
| E108—78 | Fire Tests of Roof Coverings | 1427.1 |
| E119—79 | Fire Test of Building Construction and Materials —Methods of | 1116.2, 1116.2.1, 1116.2.2, 1116.4, 1319.3, 1403.1.1, 1403.5.2 |
| E136—73 | Noncombustibility of Elementary Materials— Standard Test Method of | 1403.4.1.1 |
| E152—78 | Fire Test of Door Assemblies | 810.4.2, 1403.3.2 |
| E163—79 | Fire Test of Window Assemblies | 1403.3.4 |
| E283—73* | Rate of Air Leakage Through Exterior Windows | 2502.4.1 |
| E447—74* | Compressive Strength of Masonry Prisms—Test for | 1221.2, 1222.2 |
| E492—77* | Impact Sound Transmission Through Floor/Ceiling Assemblies Using the Tapping Machine—Laboratory Measurement of | 718.3 |
| E518—76* | Flexural Bond Strength of Masonry —Test for | 1221.2, 1222.2 |
| E519—74* | Diagonal Tension (Shear) in Masonry Assemblages —Test for | 1221.2, 1222.2 |
| E648—78 | Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source—Test for | 1404.3 |

* This standard may be obtained from ASTM as indicated or from ANSI with the prefix ANSI/ASTM. All numbers and titles remain the same.

# AWPA

American Wood Preservers Association
7735 Old Georgetown Road
Bethesda, Maryland 20014

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| C1—79 | Pressure Treatment (General Requirements) —All Timber Products | 1317.2.2 |
| C2—77 | Pressure Treatment—Lumber, Timber, Bridge Ties and Mine Ties | 1007.1<br>1007.2, 1317.2.2 |
| C3—79 | Pressure Treatment—Piles | 1007.1<br>1019.2 |
| C4—79 | Pressure Treatment—Poles | 1007.2 |
| C9—77 | Pressure Treatment—Plywood | 1317.2.2 |
| C20—74 | Fire-Retardant Pressure Treatment —Structural Lumber | 1403.5.2 |
| C27—74 | Fire-Retardant Pressure Treatment —Plywood | 1403.5.2 |
| M4—79 | Pressure Treated Wood Products—Care of | 1019.2 |
| P1—78 | Creosote—Standard for | 1317.2.2 |
| P2—77 | Creosote—Coal Tar Solutions | 1317.2.2 |
| P5—78 | Water Borne Preservatives | 1317.2.2 |
| P8—77 | Oil Borne Preservatives | 1317.2.2 |
| P9—77 | Organic Preservatives Systems —Standard for Solvents for | 1317.2.2 |

# AWPB

American Wood Preservers Bureau
P.O. Box 6085
Arlington, Virginia 22206

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| FDN—80 | Softwood Lumber, Timber and Plywood Pressure Treated with Water Borne Preservatives for Ground Contact Use in Residential and Light Commercial Foundations —Quality Control Program for | 1007.3 |
| LP2—80 | Softwood Lumber, Timber and Plywood Pressure Treated with Water Borne Preservatives for Above Ground Use —Standard for | 1317.2.2<br>1317.3.1 |
| LP22—80 | Softwood Lumber, Timber and Plywood Pressure Treated with Water Borne Preservatives for Ground Contact Use—Standard for | 1317.2.2<br>1317.3.2, 1317.3.3 |
| LP33—78 | Pressure Treated Lumber and Plywood with Light Petroleum Solvent Penta Solution (for Ground Contact)—Quality Control Standards for | 1317.2.2<br>1317.3.3 |
| LP44—78 | Pressure Treated Lumber and Plywood with Volatile Petroleum Solvent (LPG) Penta Solution (for Ground Contact)—Quality Control Standards for | 1317.2.2<br>1317.3.3 |

**AWPB (cont'd.)**

| | | |
|---|---|---|
| LP55—78 | Pressure Treated Lumber and Plywood with Creosote or Creosote Coal Tar Solution (for Ground Contact) —Quality Control Standards for | 1317.2.2<br>1317.3.3 |
| LP77—78 | Pressure Treated Lumber and Plywood with Heavy Petroleum Solvent Penta Solution (for Ground Contact)—Quality Control Standards for | 1317.2.2<br>1317.3.3 |
| MP-1—79 | Dual Treatment of Marine Piling Pressure Treated with Water Borne Preservatives and Creosote for Use in Marine Waters—Standards for | 1019.2 |
| MP-2—79 | Marine Piling Pressure Treated with Creosote for Use in Marine Waters—Standard for | 1019.2 |
| MP-4—75 | Marine Piling Pressure Treated with Water Borne Preservatives for Use in Marine Waters —Standard for | 1019.2 |

## AWPI

American Wood Preservers Institute
1651 Old Meadow Road
McLean, Virginia 22101

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| AWPI—69 | Pole Building Design | 1007.2 |

## AWS

American Welding Society
2501 N. W. Seventh Street
Miami, Florida 33125

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| D1.1—80 | Welding Code, Structural | 1201.5 |
| D1.3—78 | Welding Sheet Steel in Structures —Specification for | 1202.5 |

## BIA

Brick Institute of America
1750 Old Meadow Road
McLean, Virginia

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| BIA—69 | Engineered Brick Masonry—Building Code Requirements for | 1204.1<br>1209.1, 1211.1, 1220.2, 1221.1, 1310.2, 1407.3 |
| TN5A—70 | Sound Insulation—Clay Masonry Walls | 718.4 |

# BOCA

Building Officials and Code Administrators International
17926 South Halsted Street
Homewood, Illinois 60430

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| BFPC—81 | Basic Fire Prevention Code | 103.1<br>602.1, 603.1, 606.1, 609.1, 610.1, 611.2, 612.1, 612.6, 615.3, 616.3, 629.2, 630.11, 631.1.6, 1700.2, 1719.2, 1818.1, 1818.7, |
| BMC—81 | Basic Mechanical Code | 600.4<br>600.5, 604.2, 607.4.4, 608.2.5, 610.3, 611.4, 616.4, 701.1, 704.1, 704.2, 704.3, 708.1, 711.6, 712.1.4, 716.3.3, 1102.6, 1405.10.1, 1405.10.2.11, 1500.2, 1504.1, 1506.2, 1507.8, 1507.11, 1508.1, 1509.1, 1510.1, 1600.2, 1601.1, 1601.3, 1602.1, 1603.1, 1605.1, 1608.4, 1609.3, 1818.3, 2001.2.3, 2108.5, 2301.6, 2317.1, 2501.1, 2504.1 |
| BPMC—81 | Basic Property Maintenance Code | 103.1 |
| BOCA, SBCC, ICBO—79 | One and Two Family Dwelling Code | 308.5 |
| BOCA, ICBO, SBCC,—77 | Energy Conservation in New Building Construction —Code for | 2500.1 |

# CPSC

Consumer Product Safety Commission
Office of the Secretary
Washington, D.C. 20207

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| 16CFR Part 1201—80 | Architectural Glazing Standards and Related Materials | 1301.5.6 |
| 16CFR Part 1209—80 | Cellulose Insulation—Interim Safety Standard | 1318.5 |
| 16CFR Part 1404—80 | Cellulose Insulation | 1318.5 |

# DOC

United States Department of Commerce
National Bureau of Standards
Washington, D.C. 20234

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| FF1—70 | Surface Flammability of Carpet and Rugs —Standard for the | Table 1421.7<br>1421.7.1 |
| PS1—74 | Plywood—Construction and Industrial | 1123.1 |

DOC (cont'd.)

| | | |
|---|---|---|
| PS20—70 | American Softwood Lumber Standard | 201.0 (Nominal Dimension) |
| PS 51—71 | Plywood—Hardwood and Decorative | 1123.1 |
| PS 56—73 | Timber—Structural Glued Laminated | 1224.1 |
| PS 57—73 | Cellulosic Fiber Insulation Board (ANSI A194.1—73) | 1122.1<br>1124.1 |
| PS 58—73 | Basic Hardboard (ANSI A135.4—73) | 1124.1<br>1125.1 |
| PS 60—73 | Hardboard Siding (ANSI A135.6—73) | 1122.8<br>1125.2 |

## FM

Factory Mutual Engineering Corporation
Standards Laboratories Department
1151 Boston Providence Turnpike
Norwood, Massachusetts 02062

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| 4880—72 | Factory Mutual Building Corner Fire Test | 1319.2 |
| 4450—77 | Class I Insulated Steel Deck Roofs —Approval Standard for | 1319.3.5 |

## GA

Gypsum Association
1603 Orrington Avenue, Suite 1210
Evanston, Illinois 60201

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| 216—80 | Gypsum Board—Specifications for Application and Finishing of | 1124.1 |
| 600—79 | Fire Resistance Design Manual | 718.4 |

## HPMA

Hardwood Plywood Manufacturers Association
P.O. Box 2789
Reston, Virginia 22090

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| HP-SG—80 | Hardwood Plywood—Structural Design Guide for | 1123.1 |

## IMIAWC

International Masonry Industry All Weather Council
International Masonry Institute
823 15th St., N.W.
Washington, D.C. 20005

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| IMIAWC—75 | Cold Weather Masonry—Recommended Practices and Guide Specifications for | 1209.3 |

# MBMA

Metal Building Manufacturers Association
1230 Keith Building
Cleveland, Ohio 44115

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| MBMA—74 | Metal Building Systems Manual | 1202.1 |

# NCMA

National Concrete Masonry Association
2302 Horse Pen Road
Herndon, Virginia 22070

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| TEK69 A—78 | STC Values of Concrete Masonry Walls | 718.4 |
| TR 75-B—79 | Design and Construction of Load Bearing Concrete Masonry | 1204.1<br>1209.1, 1210.1, 1211.1, 1220.3, 1221.1, 1310.2, 1407.3 |

# NFiPA

National Fire Protection Association
Batterymarch Park
Quincy, Massachusetts 02269

| Standard reference number | Title | Referenced in code Section number |
|---|---|---|
| 11—78 | Foam Extinguishing Systems | 1707.1 |
| 11A—76 | High Expansion Foam Systems | 1707.1 |
| 11B—77 | Synthetic Foam and Combined Agent Systems | 1707.1 |
| 12—77 | Carbon Dioxide Extinguishing Systems | 1708.1<br>1708.5 |
| 12A—77 | Halogenated Extinguishing Agent Systems —Halon 1301 | 1709.1<br>1709.5 |
| 12B—77 | Halogenated Fire Extinguishing Agent Systems —Halon 1211 | 1709.1<br>1709.5 |
| 13—78 | Installation of Sprinkler Systems | 1704.1 |
| 14—78 | Standpipe and Hose Systems | 1711.2 |
| 15—79 | Water Spray Fixed Systems | 1706.1<br>1706.4 |
| 16—74 | Foam Water Sprinkler and Spray Systems | 1707.1 |
| 17—75 | Dry Chemical Extinguishing System | 1710.1<br>1710.5 |
| 26—76 | Supervision of Water Supply Valves | 1704.6 |
| 30—77 | Flammable and Combustible Liquids Code | 602.1 |
| 32—79 | Dry Cleaning Plants | 612.1 |
| 33—77 | Spray Application Using Flammable and Combustible Materials | 611.1 |
| 34—79 | Dipping and Coating Processes Using Flammable or Combustible Liquids | 611.1 |

## NFIPA (cont'd.)

| | | |
|---|---|---|
| 40—74 | Cellulose Nitrate Motion Picture Film | 608.1<br>608.2.1, 608.3 |
| 40E—75 | Storage of Pyroxylin Plastic | 607.5.1<br>607.6.2 |
| 61A—73 | Manufacturing and Handling Starch | 610.1 |
| 61B—73 | Prevention of Fire and Dust Explosions in Grain Elevators and Bulk Grain Handling Facilities | 610.1<br>610.4 |
| 61C—73 | Prevention of Fire and Dust Explosions in Feed Mills | 610.1 |
| 61D—73 | Milling of Agricultural Commodities for Human Consumption | 610.1 |
| 63—75 | Prevention of Dust Explosions in Industrial Plants | 610.1 |
| 65—75 | Processing and Finishing of Aluminum | 610.1 |
| 70—81 | National Electrical Code | 611.2<br>629.9.1, 631.1.4, 1307.4, 1907.3, 1914.1<br>2000.1, 2000.3, 2003.1, 2005.3 |
| 71—77 | Central Station Signaling Systems | 1716.1<br>1718.1 |
| 72A—79 | Local Protective Signaling Systems | 1716.1<br>1716.9.1, 1717.1, 1717.5, 1717.7.1, 1718.1 |
| 72B—79 | Auxiliary Protective Signaling Systems | 1716.1<br>1716.9.1, 1717.7.1 |
| 72C—75 | Remote Station Protective Signaling Systems | 1716.1<br>1716.9.1, 1717.7.1, 1718.1 |
| 72D—79 | Proprietary Protective Signaling Systems | 1716.1<br>1716.9.1, 1717.7.1, 1718.1 |
| 72E—78 | Automatic Fire Detectors | 630.2.9.1<br>1716.1, 1716.9.1, 1717.7.1 |
| 74—78 | Household Fire Warning Equipment | 1716.1 |
| 80—79 | Fire Doors and Windows | 1408.3.1<br>1415.2 |
| 85F—78 | Pulverized Fuel Systems—Installation and Operation | 610.1 |
| 91—73 | Blower and Exhaust Systems, Dust, Stock and Vapor Removal or Conveying | 609.1 |
| 102—78 | Assembly Seating, Tents and Air Supported Structures | 619.1<br>621.1 |
| 204—68 | Smoke and Heat Venting | 507.3 |
| 651—74 | Manufacture of Aluminum or Magnesium Powder —Standard for the | 610.1 |
| 653—71 | Dust Explosions in Coal Preparation Plants, —Prevention of | 610.1 |
| 654—75 | Dust Explosions in the Plastics Industry —Prevention of | 610.1 |
| 655—71 | Sulfur Fires and Explosions—Prevention of | 610.1 |
| 656—71 | Dust Ignitions in Spice Grinding Plants —Prevention of | 610.1 |
| 664—71 | Dust Explosions in Woodworking and Wood Floor Manufacturing Plants—Prevention of | 610.1 |
| 701—77 | Fire Tests for Flame Resistant Textile and Film —Standard Methods of | 1404.4.1<br>1404.4.3 |
| 1221—78 | Public Fire Service Communications | 1716.1 |

## NFoPA

National Forest Products Association
1619 Massachusetts Avenue, N.W.
Washington, D.C. 20036

| Standard reference number | Title | Referenced in Code Section number |
|---|---|---|
| NFoPA—77 | Design Values for Joists and Rafters | 1225.7.3<br>1225.8.4 |
| NFoPA—77 | Span Tables for Joists and Rafters | 1225.7.3<br>1225.8.4 |
| NFoPA—77 | National Design Specification for Wood Construction | 1007.1 |
| | —80 Supplement | 1223.1, 1225.8.4 |
| TR7—79 | All Weather Wood Foundation System —Basic Requirements | 1007.3 |

## RCSHSB

Red Cedar Shingle and Handsplit Shake Bureau
515 116th Avenue, N.E., Suite 275
Bellevue, Washington 98004

| Standard reference number | Title | Referenced in Code Section number |
|---|---|---|
| RCSHSB—75 | Certigrade Red Cedar Shingles —Grading rules for | 1225.8.2 |

## SJI

Steel Joist Institute
1703 Parham Road, Suite 204
Richmond, VA 23229

| Standard reference number | Title | Referenced in Code Section number |
|---|---|---|
| SJI—78 | Joist Girders—Standard Specifications for | 1203.1 |
| SJI/AISC—78 | Open Web Steel Joists, H-Series —Standard Specification for | 1203.1 |
| SJI/AISC—78 | Longspan Steel Joists, LH series, and Deep Longspan Steel Joists, DLH series— Standard Specifications for | 1203.1 |

## SMACNA

Sheet Metal and Air Conditioning Contractors National Association, Inc.
8224 Old Courthouse Road
Vienna, Virginia 22180

| Standard reference number | Title | Referenced in Code Section number |
|---|---|---|
| SMACNA—70 | Fire Damper Guide for Air Handling Systems | 1403.3.5 |

## TPI

Truss Plate Institute, Inc.
100 West Church St.
Frederick, Maryland 21701

| Standard reference number | Title | Referenced in Code Section number |
|---|---|---|
| TPI—78 | Trusses—Design Specifications for Light Metal Plate Connected Wood | 1225.8.4 |

## UL

Underwriters Laboratories, Inc.
333 Pfingsten Road
Northbrook, Illinois 60062

| Standard reference number | Title | Referenced in Code Section number |
|---|---|---|
| 10A—80 | Doors—Tin Clad Fire | 1415.2 |
| 14B—79 | Hardware, Sliding, for Standard Horizontally Mounted Tin Clad Fire Doors | 1415.2 |
| 14C—79 | Hardware, Swinging, for Standard Tin Clad Fire Doors | 1415.2 |
| 63—76 | Fire Door Frames—Standard for | 1403.3.2 |
| 555—79 | Fire Dampers | 1403.3.5 |
| Subject 723—79 | Flammability Studies of Cellular Plastics and Other Building Materials Used for Interior Finishes | 1319.2 |
| Subject 1256—79 | Roof Deck Constructions —Outline of Investigation for | 1319.3.5 |
| 1482—79 | Room Heaters, Solid Fuel Type —Standard for | 1507.14.1 |

## KAR

Department of Housing, Buildings and Construction
Rt. 127 South
Frankfort, Kentucky 40601

| Standard reference number | Title | Referenced in Code Article |
|---|---|---|
| 815 KAR 4 | Elevator Safety | Art. 21 |
| 815 KAR 10 | Fire Safety Standards | Art. 6, 17, 18 |
| 815 KAR 15 | Boilers & Pressure Vessels | Art. 16 |
| 815 KAR 20 | Plumbing | Art. 22 |
| 815 KAR 30 | Hazardous Materials | Art. 6 |
| 815 KAR 35 | Electrical Inspectors | Art. 20 |

# APPENDIX B

## RELATED STANDARDS

The following is a listing of standards which are not referenced by this code but are related in subject matter. This appendix is intended to provide a source of information of available standards that may be indirectly related to the *Kentucky Building Code*. This appendix is hereby declared not to be a part of this code.

### Aluminum

Aluminum Alloy Bars, Rods and Wire—
Standard Specifications for ..... ASTM B211—79
Aluminum Alloy Extruded Bars, Rods, Shapes
and Tubes—Standard Specifications for ..... ASTM B221—79
Aluminum Alloy Die and Hand Forgings—
Standard Specifications for ..... ASTM B247—78
Aluminum Alloy Seamless Pipe and Seamless Extruded Tubing—
Standard Specifications for ..... ASTM B241—79
Aluminum Alloy Sheet and Plate—
Standard Specifications for ..... ASTM B209—79
Aluminum Alloy Standard Structural Shapes,
Rolled or Extruded—Standard Specifications for ..... ASTM B308—78
Aluminum Alloy Drawn Seamless Tubes—
Standard Specifications for ..... ASTM B210—78
Aluminum Alloy Extruded Structural Pipe and Tube—
Standard Specifications for ..... ASTM B429—79
Aluminum Alloy Round Welded Tubes—
Standard Specifications for ..... ASTM B313—79
Aluminum Alloy Rivet and Cold Heading
Wire and Rods—Standard Specifications for ..... ASTM B316—75
Aluminum Alloy Die Castings—Standard
Specifications for ..... ASTM B85—76
Aluminum Alloy Permanent Mold Castings—
Standard Specification for ..... ASTM B108—76
Aluminum Alloy Sand Castings—Standard
Specifications for ..... ASTM B26—78a
Aluminum Sliding Glass Doors—Specifications for ..... AAMA 402.9—77
Aluminum Windows—Specifications for ..... AAMA 302.9—77

### Concrete

Cement, Hydraulic—Methods of Sampling ..... ASTM C183—78
Coarse Aggregates, Resistance to Abrasion of Small Size,
by Use of the Los Angeles Abrasion Machine—Test for ..... ASTM C131—76
Concrete, Aggregate—Method of Tests for Voids in ..... ASTM C29—78
Concrete, Air Content of Freshly Mixed, by the
Pressure Method—Method of Test for ..... ASTM C231—78
Concrete Formwork—Recommended Practice for ..... ACI 347—78
Concrete, Hardened Portland Cement—Tests for Cement
Content of ..... ASTM C85—73
Concrete Masonry Units, Hollow Loadbearing—
Specifications for ..... ASTM C90—78
Concrete Masonry Units—Sampling and Testing ..... ASTM C140—75
Concrete Masonry Units, Solid Loadbearing—
Specifications for ..... ASTM C145—75

## Concrete—continued

Concrete, Molded Cylinders—Tests for Compressive Strength of ..... ASTM C39—79
Concrete, Obtaining and Testing Drilled Cores and Sawed Beams of ..... ASTM C42—77
Concrete, Ready Mixed—Specifications for ..... ASTM C94—78a
Concrete Test Specimens in the Laboratory—Making and Curing ..... ASTM C192—76
Fine and Coarse Aggregates, Sieve or Screen Analysis of—Test for ..... ASTM C136—76
Inspection and Testing Agencies for Concrete, Steel and Bituminous Materials as Used in Construction ..... ASTM E329—77
Joist Construction, One Way Concrete—Types and Sizes of Forms for ..... ANSI A48.1—78
Lightweight Insulating Concrete, Compressive Strength—Test for ..... ASTM C495—77a
Natural Cement—Specifications for ..... ASTM C10—76
Portland Cement—Specifications for ..... ASTM C150—78a
Reinforced Concrete Structures—Manual of Standard Practice for Detailing ..... ACI 315—78
Safety Requirements for Shoring Concrete Formwork—Recommended ..... SSSI—79
Sands for Concrete—Tests for Organic Impurities in ..... ASTM C40—79
Sheet Materials for Curing Concrete—Specifications for ..... ASTM C171—75
Unit Weight, Yield and Air Content (Gravimetric) of Concrete—Test for ..... ASTM C138—77
Vermiculite Concrete Roofs and Slabs on Grade—Specifications for ..... ANSI A122.1—65

## Electrical illumination

Daylighting—Recommended Practices of ..... IES RP5—79
Design Criteria for Lighting Interior Living Spaces ..... IES RP11—79
IEEE Standard Dictionary of Electrical and Electronic Terms ..... ANSI C42.100—79
Industrial Lighting ..... ANSI/IES RP7—79
Lighting Handbook ..... IES—72
Office Lighting—Recommended Practice ..... IES RP1—73
School Lighting—Recommended Practice ..... IES RP3—77

## Energy conservation

ASHRAE 1977 Handbook of Fundamentals ..... ASHRAE—77
Basic Energy Conservation Code ..... BOCA—81

## Equipment

Elevators, Escalators and Moving Walks—Practice for the Inspection of ..... ANSI A17.2—79
Personnel Hoists, Safety Requirements for ..... ANSI A10.4—75

## Fire and sound tested assemblies

Approved Guide, Equipment, Materials, Services for Conservation of Property ..... FM—FMED—79
Fire Resistance, BIA Technical Notes on Brick Construction ..... BIA-TN16 Rev.—74
Fire Resistance Directory ..... UL—80
Fire Resistance Ratings ..... AInsA—64
—1968 Supplement ..... AInsA—68
—1970 Supplement ..... AInsA—70
—1972 Supplement ..... AInsA—72
Fireresistance Design Manual ..... GA 600—79

## Fire protection and safety practices

Air Conditioning and Ventilating Systems
—Other than Residence Type ..... NFiPA 90A—78
—Residence Type ..... NFiPA 90B—76
Aircraft Hangars—Standard on ..... NFiPA 409—79
Extinguishers, Portable Fire—Standard for the Installation and Maintenance of ..... NFiPA 10—78
Garages
—Parking Structures—Standard for ..... NFiPA 88A—79
—Repair Garages—Standard for ..... NFiPA 88B—79
Gas Shielded Arc Welding—Recommended Safe Practice for ..... AWS D10.7—60
Incinerators, Waste and Linen Handling Systems and Equipment
—Standard on ..... NFiPA 82—77
Life Safety Code ..... NFiPA 101—76
Liquefied Petroleum Gases—Standard for the Storage and Handling of ..... NFiPA 58—79
Liquefied Petroleum Gases at Utility Gas Plants—Standard for the Storage and Handling of ..... NFiPA 59—79
Outside Protection (Yard Piping)—Standard for ..... NFiPA 24—77
Oxygen Fuel Gas Systems for Welding and Cutting
—Standard for the Installation and Operation of ..... NFiPA 51—77
Piers and Wharves—Standard for the Construction and Protection of ..... NFiPA 87—75
Pumps, Centrifugal Fire—Standard for the Installation of ..... NFiPA 20—78
Safe Practices for Welding and Cutting Containers That Have Held Combustibles ..... AWS A6.0—65
Smoke Detectors, Single and Multiple Stations ..... UL 217—80
Sprinkler Systems—Recommended Practice for the Care and Maintenance of ..... NFiPA 13A—78
Water Tanks for Private Fire Protection—Standard for ..... NFiPA 22—78
Wetting Agents—Standard for ..... NFiPA 18—79

## Interior finishes

Gypsum Board Products, Gypsum Lath, Gypsum Partition Tile or Block, and Precast Reinforced Gypsum Slabs
—Method of Physical Testing of ..... ASTM C473—76a
Gypsum Formboard—Specifications for ..... ASTM C318—78
Gypsum and Gypsum Products, Chemical Analysis of
—Standard Methods for ..... ASTM C471—76
Gypsum Plasters and Gypsum Concrete—Standard Methods for Physical Testing of ..... ASTM C472—79
Insulating Board (Made from Cellulosic Fiber), Structural and Decorative
—Methods of Testing ..... ASTM C209—72
Metal Ceiling Suspension Systems for Acoustical Tile and Lay In Panels
—Standard Recommended Practice for the Installation of ..... ASTM C636—76
Metal Suspension Systems for Acoustical Tile and Lay In Panel Ceilings—Standard Specifications for ..... ASTM C635—78
Nails for the Application of Gypsum Wallboard—Standard Specifications for ..... ASTM C514—77
Quicklime and Hydrated Lime—Methods of Physical Testing of ..... ASTM C110—76a
Steel Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board, or Water Resistant Backing Board
—Specifications for ..... ASTM C754—79
Tile, Ceramic—Standard Specifications for ..... TCA 137.1—76

## Masonry

Aggregate, Fine—Effect of Organic Impurities in, on Strength of Mortar ..... ASTM C87—75
Aggregates, Lightweight, for Concrete Masonry Units—Specifications for ..... ASTM C331—77
Basement and Foundation Walls ..... NCMA TR68A—75
Brick, Concrete Building—Specifications for ..... ASTM C55—75
Cement, Masonry—Specifications for ..... ASTM C91—78
Chemical Analysis of Limestone, Quicklime and Hydrated Lime ..... ASTM C25—79
Clay Nonloadbearing Screen Tile, Structural Specification for ..... ASTM C530—75
Concrete Masonry Units, Hollow Loadbearing—Specifications for ..... ASTM C90—78
Concrete Masonry Units, Hollow Nonloadbearing—Specifications for ..... ASTM C129—75
Concrete Masonry Units, Solid Loadbearing—Specifications for ..... ASTM C145—75
Design Tables for Reinforced Concrete Masonry ..... NCMA TR84—77
Gypsum Partition Tile and Block—Specifications for ..... ASTM C52—77
Lime, Hydrated for Masonry Purposes—Specifications for ..... ASTM C207—79
Lime, Hydrated and Quick—Methods of Physical Testing of ..... ASTM C110—76a
Lime, Hydraulic Hydrated for Structural Purposes—Specifications for ..... ASTM C141—78
Lime and Limestone Products—Methods of Sampling Inspection, Packing and Marking of ..... ASTM C50—78
Mortars, Hydraulic Cement—Method of Test for Compressive Strength of (Using 2 in. Cube Specimens) ..... ASTM C109—77
Mortars, Hydraulic Cement—Method of Test for Tensile Strength of ..... ASTM C190—77
Portland Cement Lime Mortar for Brick Masonry—Standard Specification for ..... BIA M1—72
Stone, Natural Building—Methods of Test for Absorption and Bulk Specific Gravity of ..... ASTM C97—77
Stone, Natural Building—Method of Test for Compressive Strength of ..... ASTM C170—76
Stone, Natural Building—Methods of Test for Modulus of Ruptures of ..... ASTM C99—76
Structural Clay Products—Standard Definitions of Terms ..... ASTM C43—75
Water Permeance of Masonry—Method of Test for ..... ASTM E514—74

## Plastics

Flammability of Flexible Plastic—Method of Test for ..... ASTM D568—77
Plastics—Definitions of Terms Relating to ..... ASTM D883—78a
Plastics, Deformation of, Under Load—Method of Test for ..... ASTM D621—76
Water Absorption of Plastics—Methods of Test for ..... ASTM D570—77

## Plumbing and piping

Asbestos Cement Nonpressure Sewer Pipe—Specifications for ..... ASTM C428—78
Asbestos Cement Pressure Pipe—Specifications for ..... ASTM C296—78

## Plumbing and piping—continued

Brass Pipe, Seamless Red Brass—Specification for ..... ASTM B43—79
Cast Iron and Ductile Iron Pressure Pipe—Specifications for ..... ASTM A377—79
Cast Iron Soil Pipe and Fittings—Specifications for ..... ASTM A74—75
Clay Pipe
—Compression Joints for Vitrified Clay Bell and Spigot Pipe ..... ASTM C425—77
—Drain Tile—Specifications for ..... ASTM C4—75
—Extra Strength and Standard Strength Clay Pipe and Perforated Clay Pipe—Specifications for ..... ASTM C700-78a
—Testing ..... ASTM C301—78c
Concrete Pipe
—Culvert, Storm Drain and Sewer, Reinforced—Specifications for ..... ASTM C76—78
—Sewer—Specifications for ..... ASTM C14—78
Copper Drainage Tube (DWV)—Specification for ..... ASTM B306—78
Copper Pipe, Seamless, Standard Size—Specifications for ..... ASTM B42—78
Installing Vitrified Clay Sewer Pipe
—Recommended Practice for ..... ASTM C12—77
Steel Pipe
—Black and Hot Dipped Zinc Coated (Galvanized) Welded and Seamless, for Ordinary Uses—Specifications for ..... ASTM A120—79
—Steel or Iron, Spiral Welded—Specifications for ..... ASTM A211—75
—Welded and Seamless—Specifications for ..... ASTM A53—79
Tile, Clay Drain—Specification for ..... ASTM C4—75
Tube and Tubing
—Brass, Seamless—Specifications for ..... ASTM B135—74
—Copper, Seamless—Specifications for ..... ASTM B75—79
—Copper, Seamless, Water—Specifications for ..... ASTM B88—78
—Copper Brazed Steel Tubing—Specifications for ..... ASTM A254—79
Welded and Seamless Wrought Steel Pipe ..... ANSI B36.10—75
Valves, Flanges and Pipe Fittings, Gray Iron Castings—Specifications for ..... ASTM A126—79

## Reinforcement

Reinforcement, Axle Steel Deformed and Plain Bars for Concrete—Specifications for ..... ASTM A617—79
Reinforcement, Deformed and Plain Billet Steel Bars for Concrete—Specifications for ..... ASTM A615—78
Reinforcement, Deformed Steel Wire for Concrete—Specifications for ..... ASTM A496—78
Reinforcement, Low Alloy Steel Deformed Bars for Concrete—Specifications for ..... ASTM A706—76
Reinforcement, Rail Steel Deformed and Plain Bars for Concrete—Specifications for ..... ASTM A616—79
Reinforcement, Steel Wire, Cold Drawn, for Concrete—Specifications for ..... ASTM A82—79
Reinforcement, Steel Wire, Welded Fabric for Concrete—Specifications for ..... ASTM A185—79
Reinforcement, Welded Deformed Steel Wire Fabric for Concrete—Specifications for ..... ASTM A497—79

## Roofing and siding

Asphalt for Dampproofing and Waterproofing—Specifications for ..... ASTM D449—79

## Roofing and siding—continued

Asphalt Roll Roofing, Cap Sheets, and Shingles—
Methods of Testing ..... ASTM D228—79
Asphalt Roll Roofing Surfaced with
Mineral Granules—Specifications for ..... ASTM D249—73
Asphalt Roll Roofing Surfaced with Powdered
Talc or Mica—Specifications for ..... ASTM D224—75
Asphalt Roofing and Siding Products—
Manufacturer, Selection and Application of ..... ARMA—74
Asphalt Shingles Surfaced with Mineral
Granules—Specifications for ..... ASTM D225—78
Asphalt for Use in Constructing Built Up
Roof Covering—Specifications for ..... ASTM D312—78
Bituminous Materials, Accelerated Test of Weathering—
Recommended Practice for ..... ASTM D529—76
Felt—Methods of Testing ..... ASTM D461—77
Felted and Woven Fabrics Saturated with Bituminous
Substance for Use in Waterproofing and Roofing
—Methods of Sampling and Testing ..... ASTM D146—78a
Fiber Insulation Board, Structural and Decorative—
Method of Testing (Made from Cellulosic Fiber) ..... ASTM C209—72

## Steel

Alloy Steel Bolts, Quenched and Tempered, for Structural
Steel Joints—Standard Specifications for ..... ASTM A490—79
Alloy Steel Sheets and Strip, Regular Quality
Hot Rolled and Cold Rolled—Specification for ..... ASTM A506—73
Architecturally Exposed Structural Steel—Specification for ..... AISC S307—60
Bare Carbon Steel Electrodes and Fluxes for
Submerged Arc Welding—Specifications for ..... AWS A5.17—76
Bolts, High Strength, for Structural Steel Joints Including Suitable
Nuts and Plain Hardened Washers—Specifications for ..... ASTM A325—79
Bolts and Studs, Quenched and Tempered Steel—
Specifications for ..... ASTM A449—78a
Carbon and Alloy Steel Nuts for Bolts for High Pressure and
High Temperature Service—Specifications for ..... ASTM A194—79
Carbon Steel Castings Suitable for Fusion
Welding for High Temperature Service—
Specifications for ..... ASTM A216—77
Carbon Steel Nuts—Specifications for ..... ASTM A563—78a
Carbon Steel Strip, Cold Rolled—
Specifications for ..... ASTM A109—79
Castings, Mild to Medium Strength Carbon Steel
for General Application—Specifications for ..... ASTM A27—79
Cold Formed Welded and Seamless Carbon Steel Structural Tubing
in Rounds and Squares—Specifications for ..... ASTM A500—78
Electrodes, Low Alloy Steel Covered Arc Welding—
Specifications for ..... AWS A5.5—69
Electrodes, Carbon Steel Covered Arc Welding—
Specification for ..... AWS A5.1—78
High Strength Steel Bar, Uncoated, for Prestressing Concrete—
Specification for ..... ASTM A722—75
Hot Formed Welded and Seamless Carbon Steel
Structural Tubing—Specifications for ..... ASTM A501—76
Hot Formed Welded and Seamless High
Strength Low Alloy Structural Tubing—
Specifications for ..... ASTM A618—74
Hot Rolled Carbon Steel Sheets and Strip,
Structural Quality—Specifications for ..... ASTM A570—79

## Steel—continued

Low Carbon Steel, External and Internal Threaded, Standard Fasteners—Specifications for ..... ASTM A307—78
Metallic Materials—Methods of Tension Testing of ..... ASTM E8—79a
Carbon Steel Electrodes for Flux Cored Arc Welding—Specifications for ..... AWS A5.20—79
Carbon Steel Filler Metals for Gas Shielded Arc Welding—Specifications for ..... AWS A5.18—79
Non Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board—Specification for ..... ASTM C645—76
Reinforcing Steel Structural Welding Code ..... AWS D1.4—79
Reinforcement, Axle Steel Deformed and Plain Bars for Concrete—Specifications for ..... ASTM A617—79
Reinforcement, Deformed and Plain Billet Steel Bars for Concrete—Specifications for ..... ASTM A615—78
Reinforcement, Deformed Steel Wire for Concrete—Specifications for ..... ASTM A496—78
Reinforcement, Low Alloy Steel Deformed Bars for Concrete—Specifications for ..... ASTM A706—76
Reinforcement, Rail Steel Deformed and Plain Bars for Concrete—Specifications for ..... ASTM A616—79
Reinforcement, Steel Wire, Cold Drawn, for Concrete—Specifications for ..... ASTM A82—79
Reinforcement, Steel Wire, Welded Fabric for Concrete—Specifications for ..... ASTM A185—79
Reinforcement, Welded Deformed Steel Wire Fabric for Concrete—Specifications for ..... ASTM A497—79
Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use—General Requirements for ..... ASTM A6—79a
Sheet Piling Steel—Specifications for ..... ASTM A328—75a
Stainless and Heat Resisting Chromium Steel Plate, Sheet and Strip—Standard for ..... ASTM A176—79
Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet, and Strip—Standard for ..... ASTM A167—77
Steel, Carbon and High Strength, Low Alloy Hot Rolled Sheet, Hot Rolled Strip and Cold Rolled Sheet, General Requirements—Standards for ..... ASTM A568—74
Steel Castings for Structural Purposes, High Strength—Specifications for ..... ASTM A148—79
Steel, Cold Rolled Sheet, Carbon Structural—Specifications for ..... ASTM A611—79a
Steel Drill Screw Application of Gypsum Sheet Material to Light Gage Steel Stud ..... ASTM C646—78
Steel Forgings, Carbon and Alloy for General Industrial Use—Specifications for ..... ASTM A668—79
Steel, Hot Rolled and Cold Rolled Sheet and Strip, High Strength, Low Alloy Columbium and/or Vanadium—Specifications for ..... ASTM A607—75
Steel, Hot Rolled and Cold Rolled Sheet and Strip, High Strength, Low Alloy with Improved Corrosion Resistance—Specifications for ..... ASTM A606—75
Steel, Sheet, Cold Rolled, Long Terne Coated—Specification for ..... ASTM A308—78
Steel Sheet, Zinc Coated (Galvanized) by the Hot Dip Process, General Requirements—Specifications for ..... ASTM A525—79
Steel Sheet, Zinc Coated (Galvanized) by the Hot Dip Process for Roofing—Specifications for ..... ASTM A361—76
Steel Structural Rivets—Specifications for ..... ASTM A502—76
Structural Joints Using ASTM A325 or A490 Bolts—Specification for ..... AISC S314—76

**Steel**—continued

Structural Steel, High Strength—
Specifications for..... ASTM A440—77
Structural Steel, High Strength Low Alloy—
Specifications for..... ASTM A242—79
Structural Steel, High Strength Low Alloy Manganese Vanadium—
Specifications for..... ASTM A441—77
Structural Steel, High Yield Strength, Quenched and
Tempered Alloy Steel Plate, Suitable for Welding
—Specifications for..... ASTM A514—77
Structural Steel with 42,000 psi Minimum Yield Point
(½ in. Maximum Thickness)—Specification for..... ASTM A529—75
Uncoated Stress Relieved Wire for Prestressed Concrete—
Specifications for..... ASTM A421—77

## Test standards

### I. Structural unit test standards

**Concrete**

Coarse Aggregates, Resistance to Abrasion of Small Size,
by Use of the Los Angeles Abrasion Machine—Test for..... ASTM C131—76
Concrete, Hardened Portland Cement—Test for Cement
Content of ..... ASTM C85—73
Concrete Masonry Units, Hollow Load Bearing—
Specifications for..... ASTM C90—75
Concrete Masonry Units—Sampling and Testing ..... ASTM C140—75
Concrete Masonry Units, Solid Load Bearing—
Specifications for..... ASTM C145—75
Concrete, Molded Cylinders—Test for
Compressive Strength of ..... ASTM C39—79
Concrete, Obtaining and Testing Drilled Cores and
Sawed Beams of ..... ASTM C42—77
Concrete, Ready Mixed—Specifications for ..... ASTM C94—78a
Concrete Test Specimens in the Laboratory—Making and Curing ..... ASTM C192—76
Fine and Coarse Aggregates, Sieve or Screen Analysis of—
Test for ..... ASTM C136—76
Lightweight Insulating Concrete,
Compressive Strength—Test for ..... ASTM C495—77a
Sands for Concrete—Tests for Organic Impurities in ..... ASTM C40—79

**Interior finishes**

Gypsum Board Products, Gypsum Lath, Gypsum
Partition Tile or Block, and Precast Reinforced Gypsum Slabs
—Method of Physical Testing of ..... ASTM C473—76a
Gypsum Formboard—Specifications for..... ASTM C318—78
Gypsum and Gypsum Products, Chemical Analysis of—
Standard Methods for ..... ASTM C471—76
Gypsum Plasters and Gypsum Concrete, Physical Testing of—
Standard Methods for ..... ASTM C472—79
Insulating Board (Made from Cellulosic Fiber), Structural and Decorative—
Methods of Testing..... ASTM C209—72

**Masonry**

Brick, Concrete Building—Specifications for ..... ASTM C55—75
Cement, Masonry—Specifications for ..... ASTM C91—78
Chemical Analysis of Limestone, Quicklime and
Hydrated Lime ..... ASTM C25—79
Lime, Hydrated and Quick—Methods of Physical Testing of ..... ASTM C110—76a
Lime, Hydraulic Hydrated for Structural Purposes—
Specifications for..... ASTM C141—78
Lime and Limestone Products—Methods of Sampling, Inspection,
Packing and Marking of ..... ASTM C50—78

## Test standards—continued

Mortars, Hydraulic Cement—Method of Test for Compressive Strength of (Using 2 in. Cube Specimens) ..... ASTM C109—77
Mortars, Hydraulic Cement—Method of Test for Tensile Strength of ..... ASTM C190—77
Stone, Natural Building—Methods of Test for Absorption and Bulk Specific Gravity of ..... ASTM C97—77
Stone, Natural Building—Method of Test for Compressive Strength of ..... ASTM C170—76
Stone, Natural Building—Methods of Test for Modulus of Ruptures of ..... ASTM C99—76
Water Permeance of Masonry —Method of Test for ..... ASTM E514—74

**Metals**
Metallic Materials—Methods of Tension Testing of ..... ASTM E8—79a

**Wood and wood products**
Evaluating the Properties of Wood Base Fiber and Particle Panel Materials ..... ASTM D1037—78
Timber, Small Clear Specimens—Method of Testing ..... ASTM D143—78
Timbers in Structural Sizes—Methods of Static Tests of ..... ASTM D198—76
Veneer, Plywood and Other Glued Veneer Construction—Methods of Testing ..... ASTM D3499, P3500, D3501, D3502 and D3503—76

**Unclassified miscellaneous**
Cement, Hydraulic—Methods of Sampling ..... ASTM C183—78
Cement, Natural—Specifications for ..... ASTM C10—76
Cement, Portland—Specifications for ..... ASTM C150—78a
Clay Pipe, Testing ..... ASTM C301—78a
Felt—Methods of Testing ..... ASTM D461—77
Flammability of Flexible Plastic—Method of Test for ..... ASTM D568—77
Plastics Under Load—Method of Test for Deformation of ..... ASTM D621—75
Thickness of Solid Electrical Insulation—Method of Test for ..... ASTM D374—79
Tile, Clay Drain—Specification for ..... ASTM C4—76

## II. Structural assembly test standards

**Wood and wood products**
Heavy Truss Assemblies, Testing ..... ASTM E73—74
Mechanical Fasteners in Wood, Testing of ..... ASTM D1761—77

## III. Durability test standards

**Concrete and concrete aggregate**
Concrete, Aggregate—Method of Tests for Voids in ..... ASTM C29—78
Concrete, Air Content of Freshly Mixed, by the Pressure Method—Method of Test for ..... ASTM C231—78
Unit Weight, Yield and Air Content (Gravimetric) of Concrete—Test for ..... ASTM C138—77
Organic Impurities in Sand for Concrete—Method of Test for ..... ASTM C40—79

**Masonry and masonry products**
Freezing and Thawing Tests —Clay Drain Tile—Specifications for ..... ASTM C4—75

**Plastics**
Water Absorption of Plastics—Methods of Test for ..... ASTM D570—77

**Roofing and siding**
Asphalt Roll Roofing, Cap Sheets, and Shingles—Methods of Testing ..... ASTM D228—78

## Test standards—continued

Bituminous Materials, Accelerated Test of Weathering—
Recommended Practice for ..... ASTM D529—76
Felted and Woven Fabrics Saturated with Bituminous Substance
for Use in Waterproofing and Roofing
—Methods of Sampling and Testing ..... ASTM D146—78a

**Unclassified miscellaneous**

Evaluating the Properties of Wood Base Fiber and Particle
Panel Materials—Specifications for ..... ASTM D1037—78
Gypsum and Gypsum Products, Chemical Analysis of—
Standard Methods for ..... ASTM C471—76
Gypsum Board Products, Gypsum Lath, Gypsum Partition
Tile or Block, and Precast Reinforced Gypsum Slabs
—Method of Physical Testing of ..... ASTM C473—76a
Gypsum Plasters and Gypsum Concrete, Physical Testing of—
Standard Methods for ..... ASTM C472—79

### IV. Fire and flame spread test standards

Flash Point by Pensky—Masters Closed Tester—Method
of Test for..... ASTM D93—79
Flash and Fire Points by Cleveland Open Cup—
Method of Test for ..... ASTM D92—78

## Wood and wood products

Adhesives for Field Gluing Plywood to Wood Framing
—Performance Specifications for .....APA AFGO1—74
Code of Suggested Practices—Timber Construction Standard ..... AITC 106—77
Construction Details—Typical Timber Construction Standard ..... AITC 104—79
Evaluating the Properties of Wood Base Fiber and
Particle Panel Materials ..... ASTM D1037—78
Glued Laminated Structural Lumber Standards
—Appearance Grades..... AITC 110—78
—Dimensions of ..... AITC 113—75
—"E" Rated and Visually Graded Lumber of Douglas Fir, Southern Pine,
Hem-Fir, Lodgepole Pine ..... AITC 120—74
—Electric Utility Framing and Crossarms..... AITC 114—74
—Structural Glued Laminated Members and Laminations
Before Gluing of Southern Pine, Pacific Coast Douglas
Fir and Western Hemlock by Pressure Process ..... AWPA C28—79
—Structural Glued Laminated Southern Pine ..... SPIB—74
Heavy Truss Assemblies, Testing .....ASTM E73—74
Laminated Hardwood Block Flooring—Standard for..... ANSI O10.2—75
Mechanical Fasteners in Wood, Testing of ..... ASTM D1761—77
Methods for Establishing Structural Grades and Related Allowable
Properties for Visually Graded Lumber..... ASTM D245—74
Pile Foundations Know How ..... AWPI—70
Piles, Timber, Round—
Establishing Design Stresses for ..... ASTM D2899—74
Protection of Structural, Glued Laminated Timber During Transit,
Storage and Erection—Recommended Practice for..... AITC 111—79
Quality Control Standards for Pressure Treated Lumber and Plywood
—With Creosote or Creosote Coal Tar Solution
(For Above Ground Use)..... AWPB LP5—78
—With Heavy Petroleum Solvent Penta Solution
(For Above Ground Use)..... AWPB LP7—78
—With Light Petroleum Solvent Penta Solution
(For Above Ground Use)..... AWPB LP3—78
—With Volatile Petroleum Solvent (LPG) Penta Solution
(For Above Ground Use)..... AWPB LP4—78

## Wood and wood products—continued

Structural Design Data—Wood ..... NFoPA—78
Structural Glued Laminated Timber—
Inspection Manual for ..... AITC 200—73
Timber Construction Manual ..... AITC—74
Timber, Small Clear Specimens—Method of Testing ..... ASTM D143—78
Timber in Structural Sizes—Methods of Static Tests of ..... ASTM D198—76
Veneer, Plywood and Other Glued Veneer Construction—
Methods of Testing ..... ASTM D3499, P3500, D3501, D3502 and D3503—76
Wood Handbook ..... USDA Handbook No. 72—74

## Unclassified miscellaneous

Cellulose Insulation—Standard for ..... FS HH—I—515D 43FR35240, Aug. 8, 1979
Demolition—Safety Requirements for ..... ANSI A10.6—69
Dimensional Coordination of Rectilinear Building
Parts and Systems—Standard for ..... ASTM E577—76
Fallout Shelters—Suggested Building
Code Provisions for ..... DOD—OCD—TR—87—79
Flood Proofing Regulations ..... U.S. Army—72
Making Buildings and Facilities Accessible to, and
Usable by, the Physically Handicapped
—Specifications for ..... ANSI A117.1—80
Mobile Home Construction and Safety Standards ..... HUD—75
Nails, Brads, Staples and Spikes, Wire, Cut and Wrought—
Federal Specifications for, with Amendment 3-1974 ..... FS FF—N—105B—71
Natural and Mechanical Ventilation
—Standards for ..... ASHRAE 62—73
Perlite Loose Fill Insulation—
Standard Specifications for ..... ASTM C549—79
Vermiculite Loose Fill Insulation—
Standard Specifications for ..... ASTM C516—75

## Promulgating Agencies

*The following agencies promulgate the standards listed in this appendix. The abbreviations preceding agency names are used to identify the standards that an agency promulgates.*

**AAMA**
Architectural Aluminum Manufacturers Association
35 East Wacker Drive
Room 3200
Chicago, Illinois 60601

**ACI**
American Concrete Institute
P.O. Box 19150
Redford Station
Detroit, Michigan 48219

**AISC**
American Institute of Steel Construction, Inc.
Wrigley Building
400 N. Michigan Avenue
8th Floor
Chicago, Illinois 60611

**AITC**
American Institute of Timber Construction
333 W. Hampden Avenue
Englewood, Colorado 80110

**AInsA**
American Insurance Association
85 John Street
New York, New York 10038

**ANSI**
American National Standards Institute, Inc.
1430 Broadway
New York, New York 10018

**APA**
American Plywood Association
7011 S. 19th Street
Tacoma, Washington 98466

**ARMA**
Asphalt Roofing Manufacturers Assoc.
1800 Massachusetts Avenue, N.W.
Suite 702
Washington, D.C. 20036

**ASHRAE**
American Society of Heating, Refrigerating and Air Conditioning Engineers
United Engineering Center
345 East 47th Street
New York, New York 10017

**ASTM**
American Society for Testing and Materials
1916 Race Street
Philadelphia, Pennsylvania 19103

**AWS**
American Welding Society
2501 N.W. Seventh Street
Miami, Florida 33125

**AWPA**
American Wood Preservers Association
7735 Old Georgetown Road
Bethesda, Maryland 20014

**AWPB**
American Wood Preservers Bureau
P.O. Box 6085
Arlington, Virginia 22206

**AWPI**
American Wood Preservers Institute
1651 Old Meadow Road
McLean, Virginia 22101

**BIA**
Brick Institute of America
1750 Old Meadow Road
McLean, Virginia 22102

**BOCA**
Building Officials and Code Administrators International
17926 South Halsted Street
Homewood, Illinois 60430

**DOD**
Department of Defense
Office of the Secretary of the Army
Washington, D.C. 20390

**FM**
Factory Mutual Engineering
Corporation
Standards Laboratories Department
1151 Boston Providence Turnpike
Norwood, Massachusetts 02062

**FS**
Federal Specifications
Superintendent of Documents
Government Printing Office
Washington, D.C. 20402

**HUD**
United States Department of
Housing and Urban Development
Division of Mobile Home Standards
451 Seventh Street, S.W.
Washington, D.C. 20410

**IES**
Illuminating Engineers Society
345 East 47th Street
New York, New York 10017

**NCMA**
National Concrete Masonry
Association
2302 Horse Pen Road
Herndon, Virginia 22070

**NFiPA**
National Fire Protection Association
Batterymarch Park
Quincy, Massachusetts 02269

**NFoPA**
National Forest Products Association
1619 Massachusetts Avenue, N.W.
Washington, D.C. 20036

**SSSI**
Steel Scaffolding and Shoring Institute
1230 Keith Building
Cleveland, Ohio 44115

**TCA**
Tile Council of America
4801 Montgomery Lane
Washington, D.C. 20014
*or*
P.O. Box 326
Princeton, New Jersey 08540

**UL**
Underwriters Laboratories, Inc.
333 Pfingsten Road
Northbrook, Illinois 60062

**USDA**
United States Department of
Agriculture
14th and Independence Avenue, S.W.
Washington, D.C. 20225

**U.S. ARMY**
Office of the Chief of Engineers
U.S. Army
Publications Department
890 South Pickett Street
Alexandria, Virginia 22304

# APPENDIX C

## UNIT DEAD LOADS FOR DESIGN PURPOSES

The intent of this appendix is to assist the designer and building official in establishing the minimum weights for materials commmonly used in building construction. Some material assemblies have a range in weight. A typical figure is indicated, but when there is reason to suspect a considerable deviation, the actual weight should be determined.

**Note on use of Appendix C tables:** When making calculations based on the tables in this appendix, the weights of masonry include mortar but not plaster. For plaster, add 5 psf for each face plastered. Values given represent averages. In some cases there is a considerable range of weight for the same construction. For metric conversion, 1 psf equals 4.882 kg/m$^2$ and 1 pcf equals 16.02 kg/m$^3$.

**Table C-1**
**UNIT DESIGN DEAD LOADS FOR CONCRETE SLABS**

| Concrete slabs | Pounds per square foot |
|---|---|
| Concrete, reinforced stone, per inch of thickness | 12½ |
| Concrete, reinforced lightweight sand, per inch of thickness | 9½ |
| Concrete, reinforced, lightweight, per inch of thickness | 9 |
| Concrete, plain stone, per inch of thickness | 12 |
| Concrete, plain, lightweight, per inch of thickness | 8½ |

**Table C-2**
**UNIT DESIGN DEAD LOADS FOR RIBBED SLABS**

| Ribbed slabs Depth, in inches (rib depth plus slab thickness)* | Pounds per square foot | | | | | |
|---|---|---|---|---|---|---|
| | Width of rib, in inches | | | | | |
| | 4 | 5 | 6 | 7 | 8 | 9 |
| 12 inch clay tile fillers (normal weight concrete): | | | | | | |
| 4 plus 2 | 49 | 51 | 52 | 54 | — | — |
| 6 plus 2 | 60 | 63 | 65 | 67 | — | — |
| 8 plus 2½ | 79 | 82 | 85 | 87 | — | — |
| 10 plus 3 | 96 | 100 | 103 | 106 | — | — |
| 12 plus 3 | 108 | 112 | 116 | 120 | — | — |
| 20 inch wide forms: | | | | | | |
| 6 plus 2½ | 45 | 48 | 50 | 50 | — | — |
| 8 plus 2½ | 51 | 54 | 57 | 60 | — | — |
| 10 plus 2½ | 57 | 60 | 64 | 68 | — | — |
| 12 plus 2½ | 63 | 67 | 72 | 76 | — | — |
| 14 plus 2½ | — | 74 | 79 | 84 | — | — |
| 16 plus 2½ | — | — | 88 | 93 | 98 | — |
| 20 plus 2½ | — | — | — | 111 | 118 | — |

* Make appropriate allowances for tapered ends.

**Table C-2 (cont'd.)**
**UNIT DESIGN DEAD LOADS FOR RIBBED SLABS**

| Ribbed slabs Depth, in inches (rib depth plus slab thickness)* | Pounds per square foot | | | | | |
|---|---|---|---|---|---|---|
| | Width of rib, in inches | | | | | |
| | 4 | 5 | 6 | 7 | 8 | 9 |
| 30 inch wide forms: | | | | | | |
| 6 plus 2½ | 41 | 43 | 45 | 47 | — | — |
| 8 plus 2½ | 45 | 47 | 50 | 53 | — | — |
| 10 plus 2½ | 49 | 52 | 55 | 58 | — | — |
| 12 plus 2½ | 53 | 57 | 60 | 64 | — | — |
| 14 plus 2½ | — | 62 | 66 | 70 | — | — |
| 16 plus 2½ | — | — | 72 | 76 | 80 | — |
| 20 plus 2½ | — | — | — | 90 | 95 | 101 |
| Two way clay tile fillers (12x12): | | | | | | |
| 4 plus 2 | 61 | 62 | 64 | — | — | — |
| 6 plus 2 | 87 | 89 | 90 | — | — | — |
| 8 plus 2½ | 100 | 103 | 107 | — | — | — |
| 10 plus 3 | 121 | 126 | 131 | — | — | — |
| 12 plus 3 | 136 | 141 | 146 | — | — | — |

* Make appropriate allowances for tapered ends.

**Table C-3**
**UNIT DESIGN DEAD LOADS FOR WAFFLE SLABS**

| Waffle slabs Depth, in inches (Rib depth plus slab thickness) | Pounds per square foot |
|---|---|
| 19 x 19, 5 @ 24 | |
| 6 plus 2½ | 66 |
| 8 plus 2½ | 78 |
| 10 plus 2½ | 85 |
| 12 plus 2½ | 101 |
| 30 x 30, 6 @ 36 | |
| 8 plus 3 | 73 |
| 10 plus 3 | 83 |
| 12 plus 3 | 95 |
| 14 plus 3 | 106 |
| 16 plus 3 | 114 |
| 20 plus 3 | 135 |

**Table C-4**
**UNIT DESIGN DEAD LOADS FOR FLOOR FINISH**

| Floor finish | Pounds per square foot |
|---|---|
| Double ⅞ inch wood on sleepers, light concrete fill | 19 |
| Double ⅞ inch wood on sleepers, stone concrete fill | 28 |
| Single ⅞ inch wood on sleepers, light concrete fill | 16 |
| Single ⅞ inch wood on sleepers, stone concrete fill | 25 |
| 3 inch wood block on mastic, no fill | 10 |

**Table C-4 (cont'd.)**
**UNIT DESIGN DEAD LOADS FOR FLOOR FINISH**

| Floor finish | Pounds per square foot |
|---|---|
| 1 inch cement finish on stone concrete fill | 32 |
| 1 inch terrazzo on stone concrete fill | 32 |
| Marble and mortar on stone concrete fill | 33 |
| Linoleum on stone concrete fill | 32 |
| Linoleum on light concrete fill | 22 |
| 1½ inch asphalt mastic flooring | 18 |
| 3 inch wood block on ½ inch mortar base | 16 |
| Solid flat tile on 1 inch mortar base | 23 |
| 2 inch asphalt block, ½ inch mortar | 30 |
| 1 inch terrazzo, 2 inch stone concrete | 32 |
| Floor finish tile per inch depth | 12 |
| Cement finish per inch depth | 12 |
| Gypsum slabs per inch depth | 4 |
| Precast concrete plank per inch depth | (as determined by test) |
| Hardwood flooring per inch depth | 4 |
| Underflooring per inch depth | 3 |
| Linoleum | 2 |
| Asphalt tile | 2 |
| Brick pavers per inch thickness | 10 |

**Table C-5**
**UNIT DESIGN DEAD LOADS FOR WATERPROOFING**

| Waterproofing | Pounds per square foot |
|---|---|
| Five ply membrane | 5 |

**Table C-6**
**UNIT DESIGN DEAD LOADS FOR FLOOR FILL**

| Floor fill | Pounds per square foot |
|---|---|
| Cinder fill, per inch | 5 |
| Cinder concrete, per inch | 9 |
| Lightweight concrete, per inch | 7 |
| Sand, per inch | 8 |
| Stone, concrete, per inch | 12 |

**Table C-7**
**UNIT DESIGN DEAD LOADS FOR WOOD JOIST FLOORS**

| Wood joist floors (no plaster)—double wood floor joist sizes in inches | Pounds per square foot | |
|---|---|---|
| | 12 in. spacing | 16 in. spacing |
| 2 x 6 | 6 | 5 |
| 2 x 8 | 6 | 6 |
| 2 x 10 | 7 | 6 |
| 2 x 12 | 8 | 7 |
| 3 x 6 | 7 | 6 |
| 3 x 8 | 8 | 7 |
| 3 x 10 | 9 | 8 |
| 3 x 12 | 11 | 9 |
| 3 x 14 | 12 | 10 |

**Table C-8**
**UNIT DESIGN DEAD LOADS FOR MATERIALS**

| Materials | Pounds per cubic foot |
|---|---|
| Cast stone masonry (cement, stone, sand) | 144 |
| Cinder fill | 57 |
| Concrete, plain: | |
| Cinder | 108 |
| Expanded slag aggregate | 100 |
| Haydite (burned clay aggregate) | 90 |
| Slag | 132 |
| Stone (including gravel) | 144 |
| Vermiculite and perlite aggregate, nonloadbearing | 25-50 |
| Other light aggregate, loadbearing | 70-105 |
| Concrete, reinforced: | |
| Cinder | 111 |
| Slag | 138 |
| Stone (including gravel) | 150 |
| Earth (dry) | 96 |
| Earth (damp) | 108 |
| Earth (wet) | 120 |
| Cork | 15 |
| Masonry, ashlar: | |
| Granite | 168 |
| Limestone, crystalline | 168 |
| Limestone, oolitic | 135 |
| Marble | 173 |
| Sandstone | 144 |
| Masonry, rubble mortar: | |
| Granite | 153 |
| Limestone, crystalline | 147 |
| Limestone, oolitic | 138 |
| Marble | 156 |
| Sandstone | 137 |
| Rubble stone masonry | 156 |
| Terra cotta, architectural: | |
| Voids filled | 120 |
| Voids unfilled | 72 |
| Timber, seasoned: | |
| Ash, commercial white | 41 |
| Cypress, southern | 32 |
| Fir, Douglas, Coast region | 34 |
| Oak, commercial reds and whites | 45 |
| Redwood | 28 |
| Spruce, red, white, and Sitka | 28 |
| Southern pine, short leaf | 39 |
| Southern pine, long leaf | 48 |
| Timber, hemlock | 30 |

**Table C-9**
**UNIT DESIGN DEAD LOADS FOR ROOF AND WALL COVERINGS**

| Roof and wall coverings | Pounds per square foot |
|---|---|
| Asphalt shingles | 2 |
| Cement asbestos shingles | 4 |
| Cement tile | 16 |

Table C-9 (cont'd.)
UNIT DESIGN DEAD LOADS FOR ROOF AND WALL COVERINGS

| Roof and wall coverings | Pounds per square foot |
|---|---|
| Clay tile (for mortar add 10 lb): | |
| 2 inch book tile | 12 |
| 3 inch book tile | 20 |
| Roman | 12 |
| Spanish | 19 |
| Ludowici | 10 |
| Composition: | |
| Three ply ready roofing | 1 |
| Four ply felt and gravel | 5½ |
| Five ply felt and gravel | 6 |
| Copper or tin | 1 |
| Corrugated asbestos cement roofing | 4 |
| Fiber board, ½ inch | ¾ |
| Formed sheet steel | 1-3 |
| Formed steel decking | (see manufacturer) |
| Gypsum sheathing, ½ inch | 2 |
| Rigid insulation, ½ inch | ¾ |
| Sheet lead | 3 |
| Skylight, metal frame, ⅜ inch wired glass | 8 |
| Slate, 3/16 inch | 7 |
| Slate, ¼ inch | 10 |
| Spanish tile | 20 |
| Wood sheathing, per inch thickness | 3 |
| Wood shingles | 3 |

Table C-10
UNIT DESIGN DEAD LOADS FOR SUSPENDED CEILINGS

| Suspended ceilings | Pounds per square foot |
|---|---|
| Cement on wood lath | 12 |
| Cement on metal lath | 15 |
| Gypsum on wood or metal lath | 10 |
| Plaster on tile or concrete | 5 |
| Suspended metal lath and gypsum plaster | 10 |
| Suspended metal lath and cement plaster | 15 |
| Plaster on wood lath | 8 |

Table C-11
UNIT DESIGN DEAD LOADS FOR UNPLASTERED WALLS AND PARTITIONS

| Walls and partitions (unplastered) | Pounds per square foot |
|---|---|
| 4 inch clay brick, high absorption | 34 |
| 4 inch clay brick, medium absorption | 39 |
| 4 inch clay brick, low absorption | 46 |
| 4 inch sand/lime brick | 38 |
| 4 inch concrete brick, heavy aggregate | 46 |
| 4 inch concrete brick, light aggregate | 33 |
| 8 inch clay brick, high absorption | 69 |
| 8 inch clay brick, medium absorption | 79 |
| 8 inch clay brick, low absorption | 89 |
| 8 inch sand/lime brick | 74 |
| 8 inch concrete brick, heavy aggregate | 89 |

Table C-11 (cont'd.)
UNIT DESIGN DEAD LOADS FOR UNPLASTERED WALLS AND PARTITIONS

| Walls and partitions (unplastered) | Pounds per square foot |
|---|---|
| 8 inch concrete brick, light aggregate | 68 |
| 12 inch common brick | 120 |
| 12 inch pressed brick | 130 |
| 12 inch sand/lime brick | 105 |
| 12½ inch concrete brick, heavy aggregate | 130 |
| 12½ inch concrete brick, light aggregate | 98 |
| 17 inch clay brick, high absorption | 134 |
| 17 inch clay brick, medium absorption | 155 |
| 17 inch clay brick, low absorption | 173 |
| 17 inch sand/lime brick | 138 |
| 17 inch concrete brick, heavy aggregate | 174 |
| 17 inch concrete brick, light aggregate | 130 |
| 22 inch clay brick, high absorption | 168 |
| 22 inch clay brick, medium absorption | 194 |
| 22 inch clay brick, low absorption | 216 |
| 22 inch sand/lime brick | 173 |
| 22 inch concrete brick, heavy aggregate | 216 |
| 22 inch concrete brick, light aggregate | 160 |
| 4 inch brick, 4 inch loadbearing structural clay tile backing | 60 |
| 4 inch brick, 8 inch loadbearing structural clay tile backing | 75 |
| 8 inch brick, 4 inch loadbearing structural clay tile backing | 102 |
| 8 inch combination brick and concrete block | 72 |
| 12 inch combination brick and concrete block | 90 |
| 8 inch loadbearing structural clay tile | 42 |
| 12 inch loadbearing structural clay tile | 58 |
| 8 inch concrete block, heavy aggregate | 55 |
| 12 inch concrete block, heavy aggregate | 85 |
| 8 inch concrete block, light aggregate | 38 |
| 12 inch concrete block, light aggregate | 55 |
| 2 inch furring tile, one side of masonry wall, add to above figures | 12 |
| 4 inch hollow concrete block—stone aggregate | 30 |
| —lightweight | 20 |
| 6 inch hollow concrete block—stone aggregate | 42 |
| —lightweight | 30 |
| 8 inch hollow concrete block—stone aggregate | 55 |
| —lightweight | 38 |
| 10 inch hollow concrete block—stone aggregate | 62 |
| —lightweight | 46 |
| 12 inch hollow concrete block—stone aggregate | 85 |
| —lightweight | 55 |
| 4 inch solid concrete block—stone aggregate | 45 |
| —lightweight | 34 |
| 6 inch solid concrete block—stone aggregate | 50 |
| —lightweight | 37 |
| 8 inch solid concrete block—stone aggregate | 67 |
| —lightweight | 48 |
| 10 inch solid concrete block—stone aggregate | 84 |
| —lightweight | 62 |

Table C-11 (cont'd.)
UNIT DESIGN DEAD LOADS FOR UNPLASTERED WALLS AND PARTITIONS

| Walls and partitions (unplastered) | Pounds per square foot |
|---|---|
| 12 inch solid concrete block—stone aggregate | 108 |
| —lightweight | 72 |
| 4 inch loadbearing clay tile | 24 |
| 6 inch loadbearing clay tile | 36 |
| 2 inch nonloadbearing clay tile | 11 |
| 3 inch nonloadbearing clay tile | 18 |
| 4 inch nonloadbearing clay tile | 20 |
| 6 inch nonloadbearing clay tile | 30 |
| 8 inch nonloadbearing clay tile | 36 |
| 10 inch nonloadbearing clay tile | 40 |
| 4 inch nonloadbearing hollow concrete block | 20 |
| 6 inch nonloadbearing hollow concrete block | 30 |
| 8 inch nonloadbearing hollow concrete block | 40 |
| T.C. 1½ inch split terra cotta furring | 8 |
| 2 inch split terra cotta furring | 10 |
| 3 inch split terra cotta furring | 12 |
| 2 inch hollow gypsum block | 9½ |
| 3 inch hollow gypsum block | 10 |
| 4 inch hollow gypsum block | 15 |
| 5 inch hollow gypsum block | 18 |
| 6 inch hollow gypsum block | 24 |
| 2 inch solid gypsum block | 12 |
| 3 inch solid gypsum block | 18 |
| 4 inch solid gypsum block | 24 |
| 2 inch facing tile | 15 |
| 4 inch facing tile | 25 |
| 6 inch facing tile | 38 |
| 2 inch solid plaster | 20 |
| 4 inch solid plaster | 32 |
| 4 inch hollow plaster | 22 |
| Wood studs 2 x 4, unplastered | 4 |
| Wood studs 2 x 4, plastered one side | 12 |
| Wood studs 2 x 4, plastered two sides | 20 |
| 4 inch glass block | 18 |

Table C-12
UNIT DESIGN DEAD LOADS FOR LATH AND PLASTER PARTITIONS

| Lath and plaster partitions | Pounds per square foot |
|---|---|
| 2 inch solid cement on metal lath | 25 |
| 2 inch solid gypsum on metal lath | 18 |
| 2 inch solid gypsum on gypsum lath | 18 |
| 2 inch metal studs, gypsum and metal lath both sides | 18 |
| 3 inch metal studs, gypsum and metal lath both sides | 19 |
| 4 inch metal studs, gypsum and metal lath both sides | 20 |
| 6 inch wood studs, plaster and wood lath both sides | 18 |
| 6 inch wood studs, plaster and metal lath both sides | 18 |
| 6 inch wood studs, plaster and plaster boards both sides | 18 |
| 6 inch wood studs, unplastered gypsum board both sides (dry wall) | 10 |

Table C-13
UNIT DESIGN DEAD LOADS FOR PLASTER WORK

| Plaster work | Pounds per square foot |
|---|---|
| Gypsum (one side) | 5 |
| Cement (one side) | 10 |
| Gypsum on wood lath | 8 |
| Gypsum on metal lath | 8 |
| Gypsum on plaster board or fiber board | 8 |
| Cement on wood lath | 10 |
| Cement on metal lath | 10 |

# APPENDIX D

## UNIT WORKING STRESSES FOR ORDINARY MATERIALS

### D-100.0 General

**D-100.1 Scope:** Unless otherwise specified herein, the allowable working stresses and design capacities for ordinary materials, as defined in Sections 201.0 and 919.0, shall be reduced 10 percent below the recommended values of the standards listed in Appendix A. When the structural material is identified in regard to manufacture and grade, and the identification is accompanied by satisfactory mill tests or the strength and stress grade of the materials are otherwise confirmed to the satisfaction of the building official, the allowable working stresses and design capacity may be increased to comply with the standards.

### D-101.0 Masonry stresses

**D-101.1 Mortar for unit masonry:** Mortar for unit masonry shall comply with either the proportion specifications as set out in Section 1115.2, or shall meet the property specifications of the material standard listed in Appendix A. Unless laboratory data are presented to show that the mortar meets the requirements of the property specifications, the proportion specifications shall govern.

**D-101.2 Compressive stresses:** Except as permitted in other sections of this code, the compressive stresses in masonry shall not exceed the values as shown in Table D-101.

**D-101.3 Shear and tensile stresses:** Except as permitted in other sections of this code, the allowable shear or tensile stresses in masonry shall not exceed the values permitted in the standards listed in Appendix A.

### D-102.0 Concrete

**D-102.1 Concrete quality:** Selection of concrete proportions shall either be based on the maximum permissible water/cement ratios and minimum cement contents of Table D-102, or shall be in accordance with Chapter 4 of ACI 318 listed in Appendix A.

**D-102.2 Design strengths:** The design strengths and permissible stresses shall not exceed those in Section 1215.0 for plain concrete and in ACI 318 listed in Appendix A, subject to the 10 percent reduction specified for ordinary materials.

### D-103.0 Reinforced gypsum concrete

**D-103.1 Stresses:** When ordinary materials are used, the allowable working stresses shall be based on the following proportions, measured dry by weight with sufficient water to make a plastic mix that will fill the forms: 100 percent neat calcined gypsum; 97 percent gypsum and 3 percent wood chips, shavings or fibers; and 87.5 percent gypsum and 12.5 percent wood chips, shavings or fibers; with ultimate compressive strengths of 1,800, 1,000 and 500 psi (1.27, 0.70 and 0.35 kg/mm$^2$) respectively. The working stresses shall not exceed the values prescribed in ASTM C317 listed in Appendix A subject to the 10 percent reduction prescribed for ordinary materials.

**Table D-101**
**ALLOWABLE COMPRESSIVE STRESSES; GROSS CROSS SECTIONAL AREA PSI**
**(Except as noted)**

| Type of masonry and grade of masonry unit (psi gross area) | Type of mortar | | | |
|---|---|---|---|---|
| | M | S | N | O |
| Solid masonry of brick and other solid units of clay or shale; sand lime or concrete: | | | | |
| 8000 plus psi | 400 | 350 | 300 | 200 |
| from 4500 to 8000 psi | 250 | 225 | 200 | 150 |
| from 2500 to 4500 psi | 175 | 160 | 140 | 100 |
| from 1500 to 2500 psi | 125 | 115 | 100 | 75 |
| Grouted masonry of solid masonry units: | | | | |
| from 4500 to 8000 psi | 350 | 275 | 200 | — |
| from 2500 to 4500 psi | 275 | 215 | 155 | — |
| from 1500 to 2500 psi | 225 | 175 | 125 | — |
| Solid masonry of solid concrete masonry units: | | | | |
| 1800 plus psi | 175 | 160 | 140 | 100 |
| from 1200 to 1800 psi | 125 | 115 | 100 | 75 |
| Masonry of hollow units | 85 | 75 | 70 | — |
| Piers of hollow units, cellular spaces filled | 105 | 95 | 90 | — |
| Hollow walls (cavity or masonry bonded)[a] | | | | |
| Solid masonry units | | | | |
| 2500 plus psi | 140 | 130 | 110 | — |
| from 1500 to 2500 psi | 100 | 90 | 80 | — |
| Hollow masonry units | 70 | 60 | 55 | — |
| Stone ashlar masonry | | | | |
| Granite | 800 | 720 | 640 | 500 |
| Limestone or marble | 500 | 450 | 400 | 325 |
| Sandstone or cast stone | 400 | 360 | 320 | 250 |
| Rubble stone, coursed, rough or random | 140 | 120 | 100 | 80 |

**Note a.** On gross cross sectional area of wall minus area of cavity between wythes. The allowable compressive stresses for cavity walls are based upon the assumption that the floor loads bear upon but one of the two wythes. Where hollow walls are loaded concentrically, the allowable stresses may be increased by 25 percent.

**Note b.** 1 psi = 0.000703 kg/mm$^2$.

**Table D-102**
**MAXIMUM WATER/CEMENT RATIOS AND MINIMUM CEMENT CONTENTS**

| Specified compressive strength[a] (psi) | Minimum sacks of cement per cubic yard of concrete | Maximum permissible water/cement ratios | | | |
|---|---|---|---|---|---|
| | | Non-air entrained concrete | | Air entrained concrete | |
| | | Absolute ratio by weight | U.S. gal. per 94 lb. bag of cement | Absolute ratio by weight | U.S. gal. per 94 lb. bag of cement |
| 2500 | 5 | 0.67 | 7.6 | 0.54 | 6.1 |
| 3000 | 5½ | 0.58 | 6.6 | 0.46 | 5.2 |
| 3500 | 6 | 0.51 | 5.8 | 0.40 | 4.5 |

**Note a.** Twenty eight day strengths for cements meeting strength limits of ASTM C150, Type I, IA, II or IIA and 7 day strengths for Type III and IIIA.

**Note b.** 1 psi = 0.000703 kg/mm$^2$; 1 yd.$^3$ = 0.7646 m$^3$; 1 lb. = 0.454 kg; 1 gal. = 0.00379 m$^3$.

## D104.0 Steel reinforcement

**D-104.1 Stresses:** The design strengths and permissible stresses for reinforcement specified in ACI 318 listed in Appendix A shall be used in all reinforced construction, including reinforced concrete, reinforced gypsum concrete and reinforced masonry, subject to the 10 percent reduction specified for ordinary materials.

## D-105.0 Structural steel and cast steel

**D-105.1 Stresses:** The allowable working stresses for structural steel and cast steel contained in AISC S326 listed in Appendix A shall be used on all structural building construction, subject to the 10 percent reduction specified for ordinary materials.

## D-106.0 Cast iron

**D-106.1 Stresses:** The maximum stress for cast iron shall be as indicated in Table D-106.

**Table D-106**
**CAST IRON STRESSES**

| | Maximum stress in pounds per square inch |
|---|---|
| Tension | 3,000 |
| Extreme tension (fiber stress in bending) | 3,000 |
| Extreme compression (fiber stress in bending) | 16,000 |
| Shear | 3,000 |
| Column compression | 9,000 minus 40 *l/r* |
| Ratio *l/r* not to exceed seventy (70) | |

**Note a.** 1 psi = 0.00703 kg/mm².

## D-107 Open web steel joist

**D-107.1 Stresses:** The allowable working stresses specified for open web steel joists shall be in accordance with the SJI/AISC Standard *Specification for Open Web Steel Joists, H Series* listed in Appendix A. For all other steel joists, unless otherwise specifically approved and identified, the allowable working stresses specified by the standard shall be reduced 10 percent.

## D-108.0 Cold formed steel construction

**D-108.1 Stresses:** When ordinary materials which are not identified as to manufacture and grade are used, the allowable working stresses in the AISI *Specification for the Design of Cold Formed Steel Structural Members* listed in Appendix A shall be reduced 10 percent.

## D-109.0 Lumber

**D-109.1 Stresses:** When the grade of lumber is not identified as provided in Section 919.0 for controlled materials, the maximum allowable working stresses for the species of lumber used shall be determined in accordance with the principles for stress grade lumber as set forth in NFoPA *National Design Specifications for Wood Construction* listed in Appendix A.

# APPENDIX E

## RECOMMENDED FASTENING SCHEDULE

| Building element | Nail size and type | Number and location |
|---|---|---|
| Stud to sole plate | 8d common | 4 toe nail or |
| | 16d common | 2 direct nail |
| Stud to cap plate | 16d common | 2 toe nail or 2 direct nail |
| Double studs | 10d common | 12″ o.c. direct |
| Corner studs | 16d common | 24″ o.c. direct |
| Sole plate to joist or blocking | 16d common | 16″ o.c. |
| Double cap plate | 10d common | 16″ o.c. direct nail |
| Cap plate laps | 10d common | 2 direct nail |
| Ribbon strip, 6″ or less | 10d common | 2 each direct bearing |
| Ribbon strip, 6″ or more | 10d common | 3 each direct bearing |
| Roof rafter to plate | 8d common | 3 toe nail |
| Roof rafter to ridge | 16d common | 2 toe nail or direct nail |
| Jack rafter to hip | 10d common | 3 toe nail or |
| | 16d common | 2 direct nail |
| Floor joists to studs | 10d common | 5 direct or |
| (No ceiling joists) | 10d common | 3 direct |
| Floor joists to studs (With ceiling joists) | 10d common | 2 direct |
| Floor joists to sill or girder | 8d common | 3 toe nail |
| Ledger strip | 16d common | 3 each direct joist |
| Ceiling joists to plate | 16d common | 3 toe nail |
| Ceiling joists (laps over partition) | 10d common | 3 direct nail |
| Ceiling joists (parallel to rafter) | 10d common | 3 direct nail |
| Collar beam | 10d common | 3 direct |
| Bridging to joists | 8d common | 2 each direct end |
| Diagonal brace (to stud and plate) | 8d common | 2 each direct bearing |
| Tail beams to headers (when nailing permitted) | 20d common | 1 each end 4 sq. ft. floor area |
| Header beams to trimmers (when nailing permitted) | 20d common | 1 each end 8 sq. ft. floor area |
| 1″ roof decking (6″ or less in width) | 8d common | 2 each direct rafter |
| 1″ roof decking (over 6″ in width) | 8d common | 3 each direct rafter |

| Building element | Nail size and type | Number and location |
|---|---|---|
| 1″ subflooring (6″ or less) | 8d common | 2 each direct joist |
| 1″ subflooring (8″ or more) | 8d common | 3 each direct joist |
| 2″ subflooring | 16d common | 2 each direct joist |
| 1″ wall sheathing (8″ or less in width) | 8d common | 2 each direct stud |
| 1″ wall sheathing (over 8″ in width) | 8d common | 3 each direct stud |
| Plywood roof and wall sheathing (½″ or less) | 6d common | 6″ o.c. direct edges and 12″ o.c. intermediate |
| (⅝″ or greater) | 8d common | 6″ o.c. direct edges and 12″ o.c. intermediate |
| (5/16″, ⅜″, or ½″) | 16 gage galvanized wire staples, ⅜″ minimum crown; length of 1″ plus plywood thickness | 4″ o.c. edges and 8″ o.c. intermediate |
| (⅝″) | Same as immediately above | 2½″ o.c. edges and 5″ o.c. intermediate |
| Plywood subflooring: | | |
| (½″) | 6d common *or* 6d annular or spiral thread | 6″ o.c. direct edges and 10″ o.c. intermediate |
| (⅝″, ¾″) | 8d common *or* 6d annular or spiral thread | 6″ o.c. direct edges and 10″ o.c. intermediate |
| (1″, 1⅛″) | 10d common *or* 8d ring shank *or* 8d annular or spiral thread | 6″ o.c. direct edges and 6″ o.c. intermediate |
| (½″) | 16 gage galvanized wire staples | 4″ o.c. edges and 7″ o.c. intermediate |
| (⅝″) | ⅜″ minimum crown, 1⅝″ length | 2½″ o.c. edges and 4″ o.c. intermediate |

| Building element | Nail size and type | Number and location |
|---|---|---|
| Built up girders and beams | 20d common | 32″ o.c. direct |
| Continuous header to stud | 8d common | 4 toe nail |
| Continuous header, two pieces | 16d common | 16″ o.c. direct |
| ½″ fiber board sheathing | 1½″ galvanized roofing nail *or* 6d common nail *or* 16 gage staple, 1⅛″ long with minimum crown of 7/16″ | 3″ o.c. exterior edge, 6″ o.c. intermediate |
| 25/32″ fiber board sheathing | 1¾″ galvanized roofing nail *or* 8d common nail *or* 16 gage staple, 1½″ long with minimum crown of 7/16″ | 3″ o.c. exterior edge, 6″ o.c. intermediate |
| Gypsum sheathing | 12 gage 1¼″ large head corrosion resistive | 4″ o.c. on edge, 8″ o.c. intermediate |
| Particleboard (⅜″-½″) | 6d common | 6″ o.c. direct edges and 8″ o.c. intermediate |
| (⅝″-¾″) | 8d common | 6″ o.c. direct edges and 12″ o.c. intermediate |
| Particleboard sheathing (⅜-½″) | 6d common | 6″ o.c. direct edges and 8″ o.c. intermediate |
| (⅝″, ¾″) | 8d common | 6″ o.c. direct edges and 8″ o.c. inter-mediate |
| Shingles, wood[a] | No. 14 B&S Gage corrosion resistive | 2 each bearing |
| Weather boarding | 8d corrosion resistive | 2 each bearing |

**Note a.** Shingle nails shall penetrate not less than ¾ inch into nailing strips, sheathing or supporting construction except as otherwise provided in Section 1225.4.4.

**Table E-1**
**MAXIMUM SPACING OF GYPSUM WALLBOARD FASTENERS**
**(For nonfireresistance rated construction assemblies)[e]**

| Thickness of gypsum wallboard (inch) | Plane of framing surface | Long dimension of gypsum wallboard sheets in relation to direction of framing members | Maximum spacing of framing members (center to center in inches) | Maximum spacing of fasteners (center to center in inches) | | Nails[a] to wood[d] |
|---|---|---|---|---|---|---|
| | | | | Nails[a,b] | Screws[c] | |
| ½ | Horizontal | Either direction | 16 | 7 | 12 | No. 13 gage, 1⅜" long, 19/64" head |
| | Horizontal | Perpendicular | 24 | 7 | 12 | No. .098 gage, 1¼" long, Annular ringed 5d, cooler nail |
| | Vertical | Either direction | 24 | 8 | 12 | |
| ⅝ | Horizontal | Either direction | 16 | 7 | 12 | No. 13 gage, 1⅝" long, 19/64" head |
| | Horizontal | Perpendicular | 24 | 7 | 12 | No. .098 gage, 1⅜" long, Annular ringed, 6d cooler nail |
| | Vertical | Either direction | 24 | 8 | 12 | |
| | Fastening required with adhesive application | | | | | |
| ½ or ⅝ | Horizontal | Either direction | 16 | 16 | 16 | As required for ½" and ⅝" gypsum wallboard, see above |
| | | Perpendicular | 24 | 12 | 16 | |
| | Vertical | Either Direction | 24 | 16 | 24 | |
| 2⅜ (¾ total) | Horizontal | Perpendicular | 24 | 16 | 16 | Base ply nailed as required for ½" gypsum wallboard and face ply placed with adhesive |
| | Vertical | Either direction | 24 | 24 | 24 | |

**Note a.** Where the metal framing has a clinching design formed to receive the nails by two edges of metal, the nails shall be not less than ⅝ inch longer than the wallboard thickness, and shall have ringed shanks. Where the metal framing has a nailing groove formed to receive the nails, the nails shall have barbed shanks or be 5d cooler nail (No. 13½ gage, 1⅝ inches long, 15/64 inch head) for ½ inch gypsum wallboard; 6d cooler (No. 13 gage, 1⅞ inches long, 15/64 head) for ⅝ inch gypsum wallboard.

**Note b.** Two nails at 2 inches to 2½ inches apart may be used if the pairs are spaced 12 inches center to center except around perimeters.

**Note c.** Screws shall be No. 6 with tapered head and long enough to penetrate into wood framing not less than ⅝ inch and metal framing not less than ¼ inch.

**Note d.** All nails shall meet ASTM C514 or Federal Specification FF-N-105C.

**Note e.** For fireresistance rated construction, see the pertinent fire test information.

**Note f.** 1 inch = 25.4 mm.

Table E-2
ALLOWABLE SHEAR FOR WIND OR SEISMIC FORCES IN POUNDS PER FOOT FOR VERTICAL DIAPHRAGMS OF LATH AND PLASTER OR GYPSUM BOARD FRAME WALL ASSEMBLIES[a]

| Type of material | Thickness of material | Wall construction | Nail spacing[b] maximum (in inches) | Shear[c] value | Minimum nail size |
|---|---|---|---|---|---|
| Gypsum lath, plain or perforated | 3/8" Lath and 1/2" Plaster | Unblocked | 5 | 100 | No. 13 gage, 1 1/8" long, 19/64" head, plasterboard blued nail. |
| Gypsum sheathing board | 1/2"x2'x8' | Unblocked | 4 | 75 | No. 11 gage, 1 1/4" long, 7/16" head, diamond-point, galvanized. |
| | 1/2"x4' | Blocked | 4 | 175 | |
| | 1/2"x4' | Unblocked | 7 | 100 | |
| Gypsum wallboard or veneer base | 1/2" | Unblocked | 7 | 100 | 5d cooler nails. |
| | | | 4 | 125 | |
| | | Blocked | 7 | 125 | |
| | | | 4 | 150 | |
| | 5/8" | Blocked | 4 | 175 | 6d cooler nails. |
| | | Blocked Two ply | Base ply 9 Face ply 7 | 250 | Base ply—6d cooler nails. Face ply—8d cooler nails. |

**Note a.** These vertical diaphragms shall not be used to resist loads imposed by masonry or concrete construction. Values are for short time loading due to wind or earthquake and must be reduced 25 percent for normal loading.

**Note b.** Applies to nailing at all studs, top and bottom plates and blocking.

**Note c.** Values shown are for gypsum board applied to one side only. The shear values may be doubled when identical materials are applied to both sides of wall.

**Note d.** 1 inch = 25.4 mm.

# APPENDIX F

## METRIC EQUIVALENTS

1 inch equals 25.4 millimeters
1 foot equals 304.8 millimeters
1 square inch equals 645.16 square millimeters
1 square foot equals 0.093 square meters
1 cubic foot equals 0.028 cubic meters
1 cubic yard equals 0.765 cubic meters
1 gallon equals 0.00379 cubic meters
1 pound (avdp.) equals 0.454 kilograms
1 ton equals 0.907 metric ton or 907.2 kilograms
1 pound per square inch equals 6.895 kilo-Pascals or 0.000703 kilogram per square millimeter
1 pound per foot equals 1.489 kilograms per meter
1 pound per square foot equals 47.88 Pascals or 4.882 kilograms per square meter
1 pound per cubic foot equals 16.02 kilograms per cubic meter
1 foot per minute equals 0.00508 meters per second
1 inch per ton equals 0.028 millimeters per kilogram
1 cubic foot per square foot equals 0.301 cubic meters per square meter
1 gallon per minute per square foot equals 0.00068 cubic meters per second per square meter
1 gallon per minute equals 0.0000631 cubic meters per second
1 mile per hour equals 0.447 meters per second
1 cubic foot per minute equals 0.0004719 cubic meter per second
1 foot candle equals 10.764 lux
1 inch water column (at 60 degrees F.) equals 248.84 Pascals
1 ton per square foot equals 9765 kilograms per square meter
1 degree (angle) equals 0.01745 radian
1 Btu per hour per square foot per degree F. equals 5.678 Watts per square meter per degree K
1 Btu per hour equals 0.2931 Watt
1 Btu per cubic foot equals 10.468 Watts per cubic meter
Temperature (degrees C.) equals [temperature (degrees F.) -32] divided by 1.8
1 degree F. per minute equals 0.00926 degrees C. per second

# APPENDIX G

## ABOUT THE BOCA ORGANIZATION

Founded in 1915, Building Officials and Code Administrators (BOCA) International, Inc., is a nonprofit service organization dedicated to professional code administration and enforcement for the protection of public health, safety and welfare. BOCA's objectives span both public and professional interests, and the organization's primary activities include the following:

- To serve the public's need for sound and progressive construction regulation through promulgation of the *BOCA Basic Code* series of model regulatory construction codes. The *BOCA Basic Codes* are performance oriented model codes responsive to the latest advancements in construction technology.
- To serve governmental units, code administration personnel, and related building industry professionals by providing authoritative technical, educational and informational services relating to all speciality areas of code administration and enforcement.

The nation's oldest professional association for regulatory code officials, BOCA currently serves a membership that includes both regulatory officials and a wide variety of private sector building and construction professionals. This broad membership base of professional participation assists in maintaining the *BOCA Basic Codes* as responsive consensus documents published and promulgated in the public interest.

### The *BOCA Basic Codes*

BOCA's complete model code services program is dedicated to the improvement of building regulations, and the effective administration, organization, and methods of enforcement of these regulations by professionally staffed state and local governmental units.

To accomplish this, BOCA provides a complete model code services package, the "backbone" of which is the *BOCA Basic Codes* series. *BOCA Basic Codes,* available in completely revised and updated 1981 editions, include the *Basic Building Code, Basic Mechanical Code, Basic Plumbing Code, Basic Fire Prevention Code, Basic Property Maintenance Code* and *Basic Energy Conservation Code.*

### Democratic *Basic Code* revision

The *BOCA Basic Codes* are maintained in their current, responsive state through a democratic public hearing and revision procedure which allows all interested parties the opportunity to both propose changes to code provisions and testify regarding such change proposals. Change proposals to the *BOCA Basic Codes* are either accepted or rejected by vote of the organization's active membership, which consists of practicing regulatory code officials. Voting on change proposals is conducted at the organization's Annual Conference, at which time final testimony is heard. Public hearings on

proposed code changes are held prior to the Conference at the annual BOCA Mid-Winter Meeting.

All of the *BOCA Basic Codes* are completely revised and published in new editions every three years. During each of these three years, voting on proposed code changes is conducted. Code changes from the first two years of revision activity are published in annual supplements. This supplement material, along with the results of the third year's code change activity, is then incorporated directly into the next edition of the code.

This procedure is maintained for its responsiveness to our rapidly advancing building technology, and for its ability to retain code content in the hands of professional regulatory code officials and above the reach of various special interests. The *BOCA Basic Codes* are designed to protect public health, safety and welfare through efficient and effective use of available materials and current building technology.

### Other BOCA publications

In addition to the *BOCA Basic Code* series, the BOCA organization publishes a variety of other publications useful to professional building departments and code personnel. These include *The Building Official and Code Administrator* Magazine, a wide and complete variety of building department forms and permits, textbooks and handbooks regarding code administration and enforcement, and code agency organizational recommendations. Along with the magazine, BOCA membership benefits include the BOCA *Bulletin,* copies of all Research Reports issued by BOCA's Research and Evaluation Service, and draft copies of all proposed code changes and proposed new code publications.

### Technical services

BOCA's Technical Service Department offers a variety of engineering services to BOCA members and building industry firms and manufacturers. These include Plan Examination services, Research and Evaluation services, Follow Up Inspection services, consultations and special studies, and no-charge code interpretations for BOCA members.

### For further information

For specific information regarding BOCA publications or services, write: Building Officials and Code Administrators International, Inc., 17926 South Halsted Street, Homewood, Illinois 60430, or phone (312) 799-2300.

# APPENDIX H

## APPEALS AND INTERPRETATIONS

### SUMMARY OF APPEAL DECISION
### IN RE: CLAY COUNTY HEALTH DEPARTMENT BUILDING

The Appeals Committee found that the installation of a $25,000 elevator to serve a 2,000 square foot second floor addition would be an unnecessary hardship where equivalent facilitation and protection was secured by full access to the ground floor which provided program access, and held that the facility was exempt from the literal requirements of the *Kentucky Building Code,* Section 515.0, in that the 2,000 square foot second floor addition could be constructed without an elevator.

### SUMMARY OF APPEAL DECISION
### IN RE: THE CUBBARD RESTAURANT

In a proposed remodeling of a 772 square foot retail store into a restaurant located on a severe sloping street, the Appeals Committee found that:

1. A concrete ramp leading to the entrance would create a hazardous situation for persons using the sidewalk.
2. Separate handicapped restroom facilities would not be feasible due to the overall size of the building.
3. There would be great practical difficulties in carrying out the structural and mechanical requirements to accommodate the physically handicapped in accordance with the *Kentucky Building Code,* Section 515.0. The committee held that the building would be permitted to be remodeled without application of the construction requirements to accommodate the physically handicapped.

### SUMMARY OF APPEAL DECISION
### IN RE: SMITH'S TRANSFER CORPORATION

A freight transfer station expansion was proposed which would cause the structure to exceed the area limitations for unsprinklered buildings. The facility was manned and operated 24 hours a day, seven days a week. It was 200 feet from the nearest building and essentially centered on a 20 acre lot. It was accessible by paved apron on all four sides. A continually operating oval towveyor system served the facility and was to be expanded to serve the addition. The facility was to be of unprotected noncombustible construction.

The Appeals Committee held:

1. That the existing structure was insufficient to support the weight of a charged sprinkler system.
2. A sprinkler system would be detrimental to the existing facility in that it would overload the structural capacity.

3. The peculiar operation of the towveyor system would render a firewall impractical.

The addition was approved without a sprinkler for the whole structure provided:

1. An additional exit door was added;
2. There was no more than 200 feet of travel distance to an exit;
3. A manual fire alarm with pull stations at all exits connected to an automatic fire detection and alarm system with notification to the fire department is installed;
4. Emergency lighting is installed;
5. Illuminated exit signs are installed; and
6. The round the clock operation is maintained.

## SUMMARY OF APPEAL DECISION IN RE: ROWAN COUNTY BOARD OF EDUCATION

An appeal to delete the sprinkler requirement for the gymnasium portion of a 126,000 square foot school building of Type 2C construction because the appellant believed the system would be ineffective in saving lives or property was denied by the Appeals Committee.

## SUMMARY OF APPEAL DECISION IN RE: BAILLIE LUMBER COMPANY

The Appeals Committee approved the construction of three separate structures (40,000 square feet, 22,000 square feet and 19,000 square feet) without sprinkler systems to be used for grading, drying and storing of rough sawn hardwood lumber by a very few number of employees. The location of the site and placement of the structures would insulate adjacent property from hazards resulting from a potential fire. The local fire chief expressed his written approval, provided, however, that full emergency vehicle accessibility to all sides of the building as well as to the interiors of the structures was maintained at all times, that a 100 percent approved automatic smoke detection system was installed and interconnected to the local fire department, additional fire hydrants were added and the construction of the building met all the other requirements of Type 2C construction.

## SUMMARY OF APPEAL DECISION IN RE: BELDEN CORPORATION

The Appeals Committee denied a request to allow construction of a wire manufacturing plant without the installation of smoke vents, but in later proceedings approved, in lieu of the roof smoke vents, a specific mechanical exhaust system for smoke control designed by a registered Kentucky professional engineer.

## SUMMARY OF APPEAL DECISION IN RE: ST. JOSEPH HOSPITAL

The Appeals Committee decided that the department had properly interpreted Section 128.0 of the *Kentucky Building Code* by reviewing plans for St. Joseph's Hospital under the Life Safety Code.

## SUMMARY OF APPEAL DECISION IN RE: THE GRW BUILDING

The Appeals Committee held that the elevators in question were in substantial compliance with the safety laws of the state and did not require that the side exit doors be made operable.

## SUMMARY OF APPEAL DECISION IN RE: THE MARTIN TWIN THEATERS

The Appeals Committee held that the requirement for a three minute air change does not apply to an open projection booth using a xenon lamp projector and allowed two of the three required exits to be on the same side of the auditorium separated as much as reasonably possible.

## SUMMARY OF APPEAL DECISION IN RE: THE MERRILL LYNCH BUILDING

The Appeals Committee held that while side exit doors do add a measure of safety, the elevators in this particular building and this particular configuration could be safely operated without side exit doors.

## SUMMARY OF APPEAL DECISION IN RE: BALLANGER TIRE SERVICE

The Appeals Committee held that where there was a 12 inch fire separation wall between the tire storage area and the service and office area with corresponding rated doors, where there was no heating to be provided in the tire storage area, and where the committee found no increased danger to the employees, the construction was approved without a sprinkler system because under all circumstances the cost of installing a sprinkler system and reservoir would work an unreasonable hardship. Section 1202.6 was interpreted not to require a fire suppression system.

## SUMMARY OF APPEAL DECISION IN RE: THE UNIVERSITY OF LOUISVILLE LIBRARY

The Appeals Committee approved a specific alternative plan to provide accessibility upon the recommendation of the Architectural Barriers Advisory Committee which had reviewed the plans and visited the library.

## SUMMARY OF APPEAL DECISION IN RE: SILVER CREEK BAPTIST CHURCH

The Appeals Committee approved a two story classroom addition of approximately 1,900 square feet to be constructed of woodframe with brick veneer without a sprinkler system as long as all other code requirements were met, an automatic smoke detector was installed throughout and there was a two hour fire separation between the addition and the existing building so long as the primary use of the addition was for church classrooms for approximately one hour on Sundays.

## SUMMARY OF APPEAL DECISION IN RE: THE REDBANKS TOWERS

The Appeals Committee held that full compliance with the *National Electrical Code* receptacle placement provisions under the particular circumstances was unreasonable.

## SUMMARY OF APPEAL DECISION IN RE: HON INDUSTRIES

The Appeals Committee denied an appeal requesting the elimination of the requirement for a three hour firewall between a proposed addition and existing buildings and the requirement that structural elements be protected by a one hour fire rated covering or added sprinkler system.

## KENTUCKY BUILDING CODE
## OFFICIAL INTERPRETATION NO. 1

**FROM:** Jack M. Rhody
Chief Building Code Official

**RE:** Kentucky Building Code, page 69
Table 401, Line 11

**Question:** Line 11 of Table 401 requires various fireresistance ratings of structural elements in the different types of construction. Is it the intent of the *(Kentucky) Basic Building Code* that only *tested roof/ceiling* assemblies can comply? If so, how does a trussed roof system meet this provision?

**Answer:** Yes, it is the intent of the code that a fireresistance rating can only be applied to assemblies which have been tested in a specific manner. For example, in 4A type of construction with a truss roof system, there is no tested assembly for a one hour roof/ceiling assembly. Therefore, if a truss system is to be employed in a 4A structure and will require a one hour assembly, some method of equivalency must be sought. This can often be accomplished by using the ceiling membrane of a rated roof/ceiling assembly which provides an equivalent protection to the bottom chord of the truss. An assembly which provides a finish rating of 60 minutes or more can be utilized to determine equivalency.

## KENTUCKY BUILDING CODE
## OFFICIAL INTERPRETATION NO. 2

**FROM:** Jack M. Rhody
Chief Building Code Official

**RE:** Article 14, Section 1409.1.2
Separation Walls in Condominiums

It is the interpretation of this office that in residential buildings constructed in a townhouse or rowhouse design, and where a common wall sets on a property line, the wall will not be classified as a party wall. This will be the case regardless of whether the building is a newly constructed condominium or an apartment complex being converted to condominiums. The common walls may be fire separation walls except when area limits are exceeded and a firewall is required by the *Kentucky Building Code.*

## KENTUCKY BUILDING CODE
## OFFICIAL INTERPRETATION NO. 3

**FROM:** Jack M. Rhody
Chief Building Code Official

**RE:** Article 8, Section 810.4.1
Closures on Rated Corridor Doors
in Educational Occupancy

Door closures are required on classroom doors opening into rated corridors in newly constructed and remodeled educational facilities. This is a reversal of our policy used prior to the adoption of the *Kentucky Building Code* but is definitely the intent of the newly adopted code.

## KENTUCKY BUILDING CODE
## OFFICIAL INTERPRETATION NO. 4

**FROM:** Jack M. Rhody
Chief Building Code Official

**RE:** BOCA Basic Mechanical Code, M-301.0
and National Electric Code, 800-3(d)
Listed wire allowed in air plenums

Wiring may be installed in an air plenum space providing it bears the label of an approved testing agency indicating that it meets the provisions of the *National Electric Code,* Section 800-3(d).

# APPENDIX I

## EXCERPTS FROM ARCHITECTS AND ENGINEERS REGISTRATION LAWS AMENDED BY 1982 KENTUCKY GENERAL ASSEMBLY

**KRS 322.550.** If the drawings and specifications are signed by the authors thereof with the true titles of the occupations as may be required by law, the following buildings and additions to buildings, classified by use group, shall require the services of a professional engineer or architect registered in the Commonwealth of Kentucky:

(1) Factory and industrial use groups having a capacity of 100 persons or more;

(2) High hazard use group, regardless of capacity;

(3) Storage use group having a capacity of 100 persons or more.

**KRS 323.010.** As used in this chapter (KRS 323) unless the context requires otherwise:

(1) "Board" means the state board of examiners and registration of architects of Kentucky;

(2) An "architect" is any person who engages in the practice of architecture as hereinafter defined;

(3) The "practice of architecture" is the rendering or offering to render certain services, hereinafter described, in connection with the design and construction of a structure or group of structures which have as their principal purpose human habitation or use, and the utilization of space within and surrounding such structures. The services referred to in the previous sentence include planning, providing preliminary studies, designs, drawings and specifications and administration of construction contracts;

(4) A "building" is a structure which has as its principal purpose human habitation or use;

(5) "Use group" is the classification of a building or structure based on the purpose for which it is used, as set forth in the *Kentucky Building Code;*

(6) "Consultant" is an individual, partnership, or firm acting subordinately and in a position of service to an architect engaged in the practice of architecture as defined.

**KRS 323.030.** Persons and buildings to which chapter does not apply:

(1) A nonresident licensed to practice architecture in his own state or country but not in the Commonwealth and having no established place of business in the Commonwealth may act solely as a consulting associate of an architect licensed in the Commonwealth;

(2) An architect acting solely as an officer or employee of the United States government is not required to be licensed in the Commonwealth;

(3) A licensed professional engineer may prepare plans and specifications for and supervise the construction of structures as an incident to the practice of his own profession;

(4) If the drawings and specifications are signed by the authors thereof with the true titles of their occupations as may be required by law, this chapter does not apply to:

(a) Any building which is to be used for farm purposes only;

(b) Any building containing not more than 20,000 square feet total floor area, except:

1. An asylum, hospital, nursing or convalescent home, or home for the aged, regardless of capacity;

2. A school or educational institution, regardless of capacity;
3. A residential building containing more than 12 bedrooms;
4. A place of assembly, having a capacity in excess of 100 persons or churches having a capacity in excess of 400 persons or 6,000 square feet of total floor space;
5. A mercantile building having a capacity in excess of 100 persons;
6. An industrial building having a capacity in excess of 100 persons; and
7. An office building having a capacity in excess of 100 persons;

(c) Alterations to any building to which this chapter does not apply, if the alterations do not involve changes affecting structural safety.

**KRS 323.031.**

(1) If the drawings and specifications are signed by the authors thereof with the true titles of their occupations as may be required by law, this chapter (the architects registration law) does not apply to:

(a) Any building which is to be used for farm purposes only;
(b) Any building classified by use group other than those listed under this act;
(c) Any structure not classified as a building by KRS 323.010(4).

(2) Provisions of this chapter shall not apply to:

(a) Any individual, partnership, or firm acting solely as a consultant to an architect licensed in the Commonwealth;

(b) An architect or other person acting solely as an officer or employee of the United States government.

**KRS 323.033.**

(1) Except as otherwise provided hereinafter, the following buildings, or additions to existing buildings, classified by use group, shall require the services of an architect licensed in the Commonwealth of Kentucky.

(a) Assembly use group having a capacity of 100 persons or more;
(b) Business use group having a capacity of 100 persons or more;
(c) Institutional use group, regardless of capacity;
(d) Mercantile use group having a capacity of 100 persons or more;
(e) Residential use groups of more than 12 dwelling units or having a capacity of 50 persons or more;
(f) Mixed use group containing one or more of the use group classifications and capacities listed under paragraphs (a) through (c) of this subsection.

(2) Alterations or new construction requiring compliance with the *Kentucky Building Code* for any building containing one or more of the use group classifications and capacities listed under subsection (1) of this section shall require the services of an architect licensed in the Commonwealth of Kentucky; except that, when such alterations or new construction predominantly involves primarily structural components or mechanical or electrical systems, services may be performed by one or more licensed professional engineers.

(3) Buildings, or additions to existing buildings, containing one or more of the use group classifications and capacities listed under subsection (1) of this section shall require, in addition to the services of an architect, the services of one or more licensed engineers.

(4) The following buildings and additions to existing buildings, classified by use group, shall require the services of either an architect or a professional engineer registered in the Commonwealth of Kentucky.

(a) Factory and industrial use group having capacity of 100 persons or more;
(b) High hazard use group, regardless of capacity;
(c) Storage use group having a capacity of 100 persons or more.

**KRS 323.095.** Seal required; use

(1) Each architect licensed for practice within the Commonwealth shall secure an embossed circular seal of the design prescribed by regulation of the board;

(2) All working drawings, specifications and reports prepared by, or under the supervision of the individual, partnership or firm, must bear the imprint of this seal;

(3) No architect shall sign or affix his seal to any drawings, specifications or reports which have not been prepared under his immediate supervision.

**NOTE:** Copies of the complete text of the statutes and regulations are available from the Kentucky State Board of Examiners and Registration of Architects, 2216 Young Drive, Suite 3, P.O. Box 22097, Lexington, Kentucky 40522 or Kentucky State Board of Registration of Professional Engineers and Land Surveyors, P.O. Box 612, Frankfort, Kentucky 40602.

# APPENDIX J

## ACCESSIBILITY DIAGRAMS

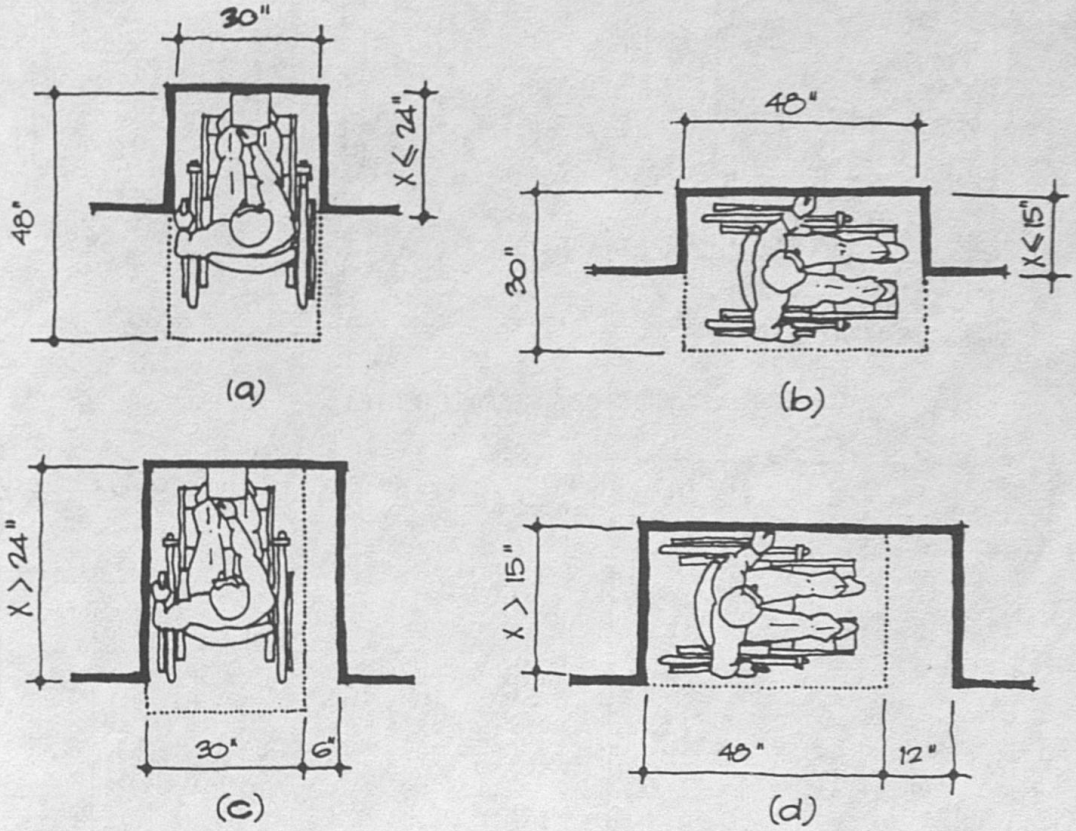



Figure 1
CLEAR FLOOR SPACE IN ALCOVES

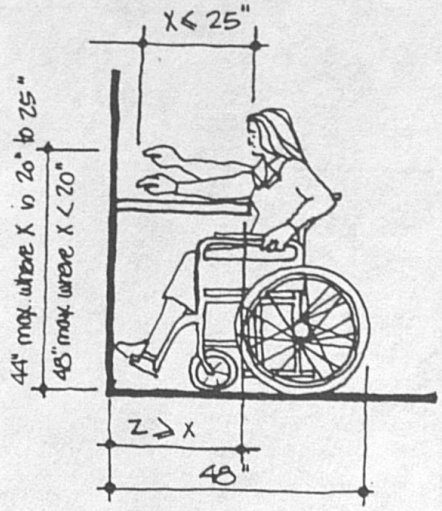



Figure 2
MAXIMUM FORWARD REACH
OVER AN OBSTRUCTION

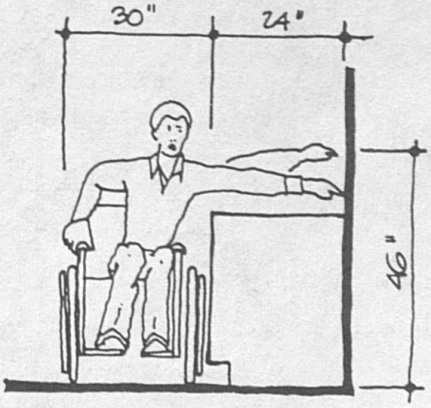



Figure 3
MAXIMUM SIDE REACH
OVER AN OBSTRUCTION

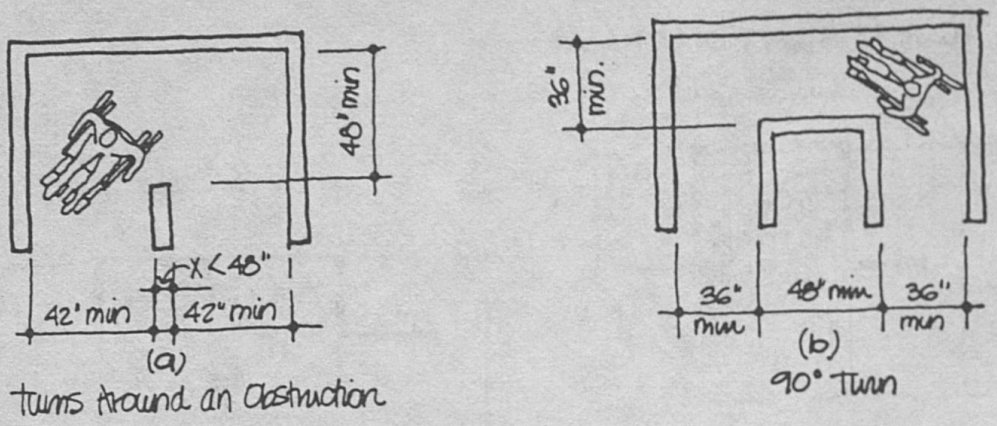



Figure 4
WIDTH OF ACCESSIBLE ROUTE

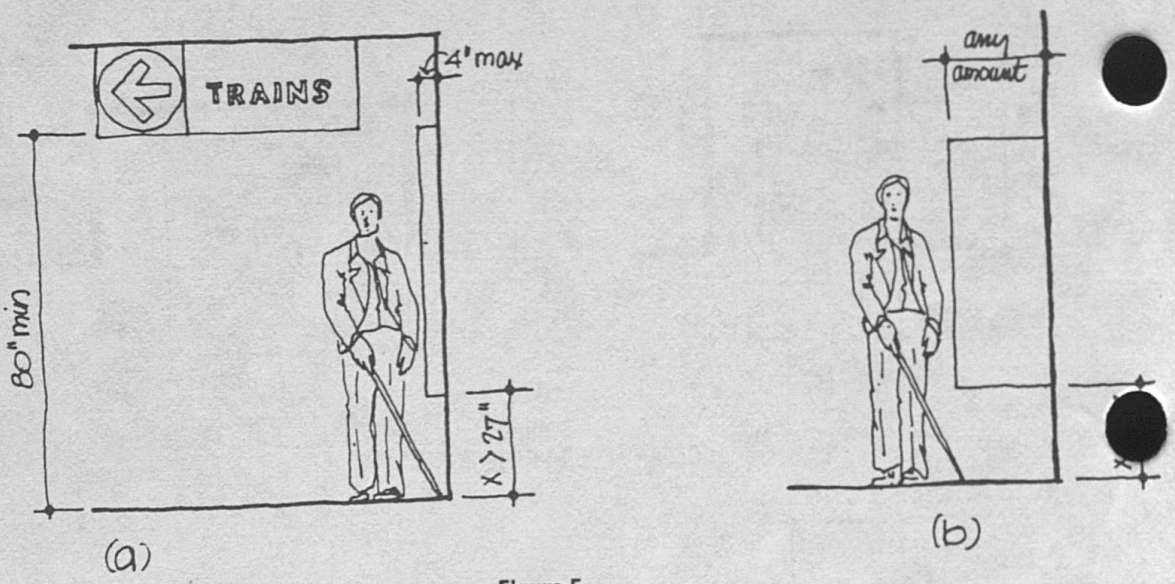



Figure 5
PROTRUDING OBJECTS

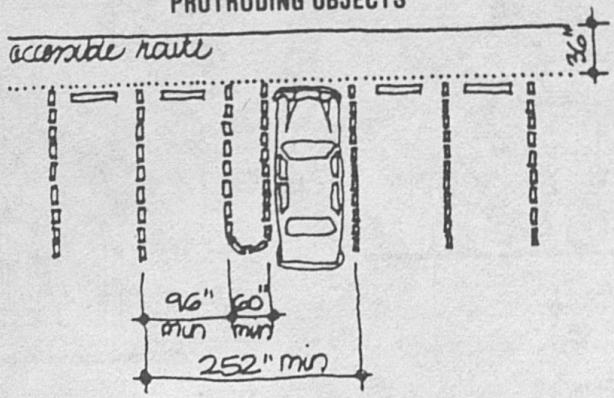



Figure 6
DIMENSIONS OF PARKING SPACES

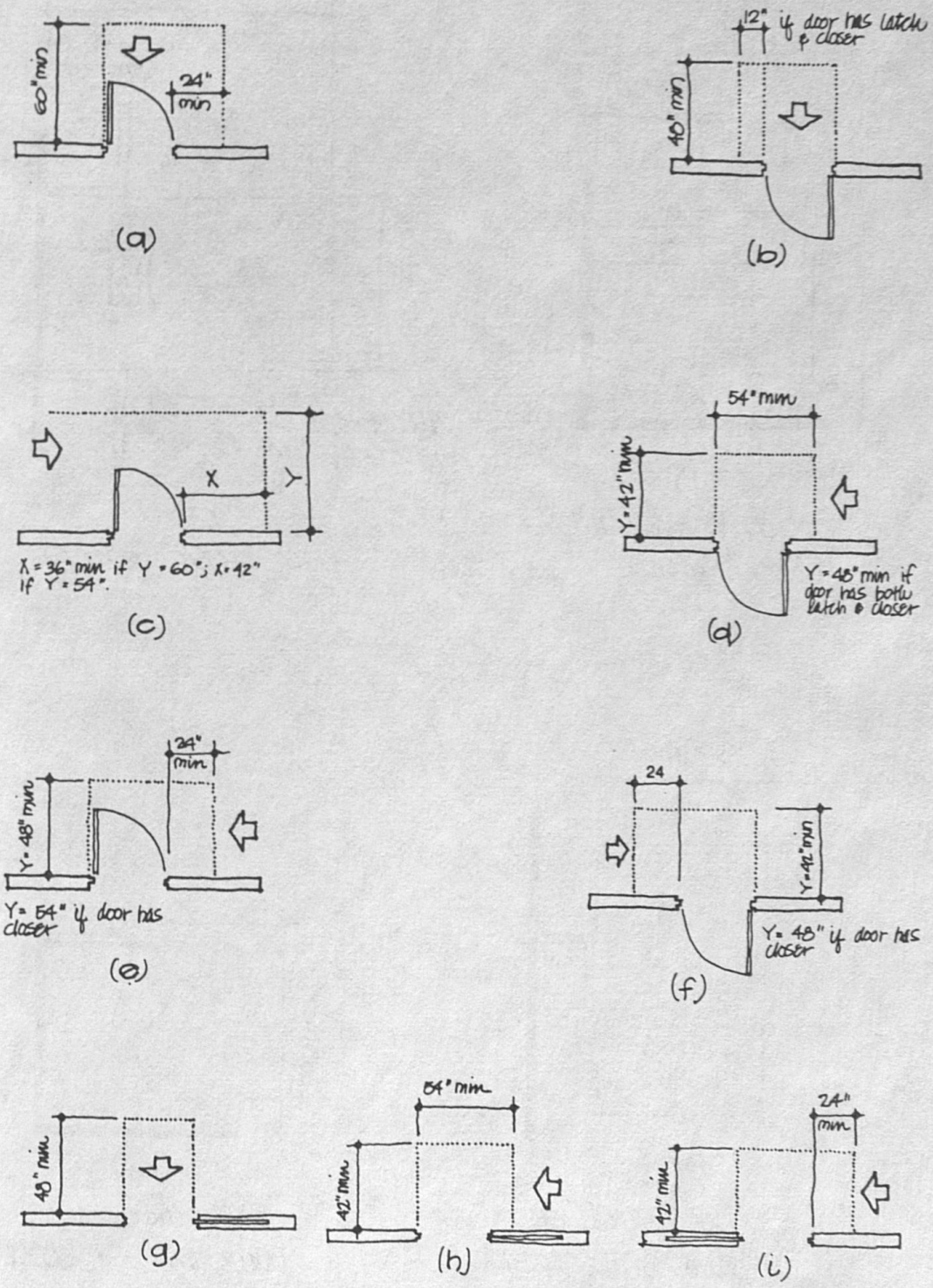
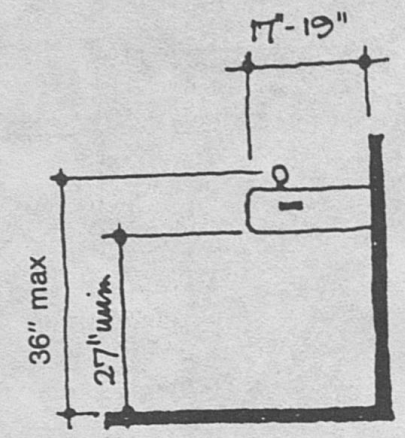
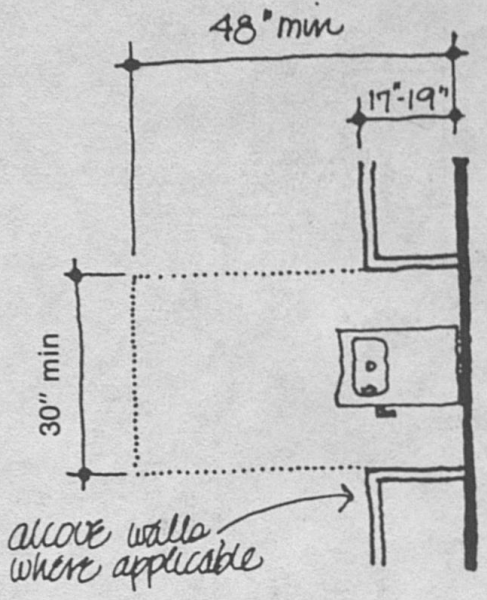


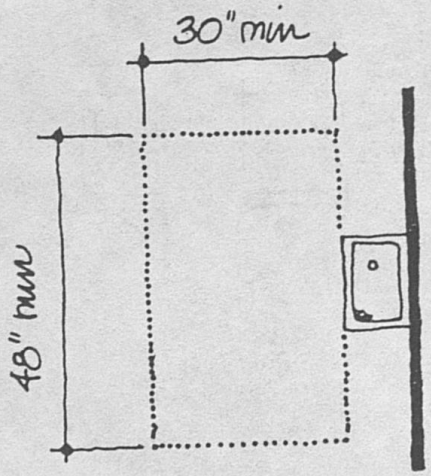

**Figure 7**
**MANEUVERING CLEARANCES AT DOORS**



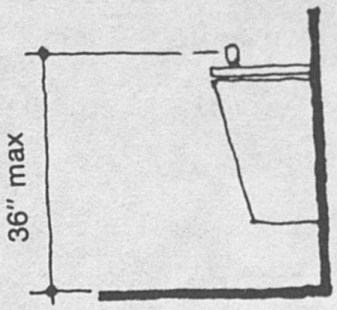

(a)
Spout Height and Knee Clearance




(b)
Clear Floor Space




(c)
Free Standing Fountain or Cooler




(d)
Free Standing Fountain or Cooler

Figure 8
DRINKING FOUNTAINS AND WATER COOLERS

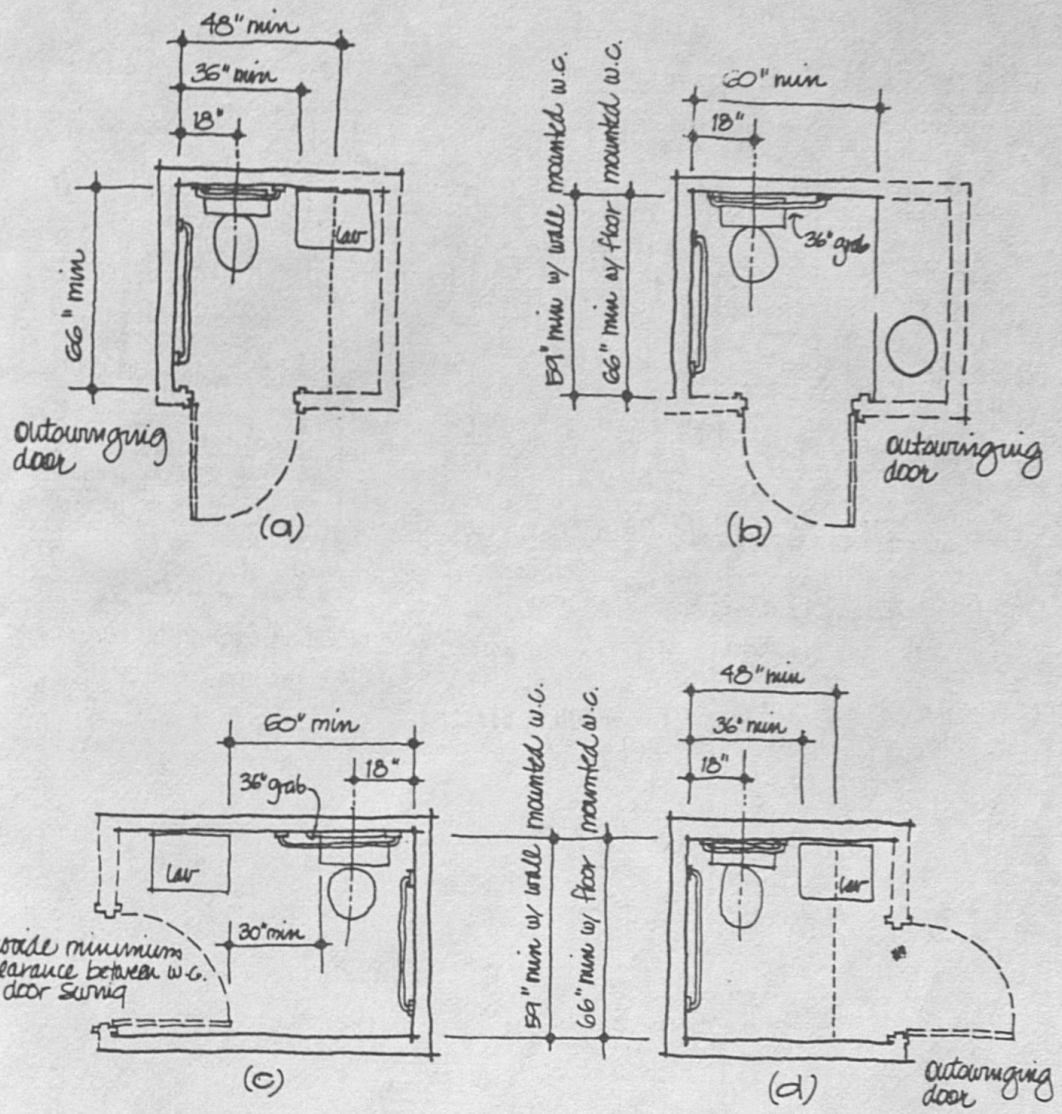



**Figure 9**
**CLEAR FLOOR SPACE AT WATER CLOSETS**

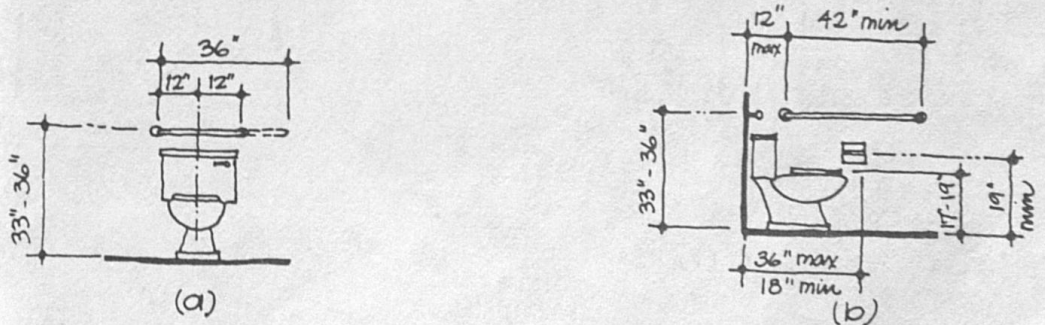



**Figure 10**
**GRAB BARS AT WATER CLOSETS**

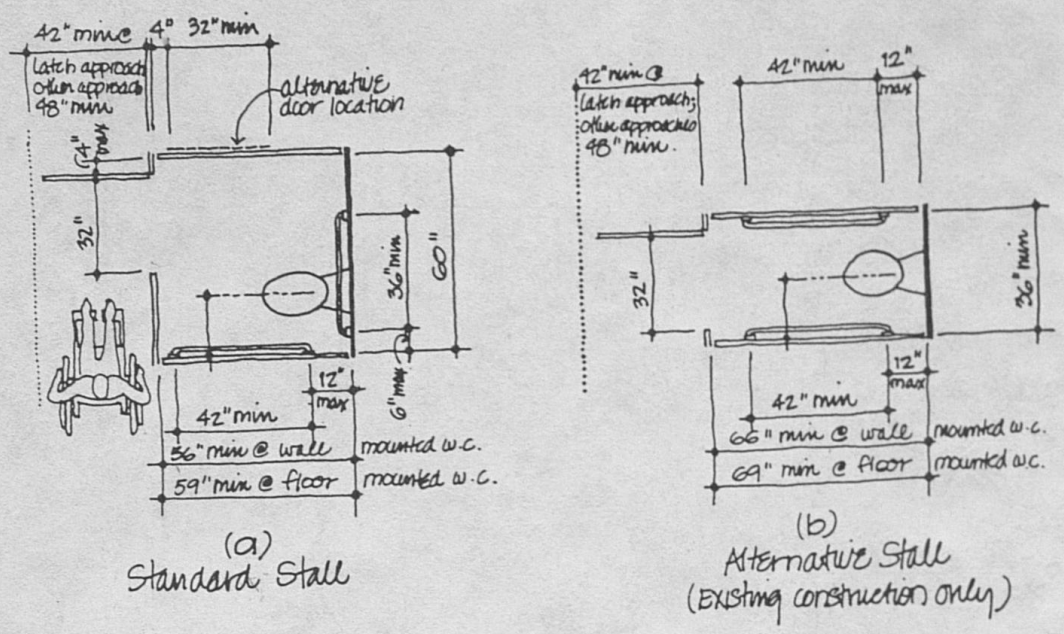



**Figure 11**
**TOILET STALLS**

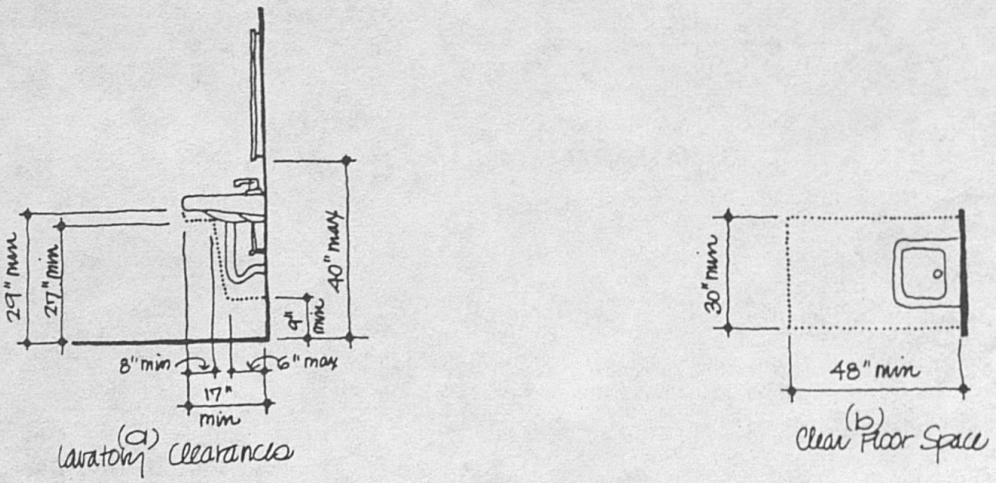



**Figure 12**
**LAVATORIES**

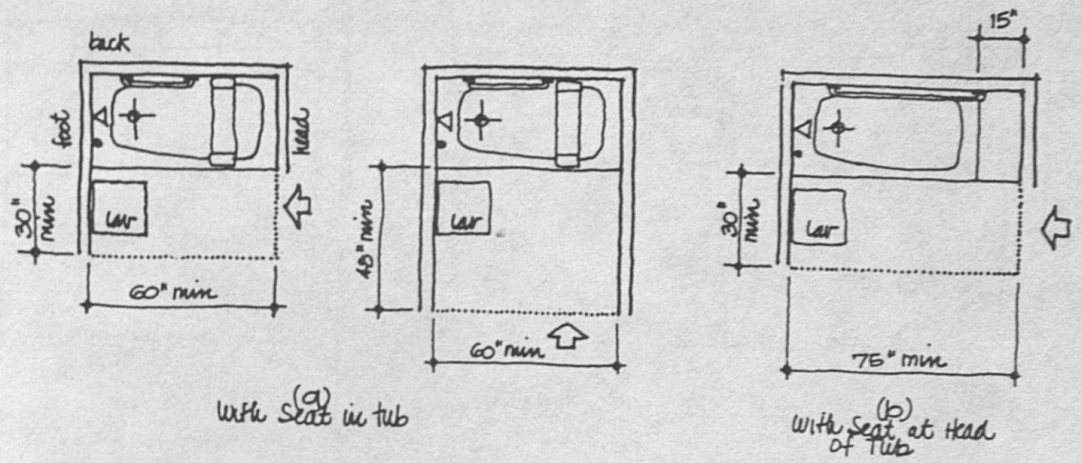



Figure 13
CLEAR FLOOR SPACE AT BATHTUBS

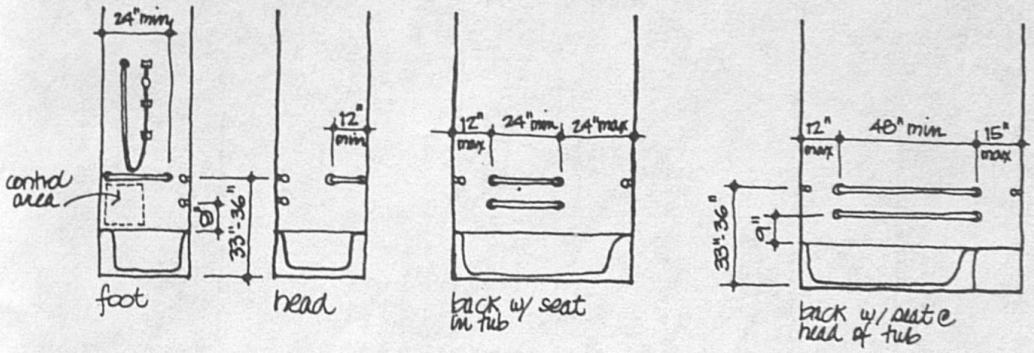



Figure 14
GRAB BARS AT BATHTUBS

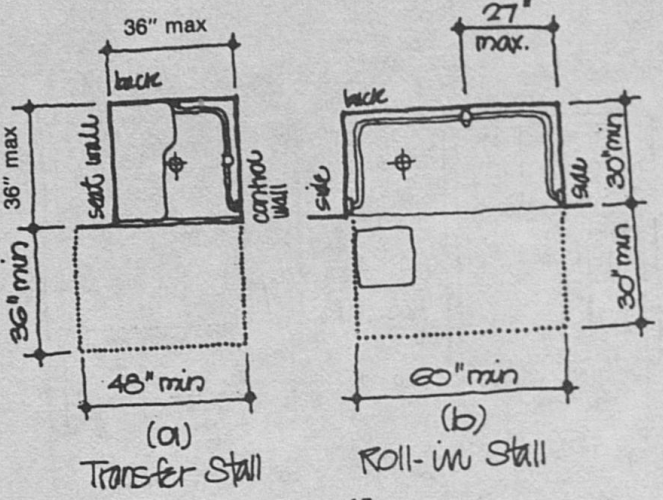



Figure 15
SHOWER SIZE AND CLEARANCES

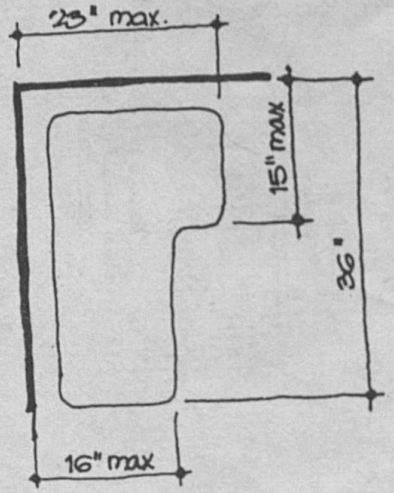
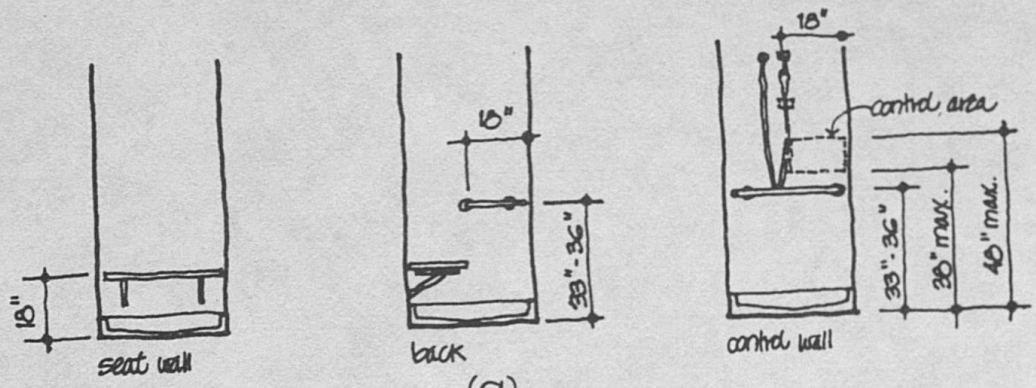



Figure 16
SHOWER SEAT DESIGN



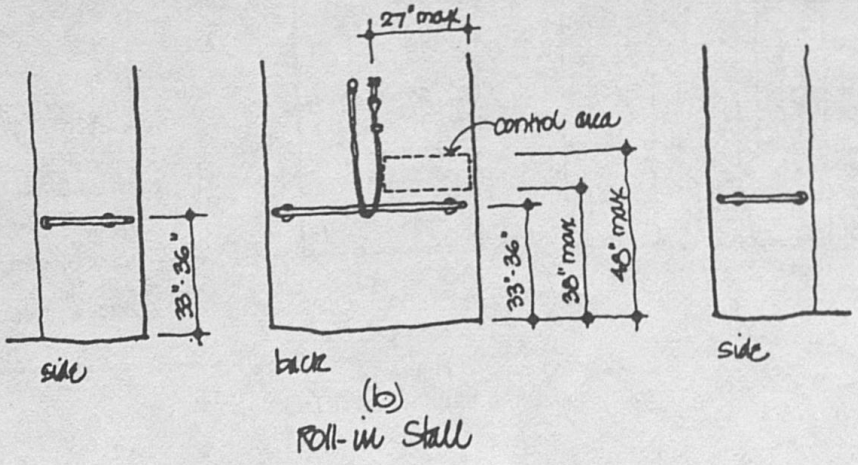




Figure 17
GRAB BARS AT SHOWER STALLS

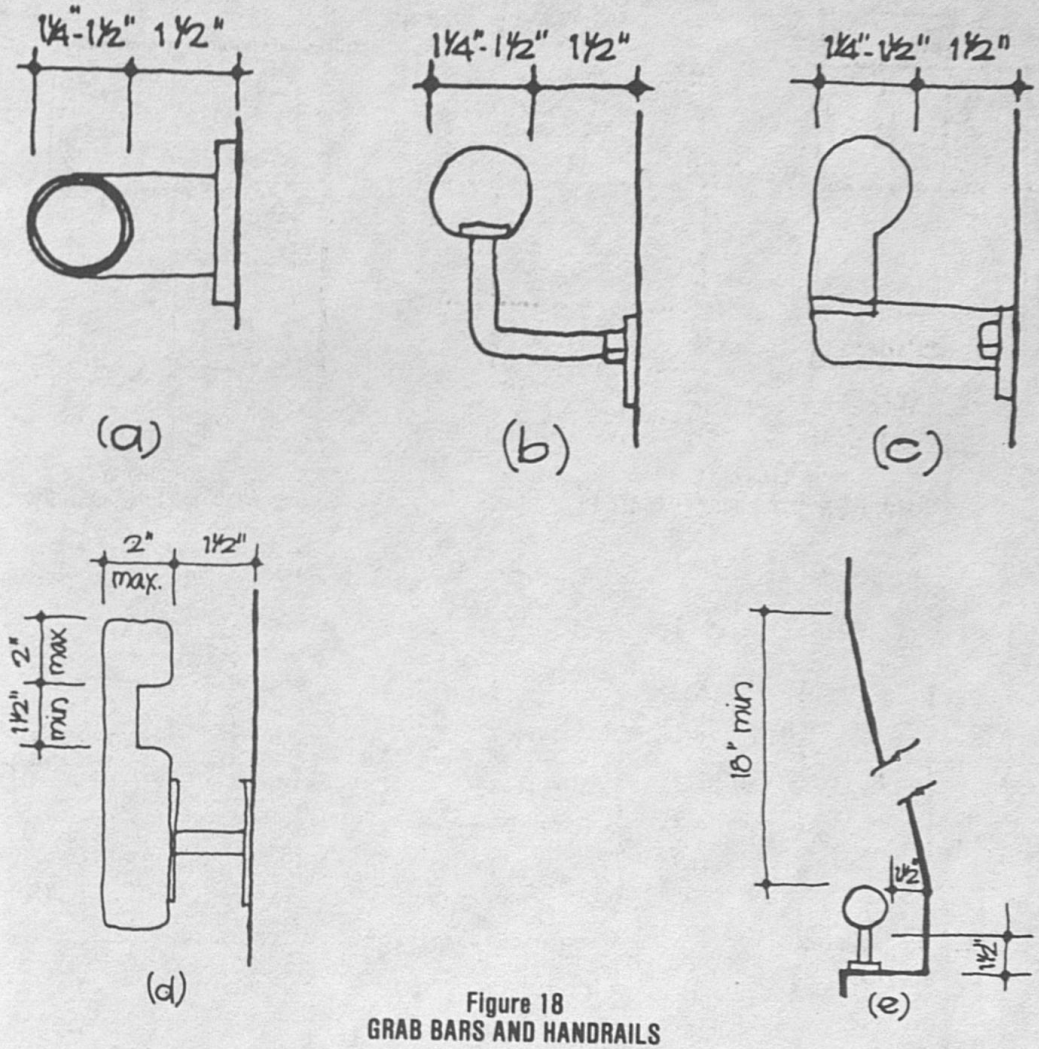



Figure 18
GRAB BARS AND HANDRAILS

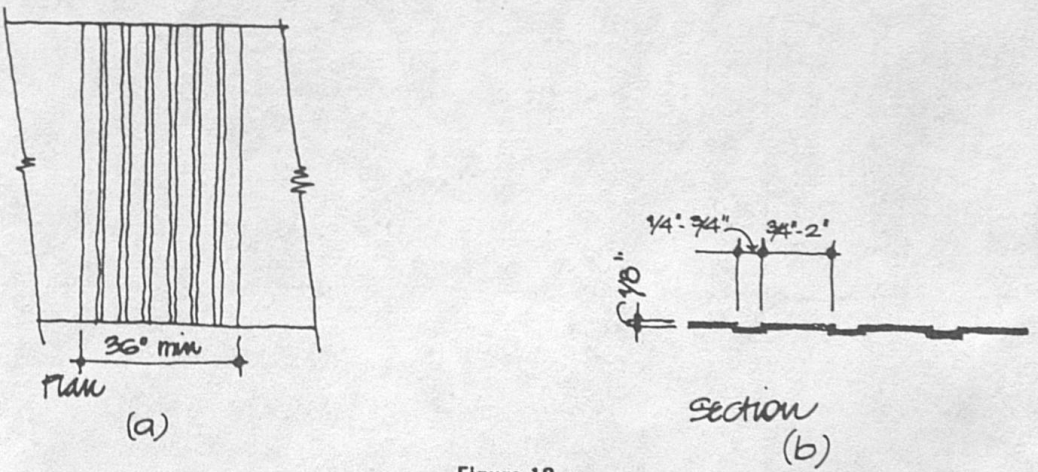



Figure 19
TACTILE WARNINGS ON WALKING SURFACES

# APPENDIX K

## FEE SCHEDULE

### 815 KAR 7:012 DEPARTMENTAL PLAN REVIEW FEES

**Section 1. Submission of plans and fees:**

(1) All plans and specifications required to be submitted to the department under the *Kentucky Building Code* shall be accompanied by the applicable fee as set forth in this regulation, rounded to the nearest dollar.

(2) All fees required herein shall be in check form payable to the Kentucky State Treasurer.

(3) No approval for construction shall be issued by the department until all required fees have been paid.

(4) The plan review fees required by this regulation are intended to cover the cost of corresponding inspections for compliance with such plans.

**Section 2. New construction:**

(1) Departmental plan review fees for new buildings shall be calculated by multiplying the total square footage times the cost per square foot of each occupancy type as listed in the following table. Total square footage will be determined by the outside dimensions of the building. Minimum fee for review of plans under this section will be $50.00:

| Occupancy type | Cost per square foot |
|---|---|
| Residential (excluding single family dwellings and duplexes) | 2¢ |
| Assembly occupancies | |
| Nightclub/restaurants | 3.5¢ |
| All other assembly | 3¢ |
| Educational | 2¢ |
| Day care centers | 2¢ |
| Business | 2¢ |
| Mercantile | 2¢ |
| Industrial factories | 2¢ |
| Warehouses | 1.5¢ |
| Institutional | 2.5¢ |
| Frozen food plants | 2¢ |
| High hazard | 3¢ |
| All other nonresidential | 2¢ |

(2) Plan review fees for additions to existing buildings, which do not require the entire building to conform to the *Kentucky Building Code,* shall be calculated in accordance with subsection (1) by the measurement of the square footage of the addition, only, as determined by the outside dimensions of the addition. Minimum fee for review of plans under this section will be $50.00.

(3) Plan review fees for existing buildings in which the use group or occupancy type is changed shall be calculated in accordance with subsection (1) by using the total square footage of the entire building or structure under the new occupancy type as determined by the outside dimensions. Minimum fee for review of plans under this section will be $50.00.

(4) Plan review fees for alterations and repairs not otherwise covered by this section shall be calculated by multiplying the cost for the repairs by .001.

**Section 3. Specialized fees:** In addition to the fees required by Section 2, the following fees must be paid for the specialized plan reviews listed:

(1) Sprinkler fees.

**AUTOMATIC SPRINKLER REVIEW FEE TABLE**

| Sprinkler heads | Plan review fee |
|---|---|
| 4-200 | $50.00 |
| 201-300 | $60.00 |
| 301-400 | $80.00 |
| 401-750 | $100.00 |
| over 750 | $100.00 plus 10¢ per sprinkler over 750 |

(2) Fire Detection System Review Fee - $10.00 per 5,000 square feet up to 70,000 square feet; over 70,000 square feet - $140.00 plus $15.00 per each additional 20,000 square foot.

(3) Standpipe Plan Review Fee - $30.00 (combination standpipe and risers plans will be reviewed under automatic sprinkler review fee schedule).

(4) Carbon Dioxide Suppression System Review Fee - 1 to 200 pounds of agent -$50.00; over 200 pounds of agent - $50.00 plus 2¢ per pound in excess of 200 pounds.

(5) Halon Suppression System Review Fee - Up to 35 pounds of agent - $50.00; over 35 pounds - $50.00 plus 5¢ per pound in excess of 35 pounds.

(6) Foam Suppression System Review Fee - $1.00 per gallon of foam concentrate. The fee for review of plans under this section shall not be less than $50.00 or more than $1,000.00.

(7) Commercial Range Hood Review Fee - $20.00 per hood.

(8) Dry Chemical Systems Review Fee (except range hoods) - 1 to 30 pounds of agent - $30.00; over 30 pounds of agent - $30.00 plus 20¢ per pound in excess of 30 pounds.

(9) Flammable Liquid or Pressure Tank Fee - $25.00 for the first tank and $5.00 for each additional tank.

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