

# ARTICLE 8—Part A

## MATERIALS AND TESTS

### SECTION 800.0 GENERAL

**800.1 Scope:** The provisions of this article shall govern the quality, workmanship and requirements for all materials and methods and 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 approved rules and the standards for materials and tests and the requirements of accepted engineering practice as herein listed.

Appendix B .....	Accepted Engineering Practice
Appendix C .....	Material Standards
Appendix D .....	Structural Unit Test Standards
Appendix E .....	Structural Assembly Test Standards
Appendix F .....	Durability Test Standards
Appendix G .....	Fire Test Standards
Appendix H .....	Standard Time-Temperature Test Controls
Appendix I .....	Fire Protection Standards

**800.2 Accepted engineering practice:** The quality, use and installation of all materials and methods of building construction shall be controlled by the standards of accepted engineering practice as listed in Appendix B except where otherwise specifically provided in this code.

**800.3 Material standards:** All building units used in wall, partition and floor construction and for fireproofing or other insulation purposes shall comply with the applicable standards listed in Appendix C.

**800.4 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 its character, quality and limitations of use.

**800.5 Used materials:** The use of all second-hand materials which meet

the minimum requirements of this code for new materials shall be permitted.

**800.6 Alternate test procedure:** In the absence of approved rules or other accepted standards, the building official shall make or cause to be made the necessary tests and investigations, or he shall accept duly authenticated reports from recognized authoritative sources in respect to the quality and manner of use of new materials or assemblies as provided in Section 108.0. The cost of all tests and other investigations required under the provisions of this code shall be borne by the applicant.

## **SECTION 801.0 BASIC CLASSIFICATION OF CONSTRUCTION MATERIALS**

**801.1 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 719.0. The design and construction shall be based on the assumptions, limitations, and methods of stress determination of recognized design procedures.

## **SECTION 802.0 TESTS**

**802.1 Test standards:** All structural units and assemblies shall be tested in accordance with the standards listed in Appendices D, E and F. In the absence of test procedures governing any specific material or method of construction, the building official shall accept authenticated reports from recognized authoritative sources which meet the requirements of this code.

**802.2 Strength tests:** To determine the safe uniformly distributed working load, when not capable of design by accepted 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, sub-assembly or assembled unit and its connections shall be subjected to strength tests prescribed in this code, or to such other tests acceptable to the building official that simulate the loads and conditions of application that the completed structure will be subjected to in normal use. Structural load determinations shall include transverse floor and roof, wall compression and racking, concentrated load, plaster bond, puncture penetration and soil tests.

**802.2.1 Strength tests 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 the following design procedure and criteria.

1. Design for wind loads by Section 857.5.4.
2. Design for impact loads of fully-tempered, laminated and wired glass shall comply with the requirements of the standard listed in Appendix B.



**802.3 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 tests for durability and weather resistance.

**802.4 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.

**802.5 Workmanship test:** All work shall be conducted and completed in an acceptable 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 (2) times the design live load. The test load shall be left in place for a period of twenty-four (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, he 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 accepted 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 seventy-five (75) per cent of the maximum deflection within twenty-four (24) hours after removal of the test load.

**802.6 Tests of service equipment and devices:** Tests of service equipment and accessories shall include proscenium curtain and stage ventilation, Section 417.7; structural load tests, Section 702.0; flues and chimneys, Section 1002.0; boilers, the mechanical code listed in Appendix B; electric installations, Section 1502.0; moving stairways, elevator interlocks and safety devices, Section 1602.0; refrigerating equipment, and other mechanical and plumbing systems and devices as required by the mechanical code and the plumbing code listed in Appendix B and all other service tests required by the approved rules.

**802.7 Fire tests:** In the determination of flash points, combustibility, flameresistance and fireresistance rating of construction materials and methods, all tests shall be conducted in conformity to Sections 902.0, 903.0 and 904.0 and the applicable standards listed in Appendices G and I.

**802.8 Prefabricated construction tests:** Prefabricated assemblies or sub-assemblies not capable of design by accepted 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 (3) units in width with two (2) longitudinal joints; and when designed on the assumption of a simple span, such units shall be tested with flat end supports.

**802.9 Test specimens:** The selection and construction of all test specimens and the details of test procedure herein required shall conform to the recognized test procedures listed in the appendices. All test specimens and constructions shall be truly representative of the materials, workmanship and details to be normally applied in practice. When structural or fire-resistance rated properties of the material are dependent upon adequate curing, the age of the specimen shall be not less than seven (7) nor more than twenty-eight (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 accepted test standards of authoritative test agencies and organizations. Details of test procedures have been omitted from this code, except for essential basic requirements when deemed necessary.

### SECTION 803.0 CONDITIONS OF ACCEPTANCE

**803.1 General:** In evaluating the physical properties of materials and methods of construction when not subject to design by accepted engineering analysis, the structural requirements shall be based on the criteria established by the provisions of the following Sections 803.2 through 803.7.

**803.2 Test load factor:** The test assembly shall sustain without failure superimposed loads equal to two and one-half ( $2\frac{1}{2}$ ) times the design live load.

**803.3 Working load deflection:** Under the approved working load, the deflection of floor and roof assemblies shall not be greater than one three-hundred-sixtieth ( $1/360$ ) of the span for plastered construction; one two-hundred-fortieth ( $1/240$ ) of the span for unplastered floor construction; and one one-hundred-eightieth ( $1/180$ ) of the span for unplastered roof construction.

**803.4 Wall and partition assemblies:** Bearing wall and partition assemblies shall sustain the load test both with and without window framing.

**803.5 Comparative tests:** When not available from existing authoritative 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.



**803.6 Concentrated load tests:** When not capable of design, all floor constructions in the use classification groups specified in Table 707 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 706.

**803.7 Puncture penetration tests:** All finish floor constructions in which light gage metal or other thin materials are used as the structural floor shall withstand the application of a two hundred (200) pound concentrated load applied to the top surface on an area of one (1) square inch at any point or points of the construction designated by the building official.

#### SECTION 804.0 APPROVALS

**804.1 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.

**804.2 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 his office and shall be open to public inspection during business hours.

**804.3 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.

**804.4 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 805.0 MASONRY CONSTRUCTION UNITS

**805.1 Nominal dimensions:** Dimensions and thicknesses specified in this code are nominal dimensions; actual dimensions may vary from the prescribed minimum in accordance with accepted tolerances in the building industry.

**805.2 Second-hand units:** Brick and other second-hand 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 good, 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 806.0 BRICK UNITS**

**806.1 General:** All clay, shale and sand-lime brick shall be selected on the appropriate grade specified by the applicable standards. Brick in contact with the ground and subject to water, frost and freezing action, shall have a minimum compressive strength of three thousand (3,000) pounds per square inch (psi); when subject to frost without danger of water saturation, a minimum compressive strength of twenty-five hundred (2500) psi; and when not subject to severe weathering or when used as a back-up in exterior walls or for interior construction, a minimum compressive strength of fifteen hundred (1500) psi. Underburned clay brick shall not be used in isolated brick piers, nor in any part of a building exposed to the weather, nor in a bearing wall which is more than forty (40) feet in height.

### **SECTION 807.0 STRUCTURAL CLAY TILE UNITS**

**807.1 Load-bearing wall tile:** Load-bearing wall tile for general masonry use exposed to weathering shall have a minimum compressive strength on the gross area of not less than fourteen hundred (1400) psi when tested with cells vertical, and not less than seven hundred (700) psi when tested with cells horizontal; and for use with an approved weather-protective veneer, or when not exposed to frost or water action, a minimum compressive strength on the gross area of one thousand (1,000) psi when tested with cells vertical, and not less than seven hundred (700) psi when tested with cells horizontal.

**807.2 Floor tile:** Structural clay floor tile for use in end construction arches shall have a minimum compressive strength on the net area of two thousand (2,000) psi and not less than twelve hundred (1200) psi for side construction arches.

**807.3 Fireproofing tile:** Structural clay tile for use in nonbearing partitions, 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 214.

### **SECTION 808.0 GLAZED MASONRY UNITS**

**808.1 Strength:** All glazed masonry units shall have the following minimum compressive strengths on the gross area when tested as laid in the wall; with cells vertical three thousand (3,000) psi, and with cells horizontal two thousand (2,000) psi.

**SECTION 809.0 CONCRETE UNITS**

**809.1 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.

**809.2 Hollow load-bearing units:** Approved hollow load-bearing 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 one thousand (1,000) psi; and for protected exterior use and general interior construction not less than seven hundred (700) psi.

**809.3 Hollow nonload-bearing units:** Approved hollow nonload-bearing concrete units shall have a minimum compressive strength on the average gross area of three hundred and fifty (350) psi.

**809.4 Solid load-bearing units:** Approved solid load-bearing concrete masonry units when unprotected against the weather or subject to frost and water action shall have a minimum compressive strength of eighteen hundred (1800) psi, and for protected exterior use or general interior use not less than twelve hundred (1200) psi.

**809.5 Concrete brick:** Approved concrete brick for use when exposed to freezing in the presence of moisture, shall have a minimum compressive strength of twenty-five hundred (2500) psi; and when used as a back-up in exterior walls or for general interior construction, a compressive strength of not less than twelve hundred and fifty (1250) psi.

**809.6 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 three hundred (300) psi of net area tested as laid in practice. When exposed to the weather, the compressive strength shall be not less than seven hundred (700) psi of gross area. All nonbearing units shall be clearly marked to distinguish them from load-bearing units.

**809.7 Concrete floor tile**

**809.7.1 Structural fillers:** Structural concrete filler-block or tile when included in strength calculations in ribbed floor construction shall have webs and shells not less than one (1) inch thick and shall develop an average compressive strength on the net area not less than that of the rib concrete.

**809.7.2 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 810.0 GYPSUM UNITS

**810.1 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 seventy-five (75) psi on the gross area.

### SECTION 811.0 STRUCTURAL GLASS BLOCK UNITS

**811.1 General:** Solid or hollow approved structural glass blocks shall not be used in fire walls, party walls or fire separation walls, or for load-bearing construction. All mortar-bearing surfaces of the block shall be precoated or prepared to insure adhesion between mortar and glass.

### SECTION 812.0 ARCHITECTURAL TERRA COTTA

**812.1 General:** All approved architectural terra cotta units shall be formed with a strong, homogeneous body of hard-burned, weather-resisting clay which gives off a sharp, metallic ring when struck and shall meet the strength and durability requirements of accepted engineering practice. All units shall be formed to engage securely with and anchor to the structural frame or masonry wall.

### SECTION 813.0 NATURAL STONE

**813.1 General:** Natural stone for masonry shall be sound and free from loose or friable inclusions; and shall meet the strength, fireresistance, durability and impact resistance for the intended use in accordance with accepted engineering practice.

### SECTION 814.0 CAST STONE

**814.1 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 841.0.

### SECTION 815.0 MORTAR FOR MASONRY

**815.1 Materials:** All portland, natural and masonry cements, quick-lime and hydrated lime for use in masonry mortar and concrete shall meet the minimum strength and durability requirements of the standards listed in Appendices B and C.

**815.2 Mortar types and proportions:** Mortar for masonry construction shall conform to one (1) of the following types shown in Table 815.2 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 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 accepted engineering practice. Masonry mortars shall have a flow after suction of not less than seventy (70) per cent.

**Table 815.2**  
**MORTAR PROPORTIONS (PARTS BY VOLUME)**

Mortar type	Portland cement	Masonry cement	Hydrated lime or lime putty		Damp loose aggregate
			Min.	Max.	
M	1	—	—	1/4	Not less than 2 1/4 and not more than 3 times the sum of the volumes of the cements and lime used.
S	1	1	—	—	
	1	—	1/4	1/2	
N	1/2	1	—	—	
	1	—	1/2	1 1/4	
O	—	1	—	—	
	1	—	1 1/4	2 1/2	

**815.3 Types of mortar permitted:** Unit masonry shall be laid in mortar of the following types listed in Table 815.3.

**Table 815.3**  
**MASONRY AND MORTAR TYPES**

Type 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

**815.4 Special mortars:** The building official may approve other special masonry mortars in place of the mortar types listed in Section 815.2, 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 ( $\frac{1}{4}$ ) the average ultimate compressive strength of the assembled test samples.

**815.5 Gypsum mortar:** Gypsum mortar shall be composed of one (1) part of unfibred calcined neat gypsum to not more than three (3) parts sand by weight. Only gypsum mortar shall be used with gypsum tile and block units.

**815.6 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 815.6.

**Table 815.6**  
**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; 1/2 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; 1/2 hydrated lime; 2 1/2 dry sand or 3 damp sand

**815.6.1 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 the Standard Specification for Dry-set Portland Cement Mortar listed in Appendix C. Dry-set mortars which are labeled for use with a particular type of tile, such as glazed wall tile, ceramic mosaics, pavers, or 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 the 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 the standard for Ceramic Tile Installed with Dry-set Portland Cement Mortar listed in Appendix B.

**815.7 Organic adhesives:** Water-resistant organic adhesives complying with Standard for Organic Adhesives for Installation of Ceramic Tile listed in Appendix C may be used in the installation of ceramic tile. The shear bond strength shall be not less than forty (40) psi for Type I adhesive, and not less than twenty (20) psi for Type II adhesive, when tested in accor-



dance with Standard for Organic Adhesives for Installation of Ceramic Tile listed in Appendix C. Tile set in organic adhesives shall be installed in accordance with the Standard Specifications for Ceramic Tile Installed with Water-resistant Organic Adhesives listed in Appendix B.

**815.8 Epoxy mortar:** Ceramic tile may be set and grouted with epoxy complying with the Standard Specifications for Chemical Resistant, Water Cleanable Tile-setting and Grouting Epoxy listed in Appendix C. Tile set in epoxy shall be installed in accordance with the Standard Specifications for Ceramic Tile Installed with Chemical Resistant, Water Cleanable Tile-setting and Grouting Epoxy listed in Appendix B.

### SECTION 816.0 CONCRETE AGGREGATES

**816.1 Aggregate quality:** All concrete aggregates shall meet the standard specifications of accepted engineering practice for organic impurities, soundness, mortar strength, durability, weather-resistance, fireresistance rating and wearing qualities.

**816.2 Fireresistance rating:** Coarse aggregate in concrete shall be rated in respect to the fireresistance of 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 standard fire test specifications applicable to such test. Protective coverings of encasements of concrete for steel in fireresistance rated construction shall likewise be selected on the basis of performance in applicable standard fire tests. All concrete constructions shall meet the requirements of Article 9 as regulated by the provisions of Table 214.

**816.2.1 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 Standard Methods of Fire Tests of Building Construction and Materials listed in Appendix G.

**816.2.2 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 Standard Methods of Fire Tests of Building Construction and Materials listed in Appendix G.

**816.3 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 ( $\frac{1}{5}$ ) of the narrowest dimension between sides of the form nor three-fourths ( $\frac{3}{4}$ ) of the minimum clear spacing between reinforcing bars.



**816.4 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 test. When used for fire protection purposes only, the building official may waive mortar strength requirements for such aggregates providing the concrete is shown by test to have adequate strength for the intended use.

### SECTION 817.0 READY-MIX CONCRETE

**817.1 Control:** Ready-mixed concrete for use in ordinary or in controlled materials procedure shall conform to Section 841.0 for reinforced concrete and to the applicable standards listed in Appendix C.

**817.2 Transportation:** Ready-mixed concrete shall be transported in approved conveyances which insure delivery of the concrete at the site in a plastic, workable and unhardened state. The maximum amount of concrete hauled in an agitator shall not exceed the approved rating of the conveyance; and the period of delivery shall not exceed the time in which loss of plasticity may occur and generally not more than one and one-half (1½) hours.

**817.3 Ordinary materials procedure:** When ready-mix is used under the ordinary materials procedure, either the cement content in bags per yard of concrete together with the maximum allowable water content, or the compressive strength and maximum permissible slump shall be specified.

### SECTION 818.0 STRUCTURAL WOOD GLUES

**818.1 Quality of glue:** Glues used in structural assemblies of built-up or laminated lumber sections shall develop the full strength of the wood, shall not produce decomposition or deleterious chemical reaction in the wood structure and shall not be attractive to vermin.

**818.2 Manufacturers' requirements:** Approved structural glues shall be handled, mixed and applied as prescribed by the manufacturer and the gluing shall be done only in accordance with the timber construction standards listed in Appendix B.

**818.3 Types of glue:** Structural glues shall be classified as described in the following Sections 818.3.1 and 818.3.2.

**818.3.1 Group 1 glues:** For general interior use or for exterior use protected against the weather, Group 1 glues shall include casein glue with mold-resistant preservative, urea-resin glue, phenol or phenol-resorcinol resin glue and any other glue meeting the requirements of the approved rules for such use.

**818.3.2 Group 2 glues:** For use under full exposure to the weather or for interior use when subjected to high humidity, Group 2 glues shall include resorcinal resin, phenol resin, melamine resin glues and any other glue meeting the requirements of the approved rules for such use.

## SECTION 819.0 INTERIOR LATHING AND PLASTERING

**819.1 General:** All interior lathing and plastering shall conform to the standards of accepted engineering practice for lathing, furring and accessories and gypsum and portland cement plastering listed in Appendices B and C; except as may be otherwise provided by statute or in this code for specific materials.

### 819.2 Installation

**819.2.1 Inspection:** The building official shall be notified not less than twenty-four (24) hours in advance of all plastering work, and plaster shall not be applied until after the lathing or other plaster base has been inspected and approved by him.

**819.2.2 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 820.0 EXTERIOR LATHING AND STUCCO

**820.1 General:** All exterior lathing, plastering and stucco work shall be installed of portland cement or other approved mortar as provided in the standards listed in Appendices B and C, in accordance with accepted engineering practice or as provided in this code for specific materials.

**820.2 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.

**820.3 Minimum weight:** Metal lath, expanded metal and wire reinforcing fabric shall weigh not less than that indicated in the following Table 820.

**820.4 Corrosion resistance:** All metal lath and stucco reinforcing fabric shall be protected with a zinc, or other approved rust-resistive coating or rust-inhibitive paint, or shall be manufactured from approved corrosion-resistive alloys.

**820.5 Sheathing:** Except in back-plastered construction, the studs shall be covered with approved sheathing complying with Section 854.0; or not less than No. 18 Steel Wire Gage (0.048 inch) galvanized wire shall be stretched horizontally at six (6) inch centers and shall be covered with not less than fourteen (14) pound waterproof felt or paper before applying



**Table 820**  
**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

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 five (5) inches on centers to which is attached a double layer of fibrous waterproof backing. The mesh opening shall not exceed two by two (2x2) inches.

**820.6 Back-plastered construction:** In back-plastered construction, when spacing of studs exceeds sixteen (16) inches, approved horizontal noncombustible cross-furring at not more than sixteen (16) inch centers shall be first applied; unless approved stiffened lath is used and the frame is adequately stiffened as provided in Section 854.0.

**820.7 Application on masonry base:** When applied directly to masonry or monolithic concrete, the surfaces shall be roughened, hacked or bush-hammered 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 (2) days after application and before applying succeeding stucco coats.

#### **820.8 Protection**

**820.8.1 From freezing:** At all times during application and for a period of not less than forty-eight (48) hours after application of each coat, provision shall be made to keep stucco work above fifty (50) degrees F.

**820.8.2 From moisture:** Stucco shall be kept a sufficient height above ground surfaces as provided in Section 854.0 and all sills, coping and projecting courses shall be flashed and provided with drips as therein specified.

### **SECTION 821.0 PLASTERING MATERIALS**

**821.1 General:** All sand, quick-lime, hydrated lime, hair binder, gypsum, keene and portland cements, pozzuolanic cements and aggregates and other materials used in plastering shall be stored, protected and applied in accordance with the standards of accepted engineering practice listed in Appendices B and C and the approved rules.



**821.2 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 the approved label.

**821.3 Lime plaster:** Lime and hydrated lime plasters for use in base and finish coats shall be applied in accordance with the approved rules and the manufacturers' specifications.

**821.4 Gypsum plaster:** All gypsum plaster shall comply with the standard specifications listed in Appendix C.

**821.5 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 the applicable standard in Appendix B.

## SECTION 822.0 PLASTER BASES

**822.1 Fiber boards:** Approved fiber boards used as plaster bases shall comply with Section 823.0. 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 the standards listed in Appendix C and the approved rules.

**822.2 Gypsum lath:** Except when greater thickness is required for fire-resistance rating under the provisions of Article 9, or as herein specified, gypsum lath used for plastering shall be not less than three-eighths ( $\frac{3}{8}$ ) inch thick and shall comply with the standards listed in Appendix C.

**822.3 Perforated gypsum lath:** Where required to provide specified time-temperature performance, perforated gypsum lath shall be not less than three-eighths ( $\frac{3}{8}$ ) inch thick. The openings shall be equivalent to three-quarter ( $\frac{3}{4}$ ) inch diameter holes for each sixteen (16) square inches of lath surface; or the lath shall be perforated as determined by full size tests for load, strength and fire-resistance ratings.

**822.4 Metal lath:** The dimensions and sizes of expanded, ribbed and sheet metal lath shall comply with accepted engineering practice and the standards listed in Appendix B; 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.

**822.5 Wire lath:** All types of wire lath shall comply with accepted engineering practice and the standards listed in Appendix B; and 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 ( $2\frac{1}{2}$ ) meshes to the inch. Woven or welded wire reinforcement shall be coated with zinc or rust-inhibitive paint.

**822.6 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 822.4 and 822.5.

**822.7 Combustible lath:** Wood lath shall be erected horizontally on walls and partitions and ceiling lath shall run in one (1) 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 (1) inch wide nor less than five-sixteenth ( $\frac{5}{16}$ ) inches thick and shall comply with all the requirements of accepted engineering practice. The lath joints shall be staggered so that not more than seven (7) laths occur in any one (1) continuous break.

### SECTION 823.0 FIBER BOARDS

**823.1 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 the standards listed in Appendix C. When required under the provisions of Article 9, the boards shall be protected or treated to develop the required fireresistance rating or flameresistance as determined by test.

**823.2 Jointing:** To insure tight-fitting assemblies, edges shall be manufactured square or shiplapped, beveled, tongue-and-grooved or U-jointed; and shall be installed in accordance with accepted engineering practice.

**823.3 Plaster base:** When used as a plaster base, fiber boards shall be permitted in fireresistive construction complying with the test provisions of Article 9, except where specifically prohibited in fireproof (Type 1) and noncombustible (Type 2) construction.

**823.4 Roof insulation:** When used as roof insulation in all types of construction, fiber boards shall be protected with an approved type of roof covering.

**823.5 Wall insulation:** When installed and firestopped to comply with Article 9, fiberboards 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 Sec. 904.0 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.

**823.6 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.

**823.7 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 one (1) inch.



## SECTION 824.0 PLYWOOD

**824.1 Quality:** All plywood when used structurally shall meet the performance standards and all other requirements of U. S. Product Standard PS 1 listed in Appendix C 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 the standards of accepted engineering practice as listed in Appendices B and C.

**824.2 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 three-eighths ( $\frac{3}{8}$ ) inch. Joints shall occur over framing members, unless wood or plywood sheathing is used or joints are lapped horizontally a minimum of one and one-half ( $1\frac{1}{2}$ ) inches 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.

**824.3 Spans:** The maximum spans for plywood roof sheathing and subflooring shall be limited by the allowable stresses and deflections for the design live load but shall have not less than the following identification index specified in Table 824.3.1, provided it is continuous over two (2) or more spans and laid with face grain perpendicular to the supports.

**824.3.1 Floor and roof sheathing:** Allowable spans for floor and roof sheathing shall be as specified in the following Table 824.3.1.

**824.3.2 Plywood combination subfloor underlayment:** Allowable spans for combination subfloor underlayment shall be as specified in the following Table 824.3.2.

**824.3.3 Vertical maximum stud spacing:** Stud spacing for vertical sheathing and for use in stress-skin panel or other prefabricated constructions shall be determined by accepted engineering analysis or by the tests prescribed for prefabricated assemblies in Section 802.0.

## SECTION 825.0 WALLBOARDS AND SHEATHING

**825.1 Sheathing:** Sheathing of particleboard, gypsum, processed fiber or other approved materials shall conform to accepted engineering practice. All sheathing shall be identified as to compliance with appropriate standards. When used in frame construction, they shall meet requirements of Sections 854.2 and 854.3. When required to meet fire-resistance ratings, the assembled construction shall comply with Table 214 for structural elements and Article 9 for trim and finishes.

**825.2 Wallboards:** Wallboard of particleboard, gypsum, processed fiber or other approved materials shall conform to accepted engineering practice. All wallboards shall be identified as to compliance with appropriate

Table 824.3.1

**ALLOWABLE SPANS FOR PLYWOOD FLOOR AND ROOF SHEATHING CONTINUOUS OVER TWO OR MORE SPANS AND FACE GRAIN PERPENDICULAR TO SUPPORTS<sup>1</sup> (SPAN IN INCHES)**

Panel Identification Index <sup>2</sup> Roof span, roof/floor span	Roof				Floor	
	Maximum Span (inches)			Load (psf)		Maximum span <sup>5</sup> (inches)
	Thickness (inches)	Edges blocked <sup>3</sup>	Edges unblocked	Total Load	Live Load	
12/0	5/16	12	12	155	150	0
16/0	3/8, 3/8	16	16	95	75	0
20/0	1/2, 3/8	19.2	19.2	75	65	0
24/0	3/4	24	20	65	50	0
24/0	1/2	24	24	65	50	0
30/12	3/8	30	26	70	50	12 <sup>7</sup>
32/16	1/2, 5/8	32	28	55	40	16 <sup>8</sup>
36/16	3/4	36	30	55	50	16 <sup>8</sup>
42/20	5/8, 3/4, 7/8	42 <sup>9</sup>	32	40 <sup>4</sup>	35 <sup>4</sup>	20 <sup>8</sup>
48/24	3/4, 7/8	48	36	40 <sup>4</sup>	35 <sup>4</sup>	24

**Note 1:** These values apply for 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.

**Note 2:** Identification index appears on all panels in the construction grades listed in footnote (1).

**Note 3:** Edges may be blocked with lumber or other approved type of edge support.

**Note 4:** For roof live load of forty (40) psf or total load of fifty-five (55) psf, decrease spans by thirteen (13) per cent or use panel with next greater identification index.

**Note 5:** Plywood edges shall have approved tongue-and-groove joints or shall be supported with blocking, unless one-fourth (1/4) inch minimum thickness underlayment is installed, or finish floor is twenty-five thirty-seconds (25/32) inch wood strip. Allowable uniform load based on deflection of one three-sixtieth (1/600) of space is one hundred sixty-five (165) psf.

**Note 6:** Plywood roof sheathing continuous over two or more spans may be placed with face grain parallel to supports spaced not over twenty-four (24) inches on center if all panel edges are blocked or other approved type edge support is provided, and if live loads do not exceed twenty-five (25) psf for one-half (1/2) inch Structural I (4-ply) and one-half (1/2) inch 5-ply in other grades, or forty (40) psf for one-half (1/2) inch Structural I (5-ply) and five-eighths (5/8) inch 5-ply in other grades.

**Note 7:** May be sixteen (16) inches, if twenty-five thirty-seconds (25/32) inch wood strip flooring is installed at right angles to joists.

**Note 8:** May be twenty-four (24) inches if twenty-five thirty-seconds (25/32) inch wood strip flooring is installed at right angles to joists.

**Note 9:** For joists spaced twenty-four (24) inches on center plywood sheathing with Identification Index Numbers 42/20 or greater can be used for subfloors when supporting one and one-half (1 1/2) inches of lightweight concrete.

standards. Wallboard shall conform to the standards of accepted engineering practice for gypsum or processed fiber wallboard interior finishes, listed in Appendices B and C. When required to meet fireresistance ratings, the assembled construction shall comply with Table 214 for structural elements and Article 9 for trim and finishes.

**825.2.1 Water resistant gypsum backer board:** In all areas subjected to repeated damp conditions and moisture accumulation such as bath tub and shower compartments, water resistant gypsum backer board (ASTM C630) shall be used as a substratum unless protected with a moisture proof and vapor proof covering.



**Table 824.3.1.A**  
**ALLOWABLE LOADS FOR PLYWOOD ROOF SHEATHING**  
**CONTINUOUS OVER TWO OR MORE SPANS AND**  
**FACE GRAIN PARALLEL TO SUPPORTS\***

	Thickness	No. of plies	Span	Total load	Live load
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

\*Uniform load deflection limitations: 1/180 of span under live load plus dead load, 1/240 under live load only. Edges shall be blocked with lumber or other approved type of edge supports.

**Table 824.3.2**  
**ALLOWABLE SPANS FOR PLYWOOD COMBINATION SUBFLOOR-UNDERLAYMENT,<sup>1</sup>**  
**PLYWOOD CONTINUOUS OVER TWO (2) OR MORE SPANS AND FACE GRAIN PERPENDICULAR**  
**TO SUPPORTS (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 1.** 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 one three hundred sixtieth ( $\frac{1}{360}$ ) of span is one hundred twenty-five (125) psf. Plywood edges shall have approved tongue-and-groove joints or shall be supported with blocking, unless one-fourth ( $\frac{1}{4}$ ) inch minimum thickness underlayment is installed, or finish floor is twenty-five thirty-seconds ( $\frac{25}{32}$ ) inch wood strip. If wood strips are perpendicular to supports, thicknesses shown for sixteen (16) inch and twenty (20) inch spans may be used on twenty-four (24) inch span. Except for one-half ( $\frac{1}{2}$ ) inch, underlayment grade and C-C (plugged) panels may be of nominal thickness one thirty-second ( $\frac{1}{32}$ ) inch less than the nominal thicknesses shown when marked with the reduced thickness.

## **ARTICLE 8—Part B**

### **STEEL, MASONRY, CONCRETE, GYPSUM AND LUMBER CONSTRUCTION**

#### **SECTION 826.0 STRUCTURAL STEEL CONSTRUCTION**

**826.1 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 accepted engineering practice as defined by the standards listed in Appendix B.

**826.2 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; and the design loads shall be clearly indicated for all parts of the building or structure.

**826.3 Temporary and special stresses:** Due provision shall be made in the design for temporary stresses occurring during erections and for the influence of special loads producing impact or vibrations as provided in Section 709.5. Stresses caused by eccentric loading shall be fully provided for; and eccentric details shall be shown on the design and shop drawings.

**826.4 Shop drawings:** Complete shop drawings shall be prepared in conformity to 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.

**826.5 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 the standards of accepted engineering practice listed in Appendix B.

**826.6 Painting and special protection:** All painting shall comply with the specifications for design, fabrication, and erection of structural steel for buildings listed in Appendix B. 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 accepted engineering practice and the approved rules.



## SECTION 827.0 FORMED STEEL CONSTRUCTION

**827.1 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 standards of accepted engineering practice listed in Appendix B.

**827.2 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.

### 827.3 Protection

**827.3.1 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 acceptable shop coat of paint, enamel, or other approved protection.

**827.3.2 Field coat:** After erection where directly exposed to the weather, except when encased in concrete made of non-corrosive 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 acceptable protection.

**827.3.3 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 eight (8) inches.

**827.3.4 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.

**827.4 Tests:** When not capable of design by accepted engineering analysis, the building official shall require tests of the individual or assembled structural units and their connections as prescribed in Sections 802.0 and 803.0. At least three (3) 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 ten (10) per cent from the mean value shall cause rejection of the series.

**SECTION 828.0 STEEL JOIST CONSTRUCTION**

**828.1 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 standard for steel joist construction listed in Appendix B.

**828.2 Design**

**828.2.1 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 7.

**828.2.2 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.

**828.2.3 Protection:** Painting of steel joists shall be in accordance with the requirements of Section 827.0 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.

**828.3 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 standard, steel joist construction of the required fireresistance rating may be used in all buildings within the height limits of Table 305.

**828.4 Tests:** When not subject to accepted engineering analysis as regulated by the standard for steel joist construction, the assembly shall meet the load test requirements specified in Sections 802.0 and 803.0.

**SECTION 829.0 REINFORCING STEEL**

**829.1 General:** Metal reinforcement for reinforced concrete, reinforced gypsum concrete, reinforced brickwork and reinforced hollow block construction shall comply with the applicable standards listed in Appendix C.

**829.2 Identification:** All reinforcing bars shall be rolled with raised symbols or letters impressed on the metal identifying the manufacturing mill. When required by the building official, the grade of material shall be identified by satisfactory mill tests. All bundles or rolls of cold-drawn steel wire reinforcement and of one-quarter ( $\frac{1}{4}$ ) inch rounds shall be securely tagged to identify the manufacturer and the grade of steel.



**829.3 High yield steels:** When the yield point of reinforcing bar steel is fifty thousand (50,000) pounds per square inch (psi) or more, the building official shall approve tension stresses in bending and compression stresses in vertical column reinforcement not more than forty (40) per cent of the minimum yield point; but such stresses shall be not more than thirty thousand (30,000) psi. Exceptions to this section may be made for one-way slabs in accordance with Section 841.2 for prestressed concrete reinforcement, and when allowed under the provisions of accepted engineering practice standards listed in Appendix B.

#### **829.4 Column reinforcement**

**829.4.1 Structural steel sections:** The allowable unit stress on structural steel column sections shall be not more than sixteen thousand (16,000) psi.

**829.4.2 Cast iron sections:** All cast iron used as reinforcement in combination with concrete shall be of pit-cast water pipe grade complying with the standards listed in Appendix C; and the allowable unit stress shall be not more than ten thousand (10,000) psi.

**829.4.3 Steel pipe sections:** The allowable unit stress on steel pipe used in concrete-filled pipe columns shall be not more than forty-five (45) per cent of the yield point of the steel, but the combined stress in the shell shall not be more than twenty thousand (20,000) psi.

**829.5 Tests:** When unidentified reinforcement is approved for use under ordinary material procedure, not less than three (3) tension and three (3) 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 830.0 CAST STEEL CONSTRUCTION**

**830.1 Materials:** Carbon steel casting for building construction shall be cast from steel conforming to the requirements of accepted engineering practice listed in Appendix B and the applicable standards listed in Appendix C. All castings shall be free from injurious blow holes or other defects which would impair the structural strength.

**830.2 Higher strength cast steel:** Higher strength cast steel may be used when approved under controlled material procedure.

**830.3 Welding cast steel:** Cast steel designed for use in welding shall be of weldable grade complying with the approved rules.

### **SECTION 831.0 CAST IRON CONSTRUCTION**

**831.1 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; conforming to the applicable standards listed in Appendix C for medium gray iron castings.

**831.2 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.

**831.3 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 six (6) inches.

**831.4 Thickness of metal:** The minimum thickness of cast iron shall be not less than herein specified.

**831.4.1 Columns:** In columns, the metal shall be not less than one-twelfth ( $\frac{1}{12}$ ) the smallest dimension of the cross-section and not less than three-quarter ( $\frac{3}{4}$ ) inch.

**831.4.2 Bases and brackets:** In bases and flanges, the metal shall be not less than one (1) inch thick reinforced with fillets and brackets.

**831.4.3 Lintels:** In lintels, the metal shall be not less than three-quarter ( $\frac{3}{4}$ ) inch thick and shall be limited to use on spans of not more than six (6) feet.

**831.5 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 ten (10) per cent shall be prohibited. Where required by the building official, three-eighth ( $\frac{3}{8}$ ) inch round inspection holes shall be drilled in the section to expose the thickness of metal for inspection purposes.

## SECTION 832.0 SPECIAL STEELS

**832.1 General:** Alloy, high carbon or other special high strength steels not listed in Appendix C, may be used in the design and construction of buildings and structures as controlled materials as prescribed in Section 721.0.

## SECTION 833.0 LIGHT WEIGHT METAL ALLOYS

**833.1 General:** Aluminum and other approved light weight metals and alloys shall be used for structural purposes in buildings and structures in accordance with the applicable standards listed in Appendix B.

## SECTION 834.0 MASONRY WALL CONSTRUCTION

**834.1 Design:** All masonry construction shall comply with the provi-



sions 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 and the standards of accepted engineering practice.

**834.2 Wetting of brick:** Brick (clay or shale) shall be wetted when laid unless their gain in weight resulting from partial immersion flatwise in one-eighth ( $\frac{1}{8}$ ) inch of water for one (1) minute is less than twenty-five thousandths (0.025) ounce per square inch of immersed area.

**834.3 Precautions against freezing:** All masonry shall be protected against freezing for not less than forty-eight (48) hours after installation; and shall not be constructed below twenty-eight (28) degrees F. on rising temperatures or below thirty-six (36) degrees F. on falling temperatures, without temporary heated enclosures or without heating materials or other precautions necessary to prevent freezing. Frozen materials shall not be used, nor shall frozen masonry be built upon.

**834.4 Incorporation of combustibles:** Lumber or other combustible materials, except nailing blocks and ornamental timber to an extent permitted by the chasing restrictions of Section 837.0 and the provisions of Section 900.3, shall not be incorporated in masonry walls, except as approved for combustible aggregates or component materials after fire test.

## SECTION 835.0 BONDING OF WALLS

**835.1 General:** Walls of solid, composite and hollow masonry and cavity and other hollow walls shall be bonded in accordance with accepted engineering practice.

**835.2 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 (1) through bond stone for each nine (9) superficial square feet of area.

**835.3 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.

**835.4 Intersecting walls and partitions:** Masonry walls and partitions shall be securely anchored or bonded at points where they intersect by one (1) of the following methods.

1. Walls may be bonded by laying at least fifty (50) per cent of the units at the intersection in true masonry bond with alternate units having a bearing of not less than three (3) inches upon the unit below, or they may be anchored with not less than three-sixteenths ( $\frac{3}{16}$ ) inch corrosion-resistant metal wire ties or joint reinforcement at vertical intervals not to exceed two (2) feet, or by other equivalent approved anchorage.

2. Where walls are carried up separately, the interesection shall be toothed or blocked with eight (8) inch maximum offsets and shall be provided with approved metal anchors at vertical intervals of not more than four (4) feet or, when approved, blocking may be eliminated and rigid steel anchors shall be provided, spaced not more than two (2) feet apart vertically.
3. Interior non-loadbearing walls may be bonded or anchored as required by 1 or 2 above or they may be anchored at their intersection, at vertical intervals of not more than two (2) feet, with at least No. 22 Galvanized Sheet Gage (0.034 in.) corrosion-resistant corrugated metal ties seven-eighths ( $\frac{7}{8}$ ) inch in width, or other equivalent approved method of anchorage.

**835.5 Erecting precautions:** Where hollow walls decrease in thickness, a course of solid masonry or of 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 twenty-five (25) feet 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 836.0 LATERAL BRACING OF WALLS**

**836.1 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 the accepted engineering practice standards for masonry listed in Appendix B; and provision shall be made in the structure to transfer wind pressures and other lateral forces to the foundations.

#### **SECTION 837.0 CHASES AND RECESSES IN BEARING WALLS**

**837.1 Where permitted:** Chases and recesses shall be prohibited in any wall less than twelve (12) inches thick or in the required area of piers and buttresses; except that eight (8) inch walls where permitted in residential buildings and the apron under window openings may be chased not more than four (4) inches in depth.

**837.2 Maximum size:** The maximum permitted depth of a chase in any wall shall be not more than one-third ( $\frac{1}{3}$ ) the wall thickness, and the maximum length of a horizontal chase or the maximum horizontal projection of a diagonal chase shall not exceed four (4) feet except as provided in Section 837.5; and except further that the length of the apron below window sills in all walls may equal the width of the window opening; and such aprons in eight (8) inch walls may be chased not more than four (4) inches in depth when waterproofed. The aggregate area of recesses and chases in any wall shall be not more than one-fourth ( $\frac{1}{4}$ ) of the area of the face of the wall in any one (1) story.



**837.3 Fireresistive limitations:** It shall be unlawful to have chases or recesses which reduce the thickness of material below the minimum specified in Article 9 for fire walls, fire separation walls or required fire-protective covering of structural members.

**837.4 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.

**837.5 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 uplift in the wall due to flexure of the slab.

#### **SECTION 838.0 CORBELED AND PROJECTED MASONRY**

**838.1 Limitations:** A wall less than twelve (12) inches thick shall not be corbeled except to support firestopping around floor framing; and except that eight (8) inch foundation walls may be corbeled to support brick-veneer frame and ten (10) inch cavity walls as provided in Section 869.0. The maximum total horizontal projection of corbels shall be not more than one-half ( $\frac{1}{2}$ ) the thickness of the wall. The maximum projection of one (1) unit shall neither exceed one-half ( $\frac{1}{2}$ ) the depth of the unit nor one-third ( $\frac{1}{3}$ ) its width at right angles to the face which is offset.

**838.2 Hollow walls:** Corbeling of hollow masonry or masonry built of hollow units shall be supported on at least one (1) full course of solid masonry.

**838.3 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 839.0 BEARING ON HOLLOW UNIT WALLS**

**839.1 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 four (4) inches in height or with a bearing plate of adequate design and dimensions to distribute the load safely on the wall or pier.

**839.2 Closure tile:** All open cells in tiles or blocks at wall ends and at openings shall be filled solidly with concrete for a length of not less than twelve (12) inches, or reversed closure tile shall be used.

**SECTION 840.0 PLAIN CONCRETE**

**840.1 General:** Except for controlled materials, cast-in-place concrete masonry shall contain not more than seven and one-half (7½) gallons of water per sack of cement, and not more than six (6) parts of aggregate for each one (1) part of cement by separate, dry volumetric measure.

**840.2 Design stress:** Plain concrete masonry shall conform to the applicable requirements of Section 841.0 for reinforced concrete, but the allowable working stress in compression shall not exceed twenty-five (25) per cent of the compressive strength, and the extreme fiber stress in bending shall not exceed three (3) per cent of the compressive strength except as provided in the applicable standard listed in Appendix B.

**SECTION 841.0 REINFORCED CONCRETE**

**841.1 Design:** The design of reinforced concrete construction shall be based on the generally accepted theory of flexure and elasticity of materials as applied to reinforced concrete and as specified in Section 842.0 for controlled materials and in Section 843.0 for ordinary materials and in accordance with the standards listed in Appendix B.

**841.2 One-way slabs:** In one (1) way slabs designed in accordance with accepted engineering practice of not more than twelve (12) foot span, the allowable tension in the reinforcement may be increased to fifty (50) per cent of the minimum yield point of the particular kind and grade of reinforcement used when the main reinforcement is three-eighths (¾) inch or less in diameter; but the allowable stress shall not exceed thirty thousand (30,000) pounds per square inch (psi).

**841.3 Cinder concrete:** Cinders shall not be used as coarse aggregate in reinforced concrete structural members, except as provided in Section 844.0.

**841.4 New systems:** Any system of construction which is not covered by, or which conflicts 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 802.0 and 803.0 and Sections 902.0 and 903.0.

**841.5 Embedded mechanical facilities:** 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 911.0. 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 or other embedded mechanical facilities shall be so placed as to leave the strength and fireresistance rating of the construction undiminished.



## **SECTION 842.0 CONTROLLED CONCRETE**

**842.1 General:** When controlled materials procedure is followed in the design and construction of a reinforced concrete building or structure, the allowable working stresses shall conform to accepted engineering practice in accordance with Building Code Requirements for Reinforced Concrete listed in Appendix B. The ultimate compressive strength of the concrete shall not be limited in controlled concrete procedure, provided proper provision is made to limit deflections and cracking.

## **SECTION 843.0 ORDINARY CONCRETE**

**843.1 General:** When ordinary material procedure is followed in the design and construction of a reinforced concrete building or structure, the allowable working stresses shall be as specified in Appendix K and the design shall conform to accepted engineering practice.

## **SECTION 844.0 STRUCTURAL CINDER CONCRETE**

**844.1 Aggregates:** Approved cinder aggregates where permitted for use in structural and fireproofing concretes shall consist of clean, well burned cinders, containing a maximum of thirty-five (35) per cent of unburned carbon and not more than one and one-half ( $1\frac{1}{2}$ ) per cent of sulphur nor more than a total of five (5) per cent of volatile materials.

**844.2 Cinder concrete proportions:** Structural cinder concrete shall be mixed in the proportions of one (1) part portland cement and not more than seven (7) parts of fine and coarse aggregate measured separately with a compressive strength of not less than eight hundred (800) psi at twenty-eight (28) days' age.

## **SECTION 845.0 SHORT SPAN FLOOR FILLING**

**845.1 General:** For spans not exceeding ten (10) feet between steel flanges, the safe supporting capacity of concrete floor and roof slabs built as fireresistance rated floor filling between steel beams shall be determined by the provisions of Section 841.2 or in accordance with the approved rules for stone and cinder concrete and other approved fireresistance rated floor filling.

## **SECTION 846.0 CONCRETE-FILLED PIPE COLUMNS**

**846.1 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.

**846.2 Design:** The safe supporting capacity of concrete-filled pipe

columns shall be computed in accordance with the approved rules or as determined by test.

**846.3 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.

**846.4 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 one (1) inch to the exterior steel shell. All structural shapes used as reinforcement shall be milled to insure bearing on cap and base plates.

**846.5 Fire-resistance rating protection:** Pipe columns shall be of such size or so protected as to develop the required fire-resistance ratings specified in Table 214. 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 four (4) inches except that in frame structures not exceeding three (3) stories or forty (40) feet in height, three (3) inch columns may be used in the basement and as secondary steel members.

**846.6 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 847.0 PNEUMATIC CONCRETE

**847.1 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 falling below fifty (50) degrees F. 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 two (2) nor more than four (4) inches either way, with a gross areas of not less than two-tenths per cent (0.2%) of the cross-sectional area of the mortar layer.

**847.2 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.



**847.2.1 Proportions:** The proportion of cement to aggregate, in loose dry volume, shall not be less than one (1) to four and one-half ( $4\frac{1}{2}$ ).

**847.2.2 Water:** The water content at the time of discharge, including moisture in the aggregate, shall not exceed three and one-half ( $3\frac{1}{2}$ ) gallons per sack of cement.

**847.2.3 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 three (3) per cent moisture.

**847.3 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 twenty-five (25) per cent of the total aggregate in any batch.

**847.4 Joints:** Unfinished work shall not be allowed to stand for more than thirty (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.

**847.5 Damage:** Any pneumatically placed concrete which subsides after placement shall be removed.

**847.6 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 848.0 MINIMUM CONCRETE DIMENSIONS**

**848.1 General:** The protection of reinforced concrete structural elements in buildings and structures of fireproof (Type 1) construction shall be adequate to meet the fire and strength tests of this code; but not less than the minimum dimensions established by the standards of accepted engineering practice. Any floor finish not placed monolithically with floor slabs, shall not be included in the calculations for structural strength.

#### **SECTION 849.0 REINFORCED GYPSUM CONCRETE**

**849.1 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 pre-mixed 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 the standards of accepted engineering practice listed in Appendix B.

**849.2 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 850.0 REINFORCED BRICKWORK**

**850.1 General:** All systems of brick masonry reinforced with steel in grouted mortar joints for use in the design and construction of buildings and structures shall conform to the requirements of this section and the standards of accepted engineering practice listed in Appendix B. Reinforced brickwork shall be used only under controlled materials procedure.

**850.2 Design:** The formulae and assumptions used in the design of reinforced concrete shall apply to reinforced brick masonry insofar as they are applicable.

#### **SECTION 851.0 REINFORCED HOLLOW BLOCK CONSTRUCTION**

**851.1 General:** Walls constructed of hollow block or other hollow unit masonry, filled solidly with concrete or grout and reinforced with steel rods shall be designed as specified for reinforced brick masonry in Section 850.0.

#### **SECTION 852.0 LUMBER AND TIMBER CONSTRUCTION**

**852.1 Design:** Structural lumber and timber and its 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 accepted engineering practice standards listed in Appendix B. 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 agency recognized as being competent. 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 accepted for precut, remanufactured, or rough sawn lumber; also for sizes larger than three (3) inches nominal thickness.

##### **852.2 Minimum dimensions**

**852.2.1 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).



**852.2.2 Structural posts:** All isolated structural posts shall have a minimum dimension of four (4) inches.

### **852.3 Fabrication**

**852.3.1 Connections:** All connections shall be fabricated with approved timber connectors, bolts, lag screws, spikes, nails or gluing or other approved connecting devices in accordance with accepted engineering practice. Bolted connections shall be snugged up tightly without crushing wood fibers under the washers. All nailed connections shall meet the minimum requirements of Appendix M.

**852.3.2 Cambering:** Trusses and long span girders shall be designed with sufficient camber or other provision shall be made to counteract any possible deflection.

**852.3.3 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. Notches in the top or bottom of joists shall not exceed one-sixth ( $\frac{1}{6}$ ) the depth of the member and shall not be located in the middle one-third ( $\frac{1}{3}$ ) of the span. Notches located closer to the supports than three (3) times the depth of the member shall not exceed one-fifth ( $\frac{1}{5}$ ) the depth. Holes bored or cut into joists for piping or electrical cables shall not be closer than two (2) inches to the top or bottom of the joist and the diameter of the hole shall not exceed one-third ( $\frac{1}{3}$ ) 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 duct work or for other fabricating purposes shall not be cut or bored more than one-third ( $\frac{1}{3}$ ) the depth of the stud. When the stud is cut or bored in excess of one-third ( $\frac{1}{3}$ ) its depth it shall be reinforced to be equal in load carrying capacity to a stud notched not more than one-third ( $\frac{1}{3}$ ) its depth.

**852.4 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.

**852.5 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 four (4) inches 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 six (6) inches and be bolted or spiked together; and when framing end to end, they shall be secured together by metal ties, straps or dogs.

**852.6 Maintenance:** All connections in the joints of timber trusses and structural frames shall be inspected periodically and bolts and other connectors shall be maintained tight.

**SECTION 853.0 HEAVY TIMBER TYPE CONSTRUCTION**

**853.1 Wood:** All structural wood members, sawn or glued laminated, used in heavy timber type construction shall be stress-grade timbers identified as to grade and strength by authoritative manufacturing, testing or inspection agencies or bureaus. All structural timber members shall have the minimum dimensions specified in Section 217.0 for Type 3A construction.

**853.2 Other structural materials:** Structural steel or reinforced concrete members may be substituted for timber in any part of the structural frame, protected to develop the required fire-resistance rating specified in Table 214, but not less than one (1) hour fire-resistance rating. Structural members supporting walls shall be protected to afford the same fire-resistance rating as the wall supported.

**853.3 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 (1) hour fire-resistance rating.

**853.4 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. Flooring shall not extend closer than one-half ( $\frac{1}{2}$ ) inch to walls to provide an expansion joint, but the joint shall be covered at top or bottom to avoid flue action.

**853.5 Beams and girders**

**853.5.1 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 one-half ( $\frac{1}{2}$ ) inch 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 fire-resistance rating of two (2) hours or more shall have not less than four (4) inches of solid masonry between their ends and the outside face of the wall and between adjacent beams. Adequate roof anchorage shall be provided.

**853.5.2 Column connections:** 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.



## SECTION 854.0 WOOD FRAME CONSTRUCTION

**854.1 General:** The exterior walls, interior partitions, floors and roofs of wood frame 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.

### 854.2 Wood stud frame

**854.2.1 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 803.4.

**854.2.2 Non-bearing walls:** Studs in non-bearing walls and partitions shall not be spaced more than forty-eight (48) inches on centers, and may be erected with the long dimension parallel to the wall, unless otherwise approved after test as an integrated assembly.

**854.2.3 Bracing:** In buildings more than one (1) story in height and where necessary for strength in one (1) story buildings, the corner posts shall be the equivalent of not less than three (3) pieces of two (2) by four (4) inch studs, braced by not less than one (1) piece of one (1) by four (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 854.3 is applied vertically in panels of not less than four (4) feet by eight (8) feet in area with approved nailing complying with Appendix M. Ledger or ribbon boards used to support joists shall be not less than one (1) by four (4) inches in size, cut into and securely nailed to each stud.

**854.2.4 Mortise and tenon framing:** Where mortise and tenon framing is used, the vertical members of the frame shall be not less than four (4) by six (6) inches in size and shall be designed as a column.

**854.2.5 Multiple stories:** When the frame is more than one (1) 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 two (2) inch framing members and not less than No. 18 Galvanized Sheet Gage (0.052 in.) for three (3) inch structural members. For four (4) inch and larger members, column splices and beam and girder supports shall comply with Section 853.0.

**854.2.6 Framing over openings:** Headers, double joists, trusses or other

approved assemblies of adequate size to transfer all superimposed loads to the vertical member shall be provided over all window and door openings in bearing walls and partitions.

**854.3 Wall sheathing:** Except as provided in Section 854.4 for weather boarding or when stucco construction complying with Section 820.6 is used, all enclosed buildings shall be sheathed with one (1) of the materials of the following nominal thickness or any other material of equal strength and durability approved by the building official:

Reinforced cement mortar .....	1 inch
Wood sheathing .....	$\frac{5}{8}$ inch
Plywood .....	$\frac{5}{16}$ inch
Gypsum sheathing .....	$\frac{1}{2}$ inch
Fiber boards .....	$\frac{1}{2}$ inch
Particle boards .....	$\frac{3}{8}$ inch

**854.3.1 Paper-backed lath sheathing:** In one- and two-family dwellings and one (1) story commercial buildings with brick or similar veneers, the sheathing may consist of a layer of paper-backed lath complying with Section 820.5 with a one (1) inch intermediate space which shall be mortar filled as each course of veneering is applied.

**854.4 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 non-corrodible vapor-type barriers complying with the approved rules; or other means shall be used to avoid condensation and leakage of moisture. The following materials shall be acceptable as approved weather coverings of the nominal thickness specified.

Brick masonry veneers .....	2 inches
Stone veneers .....	2 inches
Clay tile veneers .....	$\frac{1}{4}$ to 1 inch
Stucco or exterior plaster .....	$\frac{3}{4}$ inch
Precast stone facing .....	$\frac{5}{8}$ inch
Wood siding (without sheathing) .....	$\frac{1}{2}$ inch

**Note:** Wood siding of lesser thickness may be used providing such wall covering is placed over sheathing which conforms to Section 854.3.

Protected fiberboard siding .....	$\frac{1}{2}$ inch
Wood shingles .....	$\frac{3}{8}$ inch
Exterior plywood (without sheathing) .....	see Sec. 824.2
Exterior plywood (with sheathing) .....	$\frac{5}{16}$ inch
Asbestos shingles .....	$\frac{5}{32}$ inch
Asbestos cement boards .....	$\frac{1}{8}$ inch



Aluminum clapboard siding .....	0.024 inch
Formed steel siding .....	29 gage (0.017 in.)
Hardboard siding .....	$\frac{1}{4}$ inch
Particleboard (with sheathing) .....	$\frac{3}{8}$ inch
Particleboard (without sheathing) .....	$\frac{1}{2}$ inch

**854.4.1 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 seven-eighths ( $\frac{7}{8}$ ) inch in width at vertical intervals of not more than sixteen (16) inches and horizontal intervals of not more than thirty-two (32) inches.

**854.4.2 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 (0.017 in.) Galvanized Sheet Gage in thickness mounted on wood or metal furring strips or approved sheathing on the frame construction.

**854.4.3 Height of veneers:** The average height of four (4) inch brick veneer shall be not more than twenty-five (25) feet above its supports on foundation wall or on corbels of masonry or steel; and not more than eighteen (18) feet in height for two (2) inch veneers.

**854.4.4 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 recommended nailing schedule or the approved manufacturer's standards. Shingles and other weather coverings shall be attached with appropriate standard shingle nails to furring strips securely nailed to studs, or with approved mechanically-bonding nails, except when sheathing is wood not less than one (1) inch nominal thickness or plywood not less than five-sixteenths ( $\frac{5}{16}$ ) 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 standards listed in Appendix C. Wood shingles or shakes and asbestos shingles or siding may be nailed directly to nail base fiberboard sheathing not less than one-half ( $\frac{1}{2}$ ) inch nominal thickness with approved corrosion-resistive annular grooved nails when the installation is in accordance with the approved manufacturer's standards listed in Appendix C.

**854.5 Foundation anchorage:** Wall sill plates, a minimum of a two-by-four inch (2" x 4") member, 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 one-half ( $\frac{1}{2}$ ) inch diameter. The bolts shall be embedded in foundations to a depth of not less than eight (8) inches poured in place concrete, and not less than fifteen (15) inches

in grouted unit masonry. There shall be a minimum of two (2) anchor bolts per section of plate and anchor bolts shall be placed twelve (12) inches from the end of each section of plate with intermediate bolts spaced a maximum of eight (8) feet on center.

#### **854.6 At-grade protection**

**854.6.1 Wood framing:** All exterior wood framework of buildings, whether structural or non-loadbearing, shall be supported on approved foundation walls at least eight (8) inches above the finished grade, and higher when necessitated by greater average snow fall. 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 874.0 shall be complied with.

**854.6.2 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.

#### **854.7 Floors**

**854.7.1 Bridging:** Except as hereinafter noted, in all floor, attic and roof framing, there shall be not less than one (1) line of bridging for each eight (8) feet of span. The bridging shall consist of not less than one-by-three (1x3) 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. Mid-span bridging is not required for floor, attic or roof framing in one- and two-family dwellings (use group R-3) and multi-family dwellings (use group R-2) except when the joist depth exceeds twelve (12) inches nominal and/or when the minimum uniformly distributed live load exceeds forty (40) psf.

**854.7.2 Flooring:** The flooring of wood frame construction shall be of adequate strength and stiffness to support required loads and, where necessary for strength and for lateral support of the building, subflooring shall be provided.

#### **854.8 Roofs**

**854.8.1 Types of decking and sheathing:** Roof deck sheathing shall consist of not less than five-eighths ( $\frac{5}{8}$ ) inch boards or plywood of the thickness specified in Section 824.3, 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 one-by-four (1x4) inch roofers spaced not more than six (6) inches on centers or material of equivalent strength and rigidity.

**854.8.2 Wood shingles:** Wood shingles and handsplit shakes complying with the standards listed in Appendix C may be used for roof covering



where permitted in Section 926.0, and may be installed on tight decking or on spaced roof boards.

**854.8.3 Asphalt shingles:** Asphalt shingle roofs shall have an underlay of not less than fifteen (15) pound felt, adequately attached, applied as required for a base sheet. The underlay may be omitted over existing roof or where the slope is five (5) inches to twelve (12) inches or more, or where the shingles are laid not less than three (3) thicknesses at any point.

**854.9 Flashing:** 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; under built-in gutters; at junction of chimneys and roofs; in all roof valleys and around all roof openings.

**854.9.1 Building paper:** When veneers of brick, clay tile, concrete or natural or artificial stone are used, fourteen (14) pound felt or paper shall be attached to the sheathing with flashing wherever necessary to prevent moisture penetration behind the veneer.

**854.10 Interior finish:** In all habitable spaces, interior wall and partition surfaces shall be finished with materials which comply with the requirements of Section 920.0 and are of adequate strength to resist a horizontal force of not less than five (5) psf.

## SECTION 855.0 STRESS SKIN PANELS

**855.1 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 load-bearing members shall be permitted for use in floors, roofs, walls, partitions and ceilings when designed in accordance with accepted engineering practice or meeting the test requirements of Sections 802.0, 803.0 and 804.0.

**855.2 Splices:** Splices and connections between panels shall be weathertight and of sufficient strength to resist two and one-half ( $2\frac{1}{2}$ ) 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.

**855.3 Molded plywood units:** Structural units of plywood or other approved plastics of similar combustible characteristics formed and molded into prefabricated load-bearing members shall conform to the approved rules and shall be identified by the approved label. The design shall be based on accepted engineering analysis confirmed by the tests prescribed in Sections 802.0 and 803.0.

#### **SECTION 856.0 STRUCTURAL GLUED LAMINATED TIMBER AND BUILT-UP WOOD CONSTRUCTION**

**856.1 General:** Buildings and structures may be designed and erected of glued laminated structural members or of composite members of plywood and dimension lumber.

**856.2 Structural glued laminated timber members:** Stress rated fabricated units of suitably selected and prepared wood laminations not exceeding two (2) inches in net thickness, which may be comprised of pieces joined end to end or of pieces placed or glued edge to edge, securely bonded together with adhesives so that the grain of all laminations is approximately parallel longitudinally shall be designed and manufactured under controlled material procedure to meet the requirements of timber construction standards listed in Appendices B and C.

**856.3 Glued laminated members and plywood components:** Built up beam and column sections consisting of one (1) or more webs with glued lumber flanges and stiffeners shall be designed in accordance with accepted engineering analysis. 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 the applicable standards listed in Appendices B and C.

**856.3.1 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 not be prohibited.



## **ARTICLE 8—Part C**

### **BUILDING ENCLOSURES, WALLS AND WALL THICKNESS**

#### **SECTION 857.0 ENCLOSURE WALLS**

**857.1 General:** All buildings, except as may be provided for miscellaneous structures 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 214 and as required in this code for location, use and type of construction.

**857.2 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 309.0.

**857.3 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.

**857.4 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 906.2.

#### **857.5 Glass in walls**

**857.5.1 Labeling:** Each light of glass shall be labeled with a removable paper label showing type, thickness and manufacturer. 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 perma-

nent labeling. This type of glass shall be labeled with a removable paper label by the manufacturer.

**857.5.2 Glass supports:** Where one (1) 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 713.4 for secondary framing members. The elevation of the glazed opening shall be computed by adding the distances from grade to the head and sill, respectively, and dividing the sum by two (2).

**857.5.3 Glass dimensional tolerance:** Glass thickness tolerances shall comply with those established in the Table 857. Where thickness is to be controlled, nominal values are stated subject to the tolerances shown in the following Table 857.

**Table 857**  
**MINIMUM GLASS THICKNESS**

Nominal thickness	Plate glass min. thickness (inches)	Sheet glass min. thickness (inches)
SS	.....	0.085
DS	.....	0.115
$\frac{1}{8}$	0.094	.....
$\frac{3}{16}$	0.156	0.182
$\frac{13}{64}$	0.172	.....
$\frac{7}{32}$	.....	0.205
$\frac{1}{4}$	0.218	0.236
$\frac{5}{16}$	0.281	.....
$\frac{3}{8}$	0.343	0.357
$\frac{1}{2}$	0.468	0.478
$\frac{5}{8}$	0.562	.....
$\frac{3}{4}$	0.689	.....
$\frac{7}{8}$	0.750	.....
1	0.875	.....
$1\frac{1}{4}$	1.125	.....

**857.5.4 Wind loads:** Glass exposed to wind pressure shall be capable of withstanding the design criteria of Section 713.4 for secondary framing members but shall in no case be less than the thickness prescribed in Table 857.5.4.2. The wind load used to enter Table 857.5.4.2 shall be modified by dividing the load prescribed in Section 713.4 by the value shown in Table 857.5.4.1 for the type of glass involved.



Table 857.5.4.1  
RELATIVE RESISTANCE TO WIND LOAD  
(Assuming equal thickness)

Glass type	Approximate relationship*
Laminated	0.6
Wired glass	0.5
Heat strengthened	2.0
Fully-tempered	4.0
Factory fabricated double glazing**	1.5
Rough-rolled plate	1.0
Sandblasted	0.4
Regular plate or sheet	1.0

\*Before using Table 857.5.4.2 divide the design wind load from Section 713.0 by the value shown here for the glass type involved.

\*\*Use thickness of the thinner of the two lights, not thickness of unit.

**857.5.5 Jalousies:** In jalousie windows and doors regular plate, float sheet or rolled glass thickness shall be not less than three-sixteenths (3/16) inch; glass length shall be not more than forty-eight (48) inches; glass edges shall be smooth. Other types of glass may be used if detailed shop drawings, specifications and analysis by methods described in Section 857.5.2 or test data assuring safe performance for the specific installation are prepared by engineers experienced in this work and approved by the building official.

**857.5.6 Human impact loads:** The provisions of this code shall not be construed to establish safety standards or requirements for architectural glazing materials related to human impact hazards which vary or modify the Safety Standard for Architectural Glazing Materials listed in Appendix B.

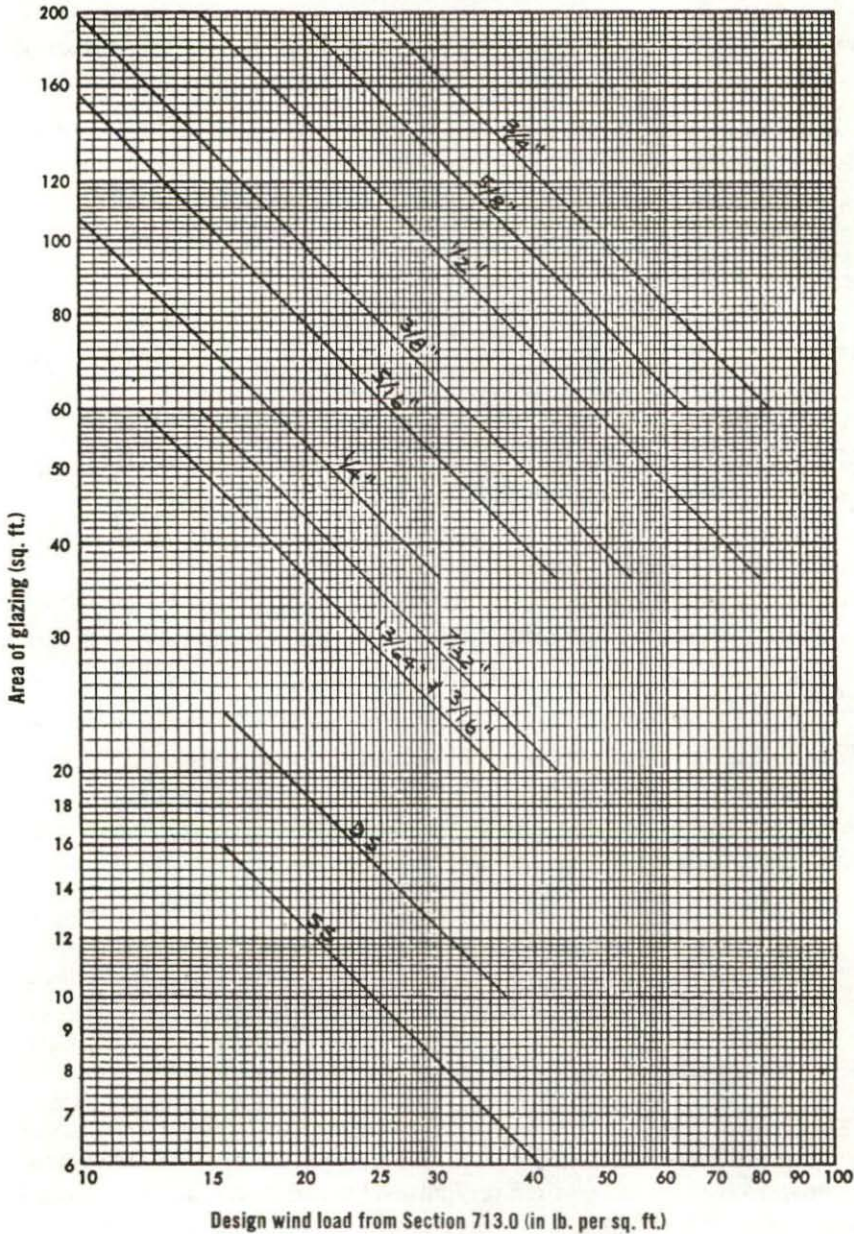
## SECTION 858.0 PROTECTION OF WALL OPENINGS

**858.1 Fire-protected openings:** Openings in exterior walls when required to be fire-protected shall comply with the provisions of Article 9.

**858.2 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 5.

Table 857.5.4.2

REQUIRED NOMINAL THICKNESS OF REGULAR PLATE OR SHEET GLASS  
(Based on minimum thicknesses allowed in Federal Specifications DD-G-451b)  
Design Factor = 2.5





### 858.3 Structural strength

**858.3.1 Against wind forces:** In all buildings required to resist wind pressure under the provisions of Article 7, exterior window openings shall be designed to resist the specified wind load when such protectives are more than one hundred (100) square feet in area in the first story or more than fifty (50) square feet in area in the upper stories.

**858.3.2 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 7 blowing both inwardly and outwardly.

## SECTION 859.0 FIRE ACCESS PANELS

**859.1 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.

**859.2 Multi-story buildings:** In all exterior walls of the building required to have thirty (30) foot wide open space adjacent thereto (see Sections 305.2 and 306.2), each floor below the thirteenth (13th) floor shall be provided with access panels as follows:

1. if such access panels are not less than thirty-two (32) inches by forty-eight (48) inches in size, they shall be spaced not more than one hundred (100) feet apart in each story; or
2. if such access panels are not less than twenty-two (22) inches by forty-two (42) inches in size, they shall be spaced not more than thirty (30) feet apart in each story.

**859.3 Single-story buildings:** In one (1) story buildings, not more than eighty-five (85) feet in height:

1. roof vents shall be provided, spaced not more than one hundred twenty-five (125) feet apart; and
2. grade level doors, or fire access panels shall be provided spaced not more than one hundred twenty-five (125) feet apart in all exterior walls of the building required to have thirty (30) foot wide open space adjacent thereto (see Sections 305.2 and 306.2)

**859.4 Construction of access panels:** Access panels shall have a sill height of not more than thirty-six (36) inches; 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 Article 9, which are readily openable from both the outside and inside. Access panels shall be not less than thirty-two (32) inches by forty-eight (48) inches in size, except in buildings of moderate fire hazard such as schools and offices, wherein the sizes may be reduced to a minimum of twenty-two (22) inches by forty-two (42) inches.

## SECTION 860.0 STRUCTURAL GLASS BLOCK WALLS

**860.1 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 twenty-five (25) feet in length and twenty (20) feet in height between structural supports and expansion joints; and the area of each individual panel shall be not more than two hundred and fifty (250) square feet. 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 one hundred and forty-four (144) square feet in area, a supplementary stiffener shall be provided behind the panels, anchored thereto and to the structural supports.

**860.2 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 calked to a depth of not less than one-half ( $\frac{1}{2}$ ) inch with non-hardening 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 one hundred (100) square feet in area nor more than ten (10) feet in either length or height.

**860.3 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 712.0, 713.0 and 716.0.

**860.4 Interior wall panels:** Structural glass blocks shall not be used in fire walls or party walls or for load-bearing 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, except that wood strip framing may be used in partitions not required to be fire-resistance rated.

**860.5 Fire-resistance rating:** Nothing herein contained shall be construed to prohibit the use of glass blocks in an opening protective assembly



or non-bearing partition or wall when required to afford a specific fire-resistance rating, provided approval of the building official is secured after satisfactory time-temperature performance under the prescribed test procedure of Article 9.

**860.6 Access panels:** Access panels shall be provided in exterior glass block walls for fire department use to comply with Section 859.0.

### SECTION 861.0 WALL FACINGS AND VENEERS

**861.1 Backing surfaces for veneers:** Veneers for other than frame buildings, shall be attached only to substantial, rigid, noncombustible surfaces which are plumb, straight and of true plane; and wood backing surfaces shall not be used, except in frame 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.

**861.2 Veneer thickness:** Materials used for non-bearing veneers on masonry walls shall not have less than the thickness indicated in Table 861.

**861.2.1 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 861  
MINIMUM THICKNESS OF NONBEARING VENEERS ON MASONRY WALLS

Ceramic veneer (architectural terra cotta, anchored type)	1 inch
Brick	2 inches
Stone (natural)	2 inches
Stone (cast artificial)	1½ inches
Clay tile (structural)	1¾ inches
Clay tile (flat slab)	¾ to 1 inch
Marble slabs	1 inch
Precast stone facing	¾ inch
Structural glass	1½ inch
Aluminum clapboard siding	.024 inch
Metal (approved corrosion-resistive)	No. 28 Galvanized Sheet Gage (0.019 in)

### SECTION 862.0 STRUCTURAL GLASS VENEERS

**862.1 Dimensions:** The minimum thickness of glass veneer shall be eleven thirty-seconds ( $1\frac{1}{32}$ ) inch and the area of individual panels shall not exceed ten (10) square feet, with a maximum length of four (4) feet. The edge of each unit shall be ground square with a slight arris; and all exposed, external corners and angles shall be rounded to a radius of not more than three-sixteenths ( $\frac{3}{16}$ ) inch.

## 862.2 Construction

**862.2.1 Backing surface:** The glass veneer shall be set in mastic cement on a float coat of one (1) inch thick cement mortar reinforced with wire lath attached to noncombustible furring spaced not more than twelve (12) inches on centers.

**862.2.2 Support of veneer:** The base course of glass units shall be supported on a corrosion-resistive metal frame anchored to the backing and calked with a waterproof compound at grade.

**862.3 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.

**862.4 Expansion joints:** Expansion joints shall be provided at ends and intermediate sections calked 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.

**862.5 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 863.0 THIN STONE AND TILE VENEERS

**863.1 Size of units:** In localities subject to frost and freezing temperatures, tile and terra cotta units shall be frost-proof and shall not be more than two hundred and eighty-eight (288) square inches in area; and where not subject to frost action, the size of the tile may be increased not more than fifty (50) per cent in area.

**863.2 Construction:** One (1) inch thick marble, granite, terra cotta, and similar materials; or ceramic tile facing one-quarter ( $\frac{1}{4}$ ) to one (1) inch in thickness shall be set in accordance with the applicable standards listed in Appendix B.

## SECTION 864.0 METAL VENEERS

**864.1 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.

**864.2 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 on wood studs and furring strips, treated with an approved preservative process.



**864.3 Waterproofing:** All joints and edges exposed to the weather shall be calked with approved durable waterproofing material or by other approved means to prevent penetration of moisture.

**864.4 Grounding metal veneers:** Grounding of metal veneers on all buildings shall comply with the requirements of Article 15 and the National Electrical Code.

### **SECTION 865.0 PLASTIC VENEERS**

**865.1 General:** Veneers of weather-resisting plastics shall comply with the definition of approved plastics in Section 1900.2.1 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.

**865.2 Height limitation:** Plastic veneer shall not be attached to any exterior wall to a height greater than thirty-five (35) feet above grade. Within the fire limits as provided in Section 301.0 exterior veneer shall be limited to the first story.

**865.3 Area limitation:** Sections of plastic veneer shall not exceed two hundred (200) square feet in area. Outside the fire limits the area may be increased by fifty (50) percent.

**865.4 Separation:** Sections of plastic veneer shall be separated by a minimum of four (4) feet vertically.

### **SECTION 866.0 THICKNESS OF SOLID MASONRY WALLS**

**866.1 General:** All masonry walls shall be of the minimum thickness specified in the Building Code Requirements for Masonry listed in Appendix B. The combined stress due to all loads shall not exceed the allowable working stresses specified in this code for the materials of construction.

### **SECTION 867.0 THICKNESS OF PANEL WALLS**

**867.1 Solid panel walls:** Panel, apron or spandrel walls as defined in this code supported at vertical intervals not exceeding thirteen (13) feet in height, shall not be limited in thickness, provided they meet the fire-resistance rating requirements of Article 9 and Table 214, and are constructed of approved noncombustible weather-resisting materials of adequate strength to resist the wind loads specified in Sections 712.0 and 713.0.

**867.2 Hollow panel walls:** Unless constructed of the materials and thickness specified by the accepted engineering standards for masonry, 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 214 for exposure on both faces.

**867.3 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.

**867.4 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 disturbances.

## SECTION 868.0 PARAPET WALLS

**868.1 Required:** Exterior walls required to have a fireresistance rating of one (1) 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 thirty (30) inches above the point where the roof surface and the wall intersect.

**868.2 Not required:** Parapets are not required on:

1. exterior walls and fire walls connecting with roofs of fireproof construction (Type 1A and 1B);
2. an exterior wall of a building, the roof of which is at least three (3) feet 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 thirty (30) feet or more;
4. exterior walls of one- and two-family dwellings (use group R-3) or buildings not exceeding one thousand (1,000) square feet in area;
5. exterior walls of a building where the roof has an angle of more than twenty (20) degrees with horizontal; and
6. exterior walls connecting with roofs of noncombustible construction when the exterior wall is carried up tightly against the underside of the roof deck.

**868.3 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 (1) one-quarter ( $\frac{1}{4}$ ) inch bar in



every third joint, continuous around the corner and extending into the masonry at least three (3) feet from the corner.

### SECTION 869.0 FOUNDATION WALLS

**869.1 Design:** Foundation walls shall be designed to resist frost action and to support safely all vertical and lateral loads as provided in Article 7. 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.

**869.2 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 (8) inch foundation walls shall be permitted under brick-veneered frame and under ten (10) inch cavity walls when the total height of the wall supported, including gables, is not more than twenty (20) feet.

**869.2.1 Reinforced concrete:** When reinforced concrete is required to resist all stresses, foundation walls shall be not less than eight (8) inches thick.

**869.2.2 Hollow and solid masonry and mass concrete:** The thickness of masonry foundation walls shall not be less than shown in Table 869 for the type of foundation and superstructure construction used. The combined height of an eight (8) inch foundation wall and the wall supported shall not exceed thirty-five (35) feet.

**Table 869**  
**THICKNESS OF FOUNDATION WALLS**

Foundation wall construction		Maximum depth below grade (feet) <sup>1,2</sup> Supported wall construction		
Type	Thickness (inches)	Frame	Masonry veneer	Masonry
Hollow masonry	8	4 (6)	4.5 (6)	5 (7)
	10	5 (7)	5.5 (7)	6 (7)
	12	7	7	7
Solid masonry	8	5 (7)	5.5 (7)	6 (7)
	10	6 (7)	6 (7)	6.5 (7)
	12	7	7	7
Mass concrete	8	7	7	7

**Note 1.** Depth below grade may be increased up to that indicated in parentheses where such increased is warranted by soil conditions and local experience and is approved by the building official.

**Note 2.** Where height of unbalanced fill (height of finish grade above basement floor or inside grade) exceeds seven (7) feet, foundation wall thickness shall be determined by structural analysis as required in Section 870.2.

**869.2.3 Hollow unit walls:** Foundation walls of approved hollow masonry units shall be provided with not less than four (4) inches of solid masonry at girder bearings or shall be strengthened with buttresses.

**869.2.4 Rubble stone:** Foundation walls of rough or random rubble stone shall be not less than sixteen (16) inches thick.

**869.2.5 Bonding:** All foundation walls shall be bonded as required for superstructure walls in Section 835.0.

**869.3 Increased thickness with depth:** When any foundation wall, other than a wall that is designed as a retaining wall, extends more than twelve (12) feet below the top of the first floor beams, the thickness of the wall shall be increased four (4) inches for each additional twelve (12) feet or fraction thereof in depth.

**869.4 Corbels on eight inch walls:** Where an eight (8) inch wall is corbeled, the top corbel course shall be a full header course of headers at least six (6) inches in length, extending not higher than the bottom of the floor framing. The maximum projection of one (1) unit shall neither exceed one-half ( $\frac{1}{2}$ ) the depth of the unit nor one-third ( $\frac{1}{3}$ ) its width at right angles to the face which is offset.

**869.5 Lateral stability:** Foundation walls of buildings and structures which serve as retaining walls shall conform to the applicable requirements of Section 870.0 or shall be strengthened with buttresses or additional wall thickness to resist lateral soil and hydrostatic pressure when subjected thereto.

## SECTION 870.0 RETAINING WALLS

**870.1 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 of accepted engineering practice (see Section 874.5).

**870.2 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.

**870.3 Hydrostatic pressure:** Unless drainage is provided, the hydrostatic head of water pressure shall be assumed equal to the height of the wall.

**870.4 Coping:** All masonry retaining walls other than reinforced concrete walls shall be protected with an approved coping.

**870.5 Guard rails:** Retaining walls with a difference in grade level on each side of the wall in excess of four (4) feet shall be provided with a forty-two (42) inch high guard rail or other approved protective measure.



**SECTION 871.0 ISOLATED PIERS**

**871.1 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 on the top of the pier.

**SECTION 872.0 WATERPROOFING AND FLOODPROOFING**

**872.1 General:** The exterior structural elements of all buildings herein specified shall be waterproofed in accordance with the approved rules.

**872.2 Steel frame:** Exterior steel columns and girders, before embedment in masonry of the required fireresistance rating specified in Table 214, shall be protected from moisture by approved waterproofing material, a parging coat of cement mortar or by a minimum of eight (8) inches of weather-tight masonry.

**872.3 Chases:** The backs and sides of all chases in exterior walls with less than eight (8) inches of approved masonry to the exterior surface shall be insulated and waterproofed.

**872.4 Foundations:** Exterior walls below grade and the cellar floors of all buildings for institutional and residential uses (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 709.0 and 870.0. The basement walls of buildings in the residential use groups and the walls of all habitable and occupiable rooms and spaces below grade shall be protected with not less than a one (1) coat application of approved waterproofing paint, or a one-half ( $\frac{1}{2}$ ) inch parging coat of portland cement mortar or other approved dampproof covering.

**872.4.1 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 B.

**872.5 Types of waterproofing:** The processes and methods used to render buildings, structures or parts thereof watertight as herein required shall comply with accepted engineering practice covering types of waterproofing.

**872.6 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 873.0 RATPROOFING

**873.1 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.

### 873.2 Grade protection

**873.2.1 Apron:** When required for protection against rodents, 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 (4) inches in thickness or of other approved nondecayable, water-resisting and rat-proofing material of required strength, shall be installed around the entire perimeter of the building.

**873.2.2 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 (8) inches above, nor less than twenty-four (24) inches 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 724.0. When the superstructure walls are not constructed of masonry, the spaces between studs shall be filled to a height of two (2) feet above grade with concrete or other material indestructible by rats.

**873.3 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.

### 873.4 Opening protection

**873.4.1 Wall openings:** Openings in the apron required for ventilation or other purposes shall be guarded with corrosion-resistive rodent-proof shields of not less than No. 22 Galvanized Sheet Gage (0.034 in.) perforated steel sheets, or No. 20 B & S gage aluminum or No. 16 Galvanized Sheet Gage (0.064 in.) expanded metal or wire mesh screens, with not more than one-half ( $\frac{1}{2}$ ) inch mesh openings.

**873.4.2 Slab openings:** Access openings in grade floor slabs shall be protected with concrete, masonry, metal or other corrosion-resistive non-combustible covers of adequate strength to support the floor loads.

**873.4.3 Pipes and conduits:** All openings for pipe, conduit, cable and similar purposes at or near grade shall have snugly-fitted collars to eliminate all open spaces.



**SECTION 874.0 PROTECTION AGAINST DECAY AND TERMITES**

**874.1 Approval:** The term "approval" as used in the following statements means approval in accordance with the procedure established by this code.

**874.2 Where conditions are favorable to decay**

**874.2.1 Wood in contact with the ground:** All wood in contact with the ground and supporting permanent structures shall be approved treated wood.

**874.2.2 Untreated wood:** Untreated wood may be used where entirely below ground water level or continuously submerged in fresh water; and may be used in contact with the ground for detached accessory buildings not intended for human occupancy, for temporary structures and for fences.

**874.3 Wood joists or the bottom of wood structural floors:** When wood joists or the bottom of wood structural floors without joists are closer than eighteen (18) inches, or wood girders are closer than twelve (12) inches, to exposed ground located within the periphery of the building over crawl spaces or unexcavated areas, they shall be approved durable or treated wood. Ventilation shall be provided as required in Section 507.0.

**874.4 Sills:** All sills which rest on concrete or masonry exterior walls and are less than eight (8) inches from exposed earth shall be of approved durable or treated wood.

**874.4.1 Sleepers and sills:** Sleepers and sills on a concrete or masonry slab which is in direct contact with earth shall be of approved durable or treated wood.

**874.4.2 Posts or columns:** Posts or columns in cellars shall be supported by piers projecting at least two (2) inches above the finish floor and separated therefrom by an approved impervious barrier except when approved durable or treated wood is used. Posts or columns used in damp locations below grade shall be of approved durable or treated wood.

**874.4.3 Wall pockets:** Ends of wood girders entering masonry or concrete walls shall be provided with a one-half ( $\frac{1}{2}$ ) inch air space on top, sides and end, unless approved durable or treated wood is used.

**874.4.4 Clearance between wood siding:** Clearance between wood siding and earth on the exterior of a building shall be not less than six (6) inches.

**874.5 Wood used in a retaining wall:** Wood used in a retaining wall shall be approved durable or treated wood, except as follows:

1. when the wall is not more than two (2) feet in height and is located on the property line; or
2. when the wall is not more than four (4) feet in height and is separated from the property line by a minimum distance equal to the height of the wall.

A retaining wall of durable wood shall not exceed six (6) feet in height. A wood retaining wall shall be separated from any permanent building by a minimum distance equal to the height of the wall.

**874.6 Where approved durable or treated woods are required:** Where approved durable or treated woods are required in this code, the building official may require identification by an approved mark or certificate of inspection. All lumber and plywood required to be preservatively treated shall bear an approved quality mark of an inspection agency that maintains continuing control, testing and inspection over the quality of the product as described in the quality control standards listed in Appendix C.

**874.7 Pressure treatment:** Where pressure treatment of wood members is required by this code, preservatives and methods of treatment shall conform to the standards for pressure treatment and preserving of lumber listed in Appendix C.

**874.7.1 Geographical areas:** In those geographical areas where experience has demonstrated a need for greater protection, the requirements in the preceding items may be modified to the extent required by local conditions.

## **SECTION 875.0 FIRE PROTECTION AND FIRESTOPPING**

**875.1 General:** To prevent the free passage of flame through concealed spaces or openings in event of fire, provision shall be made to trim all combustible framing away from sources of heat, to provide effective fire barriers against the spread of fire between all subdivisions and all stories of the building, to provide adequate fire separation against exterior exposure, and to firestop all vertical and horizontal draft openings as specified herein or in Section 919.2.

**875.2 Beam separation in ordinary construction (Types 3B and 3C):** All wood and other combustible floor, roof and other structural members framing into masonry walls shall be cut to a bevel of three (3) inches in the depth and shall project not more than four (4) inches into the wall; and the distance between embedded ends of adjacent beams or joists entering into the wall from opposite sides shall be not less than four (4) inches.

**875.3 Girder separation in heavy timber construction (Type 3A):** Wood girders framing into walls shall have at least eight (8) inches of masonry between their ends and the outside face of walls and at least eight (8) inches of masonry between adjacent beams entering the wall from opposite sides. The girders shall be fire-cut, supported in pockets or in self-releasing metal boxes, or otherwise supported to minimize destruction of the wall in the event of fire.



**875.4 Flues and chimneys:** Combustible framing shall be trimmed not less than two (2) inches away from all flues, chimneys and fireplaces, and six (6) inches away from flue openings.

**875.5 Fireplaces:** Hearths of noncombustible construction and fireboards, mantels and other combustible trim shall comply with Section 1007.0 governing fireplace construction.

**875.6 Concealed roof spaces:** Concealed roof spaces of all buildings, except where the roof and attic are of noncombustible or fireproof construction, shall be subdivided into areas not exceeding three thousand (3,000) square feet by means of approved fire stops. When doors or other openings are provided in such subdividing partitions, they shall be of noncombustible or similarly protected materials and the construction shall be tightly fitted around all ducts or other assemblies piercing such partitions.

**875.6.1 Automatic fire suppression system:** Attic spaces, equipped with an approved automatic fire suppression system throughout, may be subdivided into areas not exceeding nine thousand (9,000) square feet by means of approved fire stops in compliance with this section.

**875.7 Architectural trim:** Exterior cornices and other exterior architectural elements, where permitted of combustible construction in Section 924.0, or when erected with combustible frames, shall be firestopped at maximum intervals of twenty (20) feet. If non-continuous, they shall have closed ends, with at least four (4) inches separation between adjoining sections.

**875.8 Combustible trim and finish:** The space behind combustible trim and finish where permitted under this code and all other hollow spaces where permitted in fireresistance rated construction shall be back-filled with noncombustible materials or firestopped as required in Section 920.0.

**875.9 Firestopping:** Firestopping meeting the requirements of Section 919.0 shall be provided in stud walls and partitions and in all furred or studded off spaces of masonry walls at each floor level; between the ceiling of the top story and roof space and at maximum intervals of eight (8) feet in all such spaces; at the top and bottom and at least once in the middle of each run of stairs; in concealed wall pockets for sliding doors; at openings for pipes, belts, shafting, chutes and conveyors passing through combustible floors or partitions with close-fitting noncombustible caps or metal shutters or other approved noncombustible means; and in all other locations that would permit the free travel of flame.

## SECTION 876.0 THERMAL INSULATING MATERIALS

**876.1 General:** Insulating batts, blankets, fills or similar types of materials, including vapor barriers and breather papers or other coverings

which are a part of the insulation, incorporated in construction elements shall be installed and used in a manner that will not increase the fire hazard characteristics of the building or any part thereof.

**876.2 Installation in Type 1 and Type 2 construction:** Such materials when exposed as installed in buildings of fireproof or non-combustible (Types 1 or 2) construction shall comply with the requirements of Section 904.2 for Class I materials.

**876.3 Installation in Type 3 and Type 4 construction:** Such materials, when exposed as installed in attic spaces in buildings of ordinary or frame (Types 3 and 4) construction shall comply with the requirements of Section 904.2 for Class III materials.

**876.4 Facings and coverings:** Vapor barriers, breather papers or other coverings of insulating materials, when installed adjacent to or not more than one and one-half (1½) inches from the unexposed surface of ceiling or sidewall interior finish, or when installed in completely enclosed wall, ceiling joist or rafter spaces and firestopped as required in Section 875.0, are not required to have a flame resistance rating.

**876.5 Foam plastics:** Foam plastics shall have a smoke developed rating not greater than four hundred fifty (450) when tested in accordance with ASTM E-84 listed in Appendix G.

Unless otherwise specifically approved, based on accepted diversified tests such as ASTM E-84, ignition temperature and full scale corner tests, the requirements listed below shall apply to all uses of foam plastics in or on walls and ceilings.

1. Foam plastics having a flame spread of seventy-five (75) or less may be used within the cavity of a masonry wall, in cores of masonry units, or within the stud space of an unprotected wood frame wall or on the inside of a building to cover the surface of a complying wall or ceiling if it is fully protected by a thermal barrier of fire-resistive materials having a finish rating of not less than fifteen (15) minutes.
2. Foam plastic insulation having a flame spread of seventy-five (75) or less when tested in a thickness of four (4) inches, may be used in thicknesses up to ten (10) inches for use in cold storage rooms, food processing rooms, ice plants and similar rooms when the room is protected with automatic sprinklers and the insulation is covered with one-half (½) inch portland cement plaster or other approved



material having a finish rating of not less than fifteen (15) minutes.

3. Foam plastic insulation having a flame spread of twenty-five (25) or less may be used in a thickness of not more than four (4) inches when the foam plastic is covered by a metal facing of No. 20 B&S Gage (0.032 inches) aluminum or No. 26 Manufacturers Standard Gage (0.0179 inches) steel or greater thicknesses of either metal and the insulated area is protected with automatic sprinklers. Such panels shall not be used where noncombustible or fireresistance rated construction is required.

# ARTICLE 9

## FIRERESISTIVE CONSTRUCTION REQUIREMENTS

### SECTION 900.0 GENERAL

**900.1 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 fire-protective elements of the building; and the installation of safeguards against the spread of fire to and from adjoining structures.

**900.2 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.

**900.3 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 215.0 and 216.0 and in the following Section 900.3.1.

**900.3.1 Combustible components:** Combustible aggregates may be incorporated in concrete mixtures approved for fireresistance rated construction as provided in Sections 810.0 and 849.0 for gypsum concrete, in Section 844.0 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 material of similar combustible characteristics may be embedded in concrete and masonry construction for securing trim and finish.

### SECTION 901.0 PLANS AND SPECIFICATIONS

**901.1 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 or specifications shall include documentation or supporting data substantiating all required fire-resistance ratings.

## SECTION 902.0 FIRE HAZARD CLASSIFICATION

**902.1 General:** The degree of fire hazard of buildings and structures for each specific use group as defined by the fire grading in Table 902 shall determine the requirements for fire walls, fire separation walls and the segregation of mixed uses as prescribed in Section 213.0 and all structural members supporting such elements unless otherwise provided for in this code.

**902.2 Unclassified uses:** The building official shall determine the fire hazard classification of a building or structure design for a use not specifically provided in Table 902 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 902  
FIRE GRADING OF USE GROUPS

Class	Use group	Fire grading in hours
A-1	Assembly, theatres .....	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 occupants .....	3
I-2	Institutional, incapacitated occupants .....	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 903.0 FIRERESISTANCE TESTS

**903.1 Structural building assemblies:** Built-up masonry units and composite assemblies of structural materials including walls, partitions, columns, girders, beams and 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 214. The fireresistance rating of the floor and ceiling assemblies shall extend to and be tight against the exterior wall.

### **903.2 Column, beam and girder protection**

**903.2.1 Tests without load:** To evaluate column, beam and girder protection for structural units when the fireproofing is not a structural part of the element, in lieu of full size tests of loaded specimens, the structural sections encased in the material proposed for use as insulation and fire protection may be subjected to the standard test procedure without load.

**903.2.2 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, fire protective coverings or insulating enclosing materials need not be provided for such elements.

### **903.3 Roof coverings**

**903.3.1 Test procedure and classification:** Roof covering materials shall be classified in accordance with the severity of exposure to exterior fire and ability to resist the spread of fire from surrounding buildings and structures when tested in accordance with the roof covering standard listed in Appendix G.

**903.3.2 Class A roofings:** Are those which are effective against severe fire exposure. In addition to roof coverings which have been classified, asbestos cement, metal, portland cement concrete, slate, concrete masonry and tile are acceptable where Class A roof coverings are required.

**903.3.3 Class B roofings:** Are those which are effective against moderate fire exposure.

**903.3.4 Class C roofings:** Are those which are effective against light fire exposure.

**903.3.5 Non-classified roofings:** Are those not tested.

### **903.4 Opening protectives**

**903.4.1 Fire assembly:** Shall include the fire doors, fire window, or fire damper and all required hardware, anchorage, frames and sills necessary for the assembly.

**903.4.2 Labeled fire doors:** Opening protective assemblies including the frames, hardware and operation which comply with the standards listed in Appendix G and accepted practice, including shop inspection, of an accredited authoritative testing or inspection agency shall be deemed to meet the requirements of this code for their recommended and approved locations and use as listed in Section 915.0.



**903.4.3 Door openings more than 120 square feet:** Labeled fire doors for openings which are more than one hundred and twenty (120) square feet in area may be approved as conforming to all the standard construction requirements of tested and approved fire door assemblies except as to size.

**903.4.4 Labeled fire windows and shutters:** Fire window assemblies and shutters which comply with Section 916.0, and the standards listed in Appendix G and accepted practice of an accredited authoritative testing or inspection agency shall be deemed to meet the requirements of their recommended and required locations under this code.

**903.4.5 Labeled fire dampers:** Only fire dampers which have been tested in accordance with the standards listed in Appendix G and listed by an accredited authoritative testing or inspection agency shall be deemed to meet the requirements of this code.

**903.5 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.

**903.5.1 Tests:** The following tests shall serve as criteria for acceptance of building materials (when tested in the form and thickness in which they are used) as set forth in Sections 215.0, 216.0 and 217.0 governing the combustibility of building materials for use in Types 1, 2 and 3 construction.

1. Materials which pass the test procedure for defining noncombustibility of elementary materials set forth in ASTM E 136 listed in Appendix G when exposed to a furnace temperature of thirteen hundred eighty-two (1382) degrees F. for a period of five (5) minutes, and do not cause a fifty-four (54) degrees F. above the furnace air temperature at the beginning of the test and which do not flame after an exposure of thirty (30) seconds.
2. Materials having a structural base of noncombustible material as defined in paragraph 1 above, with a surfacing not more than one-eighth ( $\frac{1}{8}$ ) inch thick which has a flame-spread rating not greater than fifty (50) when tested in accordance with the method of test for surface burning characteristics of building materials as set forth in ASTM E 84 listed in Appendix G.

The term noncombustible does not apply to the flame spread characteristics of interior finish or trim materials. A material shall not be classed as 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.

**903.6 Fire-retardant treated wood**

**903.6.1 Tests:** Where permitted for use as a structural element, fire-retardant treated wood shall be tested in accordance with the standard method of test for surface burning characteristics of building materials (tunnel test) listed in appendix G and shall show a flame spread rating not greater than twenty-five (25) when exposed for a period of not less than thirty (30) minutes, without evidence of significant progressive combustion. The material shall bear the identification of an accredited authoritative testing or inspection agency showing the performance rating thereof.

**903.6.2 Use limitations:** Wood that has been pressure treated with fire-retardant chemicals in accordance with the standards for pressure treatment of lumber or plywood in buildings listed in Appendix G 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 h in Table 214, provided that the assembly in which such material is used shall produce the required fireresistance rating when tested in accordance with the standard method of fire test for building construction and materials listed in Appendix G. Where 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 listed fire hazard classification after being subjected to the Underwriters' Laboratories (ULI) Standard Rain Test. Where used as a structural element, such material shall meet the requirements of Section 903.6.1. Where used as interior finish, such material shall meet the requirements of Section 904.0.

**SECTION 904.0 FLAMERESISTANCE TESTS**

**904.1 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 Appendix G.

**Table 904**  
**INTERIOR FINISH CLASSIFICATION**

Class of material	Surface burning characteristics test (tunnel test)
I	0 to 25
II	26 to 75
III	76 to 200



**904.2 Interior finish materials:** All materials used for interior finish shall be classified in accordance with the Method of Test for Surface Burning Characteristics of Building Materials as listed in Appendix G.

**904.3 Interior hangings and decorations**

**904.3.1 Acceptance criteria:** Where required to be flameresistant under the provisions of this code all materials specified or required for artistic enhancement or use for decorations, draperies, curtains, scenery and hangings shall comply with this section for noncombustible or fire-retardant materials or if treated to be flameresistant shall not generate smoke or gases more dense or more toxic than those given off by untreated wood or paper burning under comparable conditions when tested in the vertical flame test listed in Appendix G.

**SECTION 905.0 SPECIAL FIRERESISTIVE REQUIREMENTS**

**905.1 General:** In buildings or parts thereof of the uses and types of construction herein specified, the general fireresistive requirements of Table 214 and the height and area limitations of Table 305 shall be subject to the exceptions and modifications described in Sections 905.2 through 905.9.

**905.2 Public garages:** All existing buildings and structures altered or converted for use to a garage, motor vehicle repair shop or gasoline service station, more than one (1) story in height, unless of fireproof (Type 1) construction, or heavy timber (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 (1) hour; except that existing roof trusses shall be exempt from all fireproofing requirements.

**905.3 Petroleum bulk storage buildings:** Warehouses for the bulk-storage of not more than fifty thousand (50,000) gallons of lubricating oils with a flash point of not less than three hundred (300) degrees F. in approved sealed containers may be erected outside the fire limits of masonry wall (Type 3) construction not more than five thousand (5,000) square feet in area and not more than one (1) story or twenty (20) feet in height; or to proportionate areas in other types of construction as regulated by Table 305. Not more than one (1) motor vehicle may be stored in such buildings unless separately enclosed with a fire separation wall of two (2) hour fireresistance rating.

**905.4 Packing and shipping rooms:** Every packing or shipping room located on or below a floor occupied for use group M (mercantile) use shall be separated therefrom by fire separation walls or floor-ceiling assemblies of not less than the fire resistance rating of the type of construction but not less than one (1) hour fire resistance rating.

**905.5 Truck loading and shipping areas:** Truck loading and shipping areas shall be permitted within any use group B (Business) building, provided such areas are enclosed in construction of not less than the fire resistance rating of the type of construction as set forth in Table 214 but not less than one (1) hour, and direct access is provided therefrom to the street.

#### **905.6 Use group R (residential) buildings**

**905.6.1 Protected ordinary construction:** Multi-family dwellings (use group R-2) of protected ordinary (Type 3B) construction may be increased to six (6) stories or seventy-five (75) feet in height when the first floor construction above the basement or cellar has a fire resistance rating of not less than three (3) hours and the floor area is subdivided by two (2) hour fire walls into fire areas of not more than three thousand (3,000) square feet.

**905.6.2 Protected noncombustible construction:** When of protected noncombustible (Type 2B) construction, multi-family dwellings (use group R-2) may be increased to nine (9) stories or one hundred (100) feet in height when separated by not less than fifty (50) feet from any other building on the lot and from interior lot lines, the exitways are segregated in a fire area enclosed in a fire wall of two (2) hour fire resistance rating and the first floor construction has a fire resistance rating of not less than one and one half (1½) hours.

**905.6.3 Retail business use:** The first floor of buildings of unprotected noncombustible (Type 2C), masonry wall (Type 3C) or frame (Type 4 B) construction may be occupied for retail store use, provided the floor-ceiling assembly and enclosure walls are protected to afford one (1) hour fire resistance rating and the exitways from the residential floors are separately enclosed in accordance with the requirements of Article 6.

#### **905.7 Grade floor protection**

**905.7.1 Non-fireproof construction:** In all buildings other one- and two-family dwellings (use group R-3) and other than fireproof (Type 1) construction with habitable or occupiable stories or basements below grade, the floor-ceiling assemblies and supports below the grade floor shall be protected by one (1) of the following methods:



1. fireresistance rating of not less than one (1) hour, or
2. heavy mill (Type 3A) construction, or
3. automatic fire suppression system.

The fireresistance rating provided shall not be less than the rating required by Table 214 for type of construction.

**905.7.2 Protected noncombustible construction:** In all buildings of protected noncombustible (Type 2A) construction, more than four (4) stories or fifty (50) feet in height, in other than residential (R) use groups, the floor-ceiling assembly above the basement or cellar shall be constructed with a fireresistance rating of not less than two (2) hours.

**905.7.3 Basement assembly uses:** Places of public assembly for amusement, entertainment, instruction, or service of food or refreshment shall not be located in stories or rooms below grade unless the floor-ceiling assembly above and below is of not less than one and one-half (1½) hour fireresistance rating.

**905.8 Noncombustible construction exemptions:** One (1) story buildings of Type 2C construction which do not exceed three thousand (3,000) square feet in area in all use groups except high hazard (H), assembly (A) and institutional (I) shall be exempt from all protected exterior wall requirements.

**905.9 Interior partitions:** In buildings and structures of other than institutional (I) and residential (R) use groups of fireproof (Type 1) and protected noncombustible (Types 2A and 2B) constructions, 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 thirty (30) or more in areas occupied by a single tenant and not exceeding five thousand (5,000) square feet between fire separation assemblies or fire walls. An area not exceeding seventy-five hundred (7500) square feet may be subdivided with fireretardant treated wood when complying with Section 903.6.

**905.10 Plenums:** The use of uninhabited basements, cellars, crawl spaces, 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 one- and two-family dwellings, provided such air plenums meet the requirements of other applicable articles of this code and of the mechanical code listed in Appendix B and provided fuel-fired equipment or exposed combustible materials are not located therein. The use of air ceiling plenums shall be confined to one (1) 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 fireresistive rating. Insulated cold water, hot water, steam, fire protec-

tion 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 the National Electrical Code listed in Appendix B. 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 one- and two-family dwellings only. Crawl spaces not used as storage areas in one- and two-family dwellings may be used for air distribution systems.

**905.11 Fire dampers:** Except when proper fire tests have shown that fire dampers are not necessary to maintain the integrity of the fireresistance rated assembly, fire dampers complying with the SMACNA Fire Damper Guide, listed in Appendix B or UL 555 listed in Appendix G, shall be installed in the following locations:

1. Ducts penetrating a fire wall. (When a fire wall is of three (3) hour or greater fire endurance, a fire door is required.)
2. Ducts passing through a fire separation wall.
3. Ducts penetrating a fireresistance rated shaft wall. Sub-ducts extending twenty-two (22) inches vertically upward may be used in lieu of fire dampers for exhaust ducts.
4. Ducts penetrating the ceiling of a fireresistance rated floor/roof-ceiling assembly.
5. Ducts penetrating fireresistance rated corridor walls, unless the building is completely sprinklered or unless the ducts are part of an engineered smoke removal system.

## **SECTION 906.0 EXTERIOR WALLS**

**906.1 General:** All exterior walls shall comply with the structural provisions of Articles 7 and 8 and with the fireresistance rating requirements of Table 214.

**906.2 Exceptions:** 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; except that 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 214; 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 214.

### **906.3 Vertical separation of windows**

**906.3.1 Where required:** In all buildings and structures designed for business (B), factory and industrial (F), high hazard (H), mercantile (M) or storage (S) uses, exceeding three (3) stories or forty (40) feet in height, openings located vertically above one another in exterior walls which are required to have a fireresistance rating of more than one (1) hour shall be separated by apron or spandrel walls not less than three (3)



feet in height extending between the top of any opening and the bottom of the opening next above.

**906.3.2 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 214; except when such required rating exceeds one (1) hour, approved wire glass construction in fixed noncombustible sash and frames not exceeding one-third ( $\frac{1}{3}$ ) of the area of such apron or spandrel may be located therein, and except further that in exterior non-bearing enclosure walls which are not required to be of more than one (1) hour fireresistance rating the provisions of this section in respect to apron or spandrel walls shall not apply.

### SECTION 907.0 FIRE WALLS AND PARTY WALLS

**907.1 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 214 for the type of construction, but not less than the fire grading of the use group specified in Table 902. The construction shall comply with all the structural provisions for bearing or nonbearing walls of this code.

**907.2 Solid masonry:** When constructed of solid masonry, the wall thickness shall be not less than the requirements of Section 866.0.

**907.3 Reinforced concrete:** When constructed of reinforced concrete, the wall thickness shall be not less than nine (9) inches for the uppermost thirty-five (35) feet or portion thereof measured down from the top of the wall.

**907.4 Cutting walls:** A wall, eight (8) inches or less in thickness, shall not be cut for chases or socketed for insertion of structural members subsequent to erection (see Section 837.0).

**907.5 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 four (4) inches above, below and between the structural members, with noncombustible materials approved for firestopping in Section 919.0. The wall shall be not less than the minimum thickness specified in the Building Code Requirements for Masonry listed in Appendix B.

**907.6 Combustible insulation:** The building official may permit the application of cork, fiberboard 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 823.0 and 876.0.

**907.7 Continuity of walls:** In all buildings and structures, walls shall be continuous from foundation to two (2) feet eight (8) inches above the roof surface, except for the following.

1. 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.
2. The wall may terminate at the underside of the roof deck in Types 3 and 4 construction if properly firestopped, and the roof sheathing or deck is constructed of approved noncombustible materials for a distance of four (4) feet on either side of the wall and combustible material does not extend through or over the wall.

**907.8 Offset fire walls:** If fire walls are offset at intermediate floor levels in fire-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 908.0 FIRE WALL OPENINGS

**908.1 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 903.0 and 914.0.

**908.2 Size of opening:** Except in sprinklered buildings, an opening through a fire wall shall not exceed one hundred and twenty (120) square feet in area, and aggregate width of all openings at any floor level shall not exceed twenty-five (25) per cent of the length of the wall.

**908.2.1 First story exception:** When the entire areas on both sides of a fire wall are protected with an approved automatic fire suppression system complying with the requirements of Article 12, openings designed for the passage of trucks may be constructed not more than two hundred and forty (240) square feet in area with a minimum distance of three (3) feet between adjoining openings. Such openings shall be protected with approved automatic opening protectives of three (3) hour fireresistance rating and provided with an approved water curtain for such openings in addition to all other requirements.

**908.3 Opening protectives:** Every opening in a fire wall shall be protected on both sides with an approved automatic protective assembly as herein required, or the approved labeled equivalent, except horizontal exit openings.

**908.3.1 Hold-open devices:** Heat-actuated hold-open devices used on an automatic fire assembly providing three (3) hour fireresistance rating shall be installed, one (1) on each side of the wall at ceiling height where the ceiling is more than three (3) feet above the opening. Fire assemblies protecting openings required to have one and one-half (1½), one (1) or



three-fourths ( $\frac{3}{4}$ ) hour fireresistance rating, and which are not exitway doors, may be activated in a similar manner, or by a single fusible link incorporated in the closing device. Doors opening in a means of egress shall be closed by actuation of a smoke detector conforming to the standards listed in Appendix I.

## SECTION 909.0 FIRE SEPARATION WALLS

### 909.1 Uses

**909.1.1 Mixed uses:** When a building contains more than one (1) 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 213.0.

**909.1.2 One- and two-family dwellings:** The requirements for the construction of fire separation walls in buildings containing single-family dwellings or two-family dwellings (use group R-3) are as follows.

**Two-family dwelling, superimposed dwelling units:** When one (1) dwelling unit of a two-family dwelling is located wholly or partly above the other dwelling unit, the two (2) dwelling units shall be completely separated by fire separation walls and floor-ceiling assemblies of not less than one (1) hour fireresistance rated construction.

**Two-family dwelling, side-by-side dwelling units:** When adjacent dwelling units of a two-family dwelling are attached by a common wall, said wall shall be a fire separation wall, having a minimum one (1) hour fireresistance rating that shall serve to completely separate the dwelling units.

**Multiple, single-family dwellings; side-by-side:** When multiple, single-family dwellings (use group R-3) are attached by a common wall, said wall shall be a fire separation wall, having a minimum one (1) hour fireresistance rating. Said wall shall extend from the foundation to the underside of the roof sheathing, and to the inside of the exterior wall sheathing.

**Multiple, two-family dwellings; side-by-side:** When multiple, two-family dwellings (use group R-3) are attached by a common wall, said wall shall be a fire separation wall, having a minimum one (1) hour fireresistance rating. Said wall shall extend from the foundation to the underside of the roof sheathing and to the inside of the exterior wall sheathing.

**909.1.3 Exitways:** Fire separation walls required for the enclosure of exitways 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 214; except that such walls may be constructed of combustible materials as regulated by Sections 616.9 and 909.3.

**909.1.4 Other uses:** Fire separation walls used for subdividing purposes other than exitways and areas of refuge shall be constructed of the types of materials and have the minimum fireresistance rating as prescribed by Table 214 for the type of construction.

## **909.2 Openings**

**909.2.1 Size:** Exitway doors located in fire separation walls shall be limited to a maximum aggregate width of twenty-five (25) per cent of the length of the wall and the maximum area of any single opening shall not exceed forty-eight (48) square feet.

**909.2.2 Protectives:** All opening protectives in fire separation walls shall comply with the provisions of Section 903.0 and shall have the minimum fireresistance rating as set forth in Section 915.0.

## **909.3 Combustible stair enclosures**

**909.3.1 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 shall provide an unbroken fire barrier in combination with protected floors, ceilings and fire doors, separating the exitways from the unprotected areas of the building. Such enclosures shall be firestopped to comply with Sections 875.9 and 919.0.

**909.3.2 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 three hundred and sixty (360) square inches in area and a total area in one (1) story of not more than seven hundred and twenty (720) square inches. Such light panels shall comply with the provisions of Section 917.0, and shall be contained in stationary sash and frames of steel or other approved noncombustible materials.

**909.4 Continuity:** All fire separation walls shall extend from the top of the fireresistance rated floor below to the ceiling above, unless otherwise provided for in this code, and shall be securely attached thereto. Where these walls enclose required exitways, areas of refuge and shafts, or where these walls separate mixed uses, they must be continuous through all concealed spaces such as the space above a suspended ceiling, and they must 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 Sections 875.0 and 919.0.

## **SECTION 910.0 VERTICAL SHAFTS**

**910.1 General:** The provisions of this section shall apply to all vertical shaft enclosures, except as provided for stairway enclosures in Sections



616.9 and 909.0, refuse chutes in Section 1107.0, and elevator and dumb-waiter hoistways in Section 1609.0.

**910.2 Open shaft enclosures:** The enclosing wall of shafts that are open to the outer air at the top shall be constructed of materials specified in Article 8 for exterior walls of buildings and structures of the required fireresistance rating specified in Table 214.

**910.3 Covered shaft enclosures:** The enclosing walls and the top of interior covered shafts shall be constructed of approved masonry, reinforced concrete or other approved construction with a fireresistance rating of not less than two (2) hours, except as provided in Section 910.4.

**910.4 Shafts in residential buildings:** In one- and two-family dwellings of other than fireproof or noncombustible construction, shafts may be supported on and constructed of combustible materials or assemblies having a fireresistance rating of not less than one (1) hour and shall extend not less than three (3) feet above the roof with a ventilating skylight of noncombustible construction as specified in Section 924.0.

**910.5 Duct and pipe shafts:** In all buildings other than one- and two-family dwellings, vertical pipes arranged in groups of two (2) or more which penetrate two (2) or more floors and occupy an area of more than one (1) square foot, and vertical ducts which penetrate two (2) or more floors, shall be enclosed by construction of not less than one (1) hour fireresistance rating to comply with this section. All combustible pipes and ducts connecting two (2) or more stories shall be enclosed as indicated herein.

#### **910.6 Top enclosure**

**910.6.1 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, with an area not less than ten (10) per cent of the shaft area.

**910.6.2 Extending to roof:** All shafts that extend to the roof of the buildings shall be covered at the top with a thermostatically controlled skylight of not less than ten (10) per cent of the area of the shaftway, constructed in accordance with the requirements of Section 925.0. The automatic operation of the skylight may be controlled by fusible links designed to operate at a fixed temperature of not more than one hundred and sixty (160) degrees F. or by electric or pneumatic operation under a rapid rise in temperature at a rate of fifteen (15) to twenty (20) degrees F. per minute or by other approved methods.

**910.6.3 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 two (2) feet above the adjoining roof, is equipped with an automatic vent opening, does not face on an interior lot line or within ten (10) feet thereof, and is not located within twenty (20) feet of an opening in adjacent walls.

**910.7 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.

**910.8 Existing shaftways:** In all existing shaftways of buildings of assembly (use group A) and institutional classifications (use group I), which are not already enclosed as herein required, the building official shall direct such construction as he may deem necessary to insure the safety of the occupants, subject to review by a board of survey as provided in Section 127.0.

**910.9 Shaft openings:** Openings other than necessary for the purpose of the shaftway shall not be constructed in shaft enclosures; and all openings shall be protected with approved fire doors, fire windows or fire shutters complying with the provisions of Sections 914.0, 915.0 and 916.0.

## SECTION 911.0 FIRERESISTANCE OF STRUCTURAL MEMBERS

**911.1 Requirements:** The fireresistance rating of construction assemblies and structural members shall comply with the requirements of Table 214 and Section 903.0.

**911.2 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 (2) floors or one (1) floor and roof, or support a bearing wall, or a non-bearing wall more than two (2) 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 912.0, or by a combination of both.

**911.3 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.

**911.4 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 five (5) feet from the finished floor.

**911.5 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 214 for exterior bearing walls for the type of construction and shall be protected against corrosion by an approved method complying with Section 872.0. The interior faces of exterior structural members shall be protected and insulated with coverings of the required fireresistance rating specified for interior structural members in Table 214.

**911.6 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, but the fireresistance rating shall not be less than one (1) hour for members supporting masonry walls.

**911.7 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 more than eight (8) feet in length shall be protected as required for structural members supporting walls for the type of construction.

**911.7.1 Stone lintels:** The use of stone lintels on spans exceeding four (4) feet shall not be permitted unless supplemented by fireresistance rated structural members or masonry arches of the required strength to support the superimposed loads.

**911.8 First story columns:** In buildings of exterior masonry wall (Type 3) construction, required fire protection may be omitted from first story columns supporting enclosure walls located on the street lot line.

## **SECTION 912.0 FIRERESISTANCE RATED FLOOR/ROOF-CEILING ASSEMBLIES**

**912.1 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 one hundred (100) square inches in any one hundred (100) square feet 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.

**912.2 Ceiling panels:** Where the weight of lay-in ceiling panels, used as a part of fireresistive floor-ceiling or roof-ceiling assemblies, is not adequate to resist an upward force of one (1) pound per square foot (psf), wire

or other approved devices shall be installed above the panels to prevent vertical displacement under such upward force.

**912.3 Firestopping of ceiling spaces:** Floor and roof construction in which the secondary structural members are not individually encased in fireresistance rated materials or assemblies of component materials, shall be firestopped in areas of not more than three thousand (3,000) square feet with noncombustible materials. Such firestopping shall comply with Section 919.0, or solid web structural members may be substituted for such firestops. Where floor and roof construction with accompanying ceilings is made entirely of noncombustible or fireproof construction, firestopping may be omitted.

**912.4 Firestopping of wood joist construction:** Where the ceilings are suspended below wood joist floor construction, the space between the ceiling and the floor above shall be firestopped in areas of not more than one thousand (1,000) square feet with materials meeting the requirements of Section 919.0.

**912.5 Location of firestops:** Firestops shall be located directly over tenant separation walls, if the walls do not extend to the floor above.

**912.6 Unusable space:** In an assembly required to be of one (1) hour fireresistance rating, the ceiling membrane may be omitted over unusable space or the flooring may be omitted where unusable space occurs above.

**912.7 Openings in fireresistance rated floors:** The required fire resistance 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 913.0 ROOF CONSTRUCTION

**913.1 General:** Roof construction shall be protected with noncombustible material or assemblies of noncombustible materials to afford the fireresistance rating required by Table 214 as herein modified.

**913.2 Roofs 20 feet or higher:** When every part of the structural framework of roofs in Type 1 or Type 2 buildings is twenty (20) feet 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, in accordance with Section 217.1, may be used for such unprotected members in one (1) story buildings.

**Exception:** Buildings of H (High Hazard), S-1 (Moderate Hazard Storage) or M (Mercantile) occupancies when of Type 1 or 2A construction shall not have less than one (1) hour fireresistance rated roof construction.

**913.3 Roof slabs, arches and decking:** Where the omission of fire protection from roof trusses, roof framing and decking is permitted, the horizon-



tal or sloping roofs in Type 1 and Type 2 buildings, immediately above such members, shall be constructed of noncombustible materials of the required strength without a specified fireresistance rating, or of mill type construction in buildings not over five (5) stories or sixty-five (65) feet in height.

**913.4 Firestopping:** Firestopping of ceiling and attic spaces shall be provided as required by Sections 875.0, 912.0 and 919.0.

#### **SECTION 914.0 EXTERIOR OPENING PROTECTIVES**

**914.1 Where required:** Where specified herein, the exterior openings of all buildings and structures other than churches (use group A-4), residential buildings (use groups R-2 and R-3), buildings of unprotected noncombustible (Type 2C) construction, and buildings of frame (Type 4) construction shall have approved opening protectives meeting the requirements of this code and the provisions of Article 4 for special uses and occupancies.

**914.2 Horizontal exposure:** Approved protectives shall be provided in every opening where the fire separation is less than fifteen (15) feet.

**914.3 Vertical exposure:** Approved protectives shall be provided in every opening which is less than fifty (50) feet vertically above the roof of an adjoining or adjacent structure that is within a horizontal distance of thirty (30) feet 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 (1½) hours.

**914.4 First story openings:** The required fireresistance rated opening protectives may be omitted in first story openings facing on a street or other public space not less than thirty (30) feet wide, when not extending more than twenty-five (25) feet above grade.

**914.5 Protected openings:** Required protective assemblies in exterior openings shall be fixed, or they may be self-closing, or provided with approved automatic self-closing devices.

**914.6 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 Article 8 and Article 19.

#### **SECTION 915.0 FIRE DOORS**

**915.1 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 Sections 903.0 and 904.0 and the fireresistance ratings herein required, unless otherwise specifically provided for in this code.

**Table 915**  
**FIRE DOOR FIRERESISTANCE RATINGS**

Location	Fire resistance rating in hours
Fire walls and fire separation walls of three (3) or more hour construction .....	3
Fire walls, fire separation walls and exitway enclosures of two (2) hour construction ..	1½
Shaft enclosures and elevator hoistways of two (2) hour construction .....	1½
Shaft enclosures of one (1) hour construction .....	1
Fire separation walls of one (1) hour construction .....	¾

**915.2 Labeled protective assemblies:** Labeled protective assemblies meeting the requirements of Sections 903.4.2 and 903.4.4 and the applicable standards listed in Appendix I, including shop inspection, shall be approved for use as provided for in this code.

### **915.3 Multiple doors**

**915.3.1 Fire walls:** Two (2) doors, each with a fire resistance rating of one and one-half (1½) hours, installed on opposite sides of the same opening, shall be deemed equivalent in fire resistance rating to one (1) three (3) hour fire door.

**915.3.2 Fire separation walls:** Two (2) doors of three-quarter (¾) hour fire resistance rating each, installed on opposite sides of the same opening shall be deemed equivalent in fire resistance rating to a one and one-half (1½) hour fire door; except when used in a required exitway.

**915.4 Glass panels:** Wired glass panels shall be permitted in fire doors within the limitations of Section 917.0 and as herein specifically prescribed.

**915.5 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 accept the use of rate of rise heat actuated 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 916.0 FIRE WINDOWS AND SHUTTERS**

**916.1 Fire resistance rating:** Approved assemblies of fire windows and fire shutters shall meet the test requirements of Sections 903.0 and 904.0 or shall be approved labeled assemblies meeting the requirements of Section 903.4.4.

**916.1.1 Exception:** Steel window frame assemblies of one-eighth (⅛) inch 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 one-quarter ( $\frac{1}{4}$ ) inch wire glass as required in Section 917.0 when securely installed in the building construction and glazed with one-quarter ( $\frac{1}{4}$ ) inch labeled wired glass, shall be deemed to meet the requirements for a three-quarter ( $\frac{3}{4}$ ) hour fire window assembly.

**916.2 Window mullions:** All metal mullions which exceed a nominal height of twelve (12) feet shall be protected with insulating materials to afford the same fireresistance rating as required for the wall construction in which the protective is located.

**916.3 Swinging fire shutters:** When fire shutters of the swinging type are used in exterior openings, not less than one (1) row in every three (3) vertical rows shall be arranged to be readily opened from the outside and shall be identified by distinguishing marks or letters not less than six (6) inches high.

**916.4 Rolling fire shutters:** When fire shutters of the rolling type are used, they shall be of approved counterbalance construction that can be readily opened from the outside.

### SECTION 917.0 WIRED GLASS

**917.1 Maximum size:** One-quarter ( $\frac{1}{4}$ ) inch wired glass, which has been listed and labeled for use in approved labeled opening protectives, may be used with the size limitations described in Table 917.

Table 917  
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 & 1½ hour, Class B doors	100	33	10
¾ hour, Class C door	1296	54	54
1½ hour, Class D door	0	0	0
¾ hour, Class E door	1296	54	54
Fire windows	1296	54	54

**917.1.1 Fire walls:** Wire glass in fire doors located in fire walls shall be prohibited, except when serving as horizontal exits, the self-closing swinging door may be provided with a vision panel of not more than one hundred (100) square inches without a dimension exceeding twelve (12) inches.

**917.1.2 Fire separation walls:** Wired glass vision panels may be used in fire doors of one and one-half (1½) hour fireresistance rating intended for use in fire separation walls; but the glass panels shall not be more than one hundred (100) square inches.

**917.2 Exitway protectives:** Unless specifically required in Article 4 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.

**917.3 Fire separation walls:** One-quarter ( $\frac{1}{4}$ ) inch wired glass panels may be used in fire separation walls used for subdividing purposes as set forth in Section 909.1.3, provided the required fireresistance rating of the wall does not exceed one (1) hour. The maximum size of such panels shall not exceed the limitations for a three-quarter ( $\frac{3}{4}$ ) hour Class C door.

### SECTION 918.0 FIRERESISTIVE REQUIREMENTS FOR PLASTER

**918.1 Thickness of plaster:** The required thickness of fireresistance rated plaster protection shall be determined by the prescribed fire tests for specified use and type of construction and in accordance with the provisions of Section 819.0 for interior plastering and Section 820.0 for 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.

**918.2 Plaster equivalents:** For fireresistive purposes, one-half ( $\frac{1}{2}$ ) inch of unsanded gypsum plaster shall be deemed equivalent to three-quarter ( $\frac{3}{4}$ ) inches of one (1) to three (3) sanded gypsum or one (1) inch portland cement sand plaster.

**918.3 Noncombustible furring:** In fireproof (Type 1) and noncombustible (Type 2) construction, plaster shall be applied directly on masonry or on approved noncombustible plastering base and furring.

**918.4 Double reinforcement:** Except in solid plaster partitions, or when otherwise determined by the prescribed fire tests, plaster protections more than one (1) inch in thickness shall be reinforced with an additional layer of approved lath imbedded at least three quarter ( $\frac{3}{4}$ ) inch from the outer surface and fixed securely in place.

**918.5 Plaster alternates for concrete:** In reinforced concrete construction, gypsum or portland cement plaster may be substituted for one-half ( $\frac{1}{2}$ ) inch of the required poured concrete protection, except that a minimum thickness of three-eighth ( $\frac{3}{8}$ ) inch of poured concrete shall be provided in all reinforced concrete floors and one (1) inch in reinforced concrete columns in addition to the plaster finish and the concrete base shall be prepared in accordance with Section 820.7.

### SECTION 919.0 FIRESTOPPING

**919.1 Where required:** Firestopping shall be designed and constructed



to close all concealed draft openings and to form effectual fire barriers against the spread of fire between stories of every building and in all open structural spaces therein, including the following locations: for the subdivision of attic spaces in Section 875.6; for combustible wall, partition and floor framing in Section 875.0; for ceiling spaces in Section 912.0; for open spaces behind acoustical and other finishes in Section 921.0; for floor sleeper spaces in Section 922.0; and for pipe, duct and flue openings in the mechanical code listed in Appendix B.

**919.2 Firestopping materials:** All firestopping shall consist of approved noncombustible materials securely fastened in place. Firestops of two (2) thicknesses of one (1) inch lumber with broken lap joint or one thickness of  $\frac{3}{4}$ -inch plywood with joints backed by  $\frac{3}{4}$ -inch plywood or of two (2) inch lumber installed with tight joints shall be permitted in open spaces of wood framing.

**919.3 Required inspection:** Firestopping shall not be concealed or covered from view until inspected and approved by the building official.

## SECTION 920.0 INTERIOR FINISH AND TRIM

**920.1 General:** Interior finish and interior 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 one twenty-eighth (1/28) of an inch in thickness, and is applied directly to a noncombustible base or substrate meeting the requirements of Section 903.6.2. Show windows in the first story of buildings may be of wood or of unprotected metal framing.

**920.2 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, 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 heavy timber type construction in Sections 217.0 and 853.0 shall not be subject to interior finish regulations.

**920.3 Smoke or gases:** Interior finish materials shall not be permitted that have a smoke developed factor greater than four hundred and fifty (450) when tested in accordance with the method of test for surface burning characteristics of building materials listed in Appendix G. When restrictions are not otherwise established in this code, interior finish is not controlled, except that pyroloxin or similar finishes shall not be applied which, as dry films, produce excessive smoke or toxic fumes when exposed to fire.

**920.4 Materials:** Material 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 Type 2 construction within the scope permitted in this section or Section 922.0 shall not declassify the building with respect to its type of construction.

**920.4.1 Foam plastics:** Foam plastics shall not be used as interior finish except as provided in Section 876.5, or as interior trim except as provided in Section 920.6.

**920.5 Interior finish:** Interior finish of wall 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 920 when tested in accordance with the requirements of Section 904.0.

**Table 920**  
**INTERIOR FINISH REQUIREMENTS**

Use groups	Required vertical exitways and passageways (d)	Corridors providing exitway access	Rooms or enclosed spaces (a)
A-1 Assembly, theatres	I	I	II (b)
A-2 Assembly, night clubs	I	I	II (b)
A-3 Assembly, halls, terminals, restaurants	I	I	II (b)
A-4 Assembly, churches, schools	I	I	III
B Business	I	II	III
F Factory and industrial	I	II	III
H High hazard	I	II	III
I-1 Institutional, restrained	I	I	I (c)
I-2 Institutional, incapacitated	I	II	I (c)
M Mercantile walls, ceilings	I	II	III (e)
R-1 Residential, hotels	I	II	III
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	I	II	III
S-2 Storage, low hazard	I	II	III

**Note a.** Requirements for rooms or enclosed spaces are based upon spaces enclosed in partitions of the building or structure, and where fire-resistance 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 occupancy 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 place of assembly with a capacity of three hundred (300) persons or less.

**Note c.** Class III interior finish materials may be used in administrative areas. Class II interior finish materials may be used in individual rooms of not over four (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 one thousand (1,000) square feet of applied surface area in the grade lobby when applied directly to a non-combustible base or over furring strips applied to a noncombustible base and fire-stopped as required by Section 921.0.

**Note e.** Class III interior finish materials may be used in mercantile occupancies of three thousand (3,000) square feet or less gross area. Used for sales purposes on the street floor only. (Balcony permitted).



**920.5.1 Basements:** In buildings other than 1- and 2-family residences, 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.

**920.5.2 Maximum flame spread:** Interior finish materials with flame spread classifications in excess of two hundred (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.

**920.6 Interior trim:** Baseboards, chair-rails, mouldings, trim around openings and other interior trim, not in excess of ten (10) per cent 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 Section 915.0 and Section 916.0.

**920.7 Carpets:** Carpet type floor coverings shall qualify under the provisions of the Department of Commerce (DOC) "Pill Test" (DOC FF-1-70) listed in Appendix G.

## SECTION 921.0 APPLICATION OF INTERIOR FINISH

**921.1 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 two hundred (200) degrees F. or less for thirty (30) minutes, or otherwise become loose through changes in the setting medium from the effects of time or conditions of occupancy.

**921.2 Application to structural elements:** Interior finish materials applied to walls, ceilings, or structural elements of a building or structure which are required to be fire-resistance 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 ten (10) square feet in area or eight (8) feet in any dimension.

**921.3 Furred construction:** Where walls, ceilings or other structural elements are required to be fire-resistance rated or to be constructed of noncombustible component materials and interior finish is set out or dropped distances greater than one and three-quarter (1¾) inches 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 automatic fire suppression system (see Note a to Table 920) or is

attached to a noncombustible backing complying with Section 921.6 or to furring strips applied directly to such backing as provided in Section 921.2.

**921.4 Heavy timber construction:** Interior finish materials may be applied directly to the wood members and decking of heavy timber (Type 3 A) construction, where permitted, or to furring strips applied to such members or wood decking as provided in Section 921.2.

**921.5 Class II and III material:** Interior finish materials, other than Class I material, which are less than one-fourth ( $\frac{1}{4}$ ) inch in thickness shall be applied directly against a noncombustible backing or a backing complying with the requirements of Section 903.6.2 unless the tests under which such material has been classed were made with the materials suspended from the noncombustible backing.

**921.6 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 any materials meeting the requirements of this code for noncombustible classification of material under Section 903.5.1 or of fire-retardant treated wood. 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 921.2, or may be suspended from the structural members at any distance provided concealed spaces created thereby shall be firestopped in accordance with the applicable requirements of this code. Where Class III interior finish is applied to a continuous noncombustible backing beneath wood joist construction, the allowable area for firestopping required in Section 912.4 may be increased to three thousand (3,000) square feet.

## **SECTION 922.0 COMBUSTIBLE MATERIALS PERMITTED IN FLOOR CONSTRUCTION OF TYPE 1 AND TYPE 2 BUILDINGS**

**922.1 General:** Except as provided in Section 616.0 for stairs and Section 417.0 for theatres and similar places of public assembly (use groups A-1 and A-2), the use of combustible materials in or on floors of Type 1 and Type 2 buildings shall be herein specified.

**922.2 Sleepers, bucks, and grounds:** Floor sleepers, bucks, nailing blocks and grounds may be constructed of combustible materials, provided the space between the fireristance rated floor construction and the flooring is either solidly filled with noncombustible materials or firestopped in areas of not more than one hundred (100) square feet, provided such open spaces shall not extend under or through permanent partitions or walls.



**922.3 Flooring:** Wood finish floorings may be attached directly to the embedded or firestopped wood sleepers and wood finish flooring shall be permitted when cemented directly to the top surface of approved fire-resistance rated construction or cemented directly to a wood subfloor attached to sleepers as provided in Section 922.2. Combustible insulating boards not more than one-half ( $\frac{1}{2}$ ) 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 922.2.

### **SECTION 923.0 DECORATIVE MATERIAL RESTRICTIONS**

**923.1 General:** In places of public assembly, all draperies, hangings, and other decorative materials suspended from walls or ceilings shall be noncombustible or flamer-resistant meeting the requirements of Section 904.0 as herein specified.

**923.2 Noncombustible:** The permissible amount of noncombustible decorative hangings shall not be limited.

**923.3 Flamer-resistant:** The permissible amount of flamer-resistant decorative hangings shall not exceed ten (10) per cent of the total wall and ceiling area.

### **SECTION 924.0 EXTERIOR TRIM RESTRICTIONS**

**924.1 Gutters and leaders:** All gutters and leaders hereafter placed on buildings and structures other than frame (Type 4) buildings, one- and two-family dwellings and private garages and similar accessory buildings shall be constructed of noncombustible materials.

#### **924.2 Architectural trim**

**924.2.1 Construction requirements:** All architectural trim, such as cornices 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; except that outside the fire limits, such trim may be of combustible material when the building does not exceed three (3) stories or forty (40) feet in height. Combustible trim may be used on all buildings of Types 3 and 4 construction.

**924.2.2 Location:** When combustible architectural trim is located along the top of exterior walls it must be completely backed up by the exterior wall and shall not extend over or above the top of exterior walls.

**924.2.3 Firestopping:** Continuous exterior architectural trim constructed of combustible materials shall be firestopped as required in Section 875.0.

**924.3 Combustible half timbering:** In buildings of masonry (Type 3) construction that do not exceed three (3) stories or forty (40) feet in height, 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.

**924.4 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 frame construction. Balconies of frame construction shall afford the fireresistance rating required by Table 214 for floor construction and the aggregate length shall not exceed fifty (50) per cent of the building perimeter on each floor.

**924.5 Bay and oriel windows:** All bay and oriel windows attached to or supported by walls other than frame construction shall be of noncombustible construction, framed with brackets of steel, concrete or other approved noncombustible materials, unless specifically exempted by Section 302.0.

**924.6 Existing combustible construction:** Any existing cornice or other exterior architectural element constructed of wood or similar combustible materials may be repaired with the same material to the extent of fifty (50) per cent of its area in any one (1) year if the public safety is not thereby endangered.

**924.7 Wood veneers:** Inside the fire limits wood veneers are permitted in accordance with Section 302.0.

## SECTION 925.0 ROOF STRUCTURES

**925.1 General:** All construction, other than aerial supports, clothes dryers and similar structures less than twelve (12) feet 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 forty (40) feet in height outside the fire limits shall be constructed of noncombustible materials.

**925.2 Scuttles:** Trap doors and scuttles as required by Section 617.0 shall be not less than two (2) feet by three (3) feet in size and shall be of fireresistance rated construction in fireproof (Types 1A and 1B), and noncombustible (Type 2) buildings and of approved noncombustible materials, or of wood covered on top and edges with sheet metal in exterior masonry (Type 3) and protected frame (Type 4A) buildings.

### 925.3 Skylight

**925.3.1 Sash and frames:** Sashes 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.

**925.3.2 Glass, wired or plain:** Skylights shall be glazed with wired glass or of approved glass block construction conforming to Sections 811.0 and 860.0, except that skylights placed over shafts and stair enclosures and skylights used for emergency heat and smoke ventings shall be glazed with plain glass not over one-eighth ( $\frac{1}{8}$ ) inch thick. A single panel of wired glass in skylights shall not exceed seven hundred twenty (720) square inches in area or forty-eight (48) inches in any dimension. Light transmitting plastic may be used as specified in Section 1905.0.

**925.3.3 Screens:** Plain glass skylights shall be protected by substantial corrosion-resistive metal or other approved noncombustible screens having a mesh not less than three-quarter ( $\frac{3}{4}$ ) by three-quarter ( $\frac{3}{4}$ ) inches nor larger than one-by-one (1x1) inches, constructed of not lighter than No. 12 B and S Gage (0.0808 inch) wires. The screen shall be erected at a distance of not less than four (4) nor more than ten (10) inches above all glazed portions of the skylight and shall project on all sides for a distance of not less than the height of the screen above the glass. A similar screen shall be placed below the skylight to afford protection to the occupants of the building. The provisions for wired glass or screen protection shall not apply to glass block skylights or to greenhouse construction.

**925.4 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 214 and Article 8 except as modified herein.

**925.4.1 Recessed walls:** When the exterior wall of a penthouse is recessed five (5) feet 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 ( $1\frac{1}{2}$ ) hours, the penthouse exterior wall may be constructed with a fireresistance rating of not less than one and one-half ( $1\frac{1}{2}$ ) hours, covered on the outside with noncombustible, weatherproof material and supported on protected steel or reinforced concrete construction.

**925.4.2 Doors, frames, and sash:** Doors, frames, and window sash, except where otherwise specifically required to be fireproof or fireresistance rated under this code, shall be constructed the same as other similar elements in the building or structure.

**925.5 Other enclosed roof structures:** Enclosed roof structures, other than the 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 214 and Article 8

and the provisions described in the following Sections 925.5.1 and 925.5.2.

**925.5.1 Noncombustible materials:** Unless constructed of masonry or reinforced concrete in accordance with Article 8, roof structures erected on buildings and structures of fireproof or noncombustible (Types 1 or 2) constructions shall be enclosed in walls of noncombustible materials having a fireresistance rating of not less than one (1) hour, protected with weather-resistive roof coverings complying with Section 926.0.

**925.5.2 Combustible materials:** Roof structures erected on the roof of exterior masonry buildings (Type 3) and protected frame buildings (Type 4A) may be constructed of combustible materials protected to afford a one (1) hour fireresistance rating covered on the outside with approved roofing materials.

#### **925.6 Mansard roofs and other sloping roofs**

**925.6.1 High slope roofs:** Every mansard roof or other sloping roof having a pitch of more than sixty (60) degrees to the horizontal hereafter erected on any building or structure of other than Type 4 frame construction more than three (3) stories or forty (40) feet in height shall be constructed of noncombustible materials with a fireresistance rating of not less than one (1) hour; except that when the building is more than seven (7) stories or eighty-five (85) feet 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 (1½) hour fireresistance rating.

**925.6.2 Low slope roofs:** When the pitch is less than sixty (60) degrees to the horizontal, the mansard roof or other sloping roof located on any building may be constructed of the same materials as required for the roof of the building.

**925.7 Dormers:** The sides and roofs of dormers shall be of the same type of construction as the main roof construction; 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 926.0. The side of dormers shall be protected with approved roof coverings or with material which would be permitted for covering the exterior walls of the building.

#### **925.8 Water tanks**

**925.8.1 Supports:** Water tanks having a capacity of more than five hundred (500) gallons placed in or on a building shall be supported on masonry, reinforced concrete, steel or other approved noncombustible framing or on timber conforming to heavy timber mill construction (Type 3A); provided that, when such supports are located in the building above the lowest floor, they shall be fireresistance rated as required for fireproof (Type 1A) construction.



**925.8.2 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 B.

**925.8.3 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.

**925.8.4 Tank cover:** All unenclosed roof tanks exposed to the weather shall have approved covers sloping towards the outer edges.

**925.8.5 Hoop and strap protection:** When metal hoops are used in the construction of wood tanks, they shall be protected with acceptable corrosion-resistive coatings or shall be manufactured from approved corrosion-resistive alloys.

#### **925.9 Cooling towers**

**925.9.1 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.

**925.9.2 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 fifty-five (55) feet above grade and the tower is located on a building, the drip bars only may be fabricated of combustible materials as herein provided.

**925.10 Miscellaneous roof structures:** Except as herein specifically provided, all towers, spires, dormers or cupolas shall be erected of the type of construction and fire-resistance rating required for the building to which they are accessory as regulated by Tables 214 and 305; except that when the height of such appurtenant structures exceeds eighty-five (85) feet above grade or when the area at any horizontal section of the tower, spire, dormer or cupola exceeds two hundred (200) square feet or when it used for any purpose other than as a belfry or architectural embellishment, the structure and its supports shall be of fireproof (Type 1) construction, noncombustible (Type 2) construction or fire-retardant treated wood complying with Sections 903.6.1 and 903.6.2. Radio and television towers and antennae shall be constructed to comply with Sections 426.0 and 427.0.

### **SECTION 926.0 ROOF COVERINGS**

**926.1 Classification:** All approved roof coverings shall meet the test requirements and be classified in accordance with Section 903.3 of this code.

**926.2 Existing roofs:** The repair of existing roofs shall comply with

provisions of Section 106.0 but more than twenty-five (25) per cent of the roof covering of any building shall not be replaced in a period of twelve (12) months unless the entire roof covering is made to conform to the requirements for new roofing.

### 926.3 Classification of use

**926.3.1 Class A roof coverings:** Class A roof coverings shall be permitted for use in buildings and structures of all types of construction.

**926.3.2 Class B roof coverings:** Class B roof coverings shall be permitted as the minimum for use in buildings and structures of Type 1 construction.

**926.3.3 Class C roof coverings:** Class C roof coverings shall be permitted as the minimum for use in buildings and structures of Types 2, 3 and 4A construction.

**926.3.4 Non-classified roof coverings:** Non-classified roof coverings shall be permitted on the buildings and structures listed below.

1. Buildings and structures of unprotected frame (Type 4B) construction when the distance from any other building is not less than twelve (12) feet.
2. Private garages, airplane hangers and similar accessory structures, not exceeding one (1) story or twenty (20) feet in height and twenty-five hundred (2500) square feet in area, when outside the fire limits, located in the same lot with a dwelling and with a fire separation of not less than twelve (12) feet.
3. Moderate and low hazard storage buildings (use groups S-1 and S-2) not exceeding one (1) story or twenty (20) feet in height and six thousand (6,000) square feet in area with a fire separation of not less than twelve (12) feet.

Fire walls may be used to obtain the required fire separation.

**926.4 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.

**926.5 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 and 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.



**926.5.1 Alternate methods of grounding metal roofing:** Alternate methods of grounding metal roofing may be used, provided they are at least equal in performance to the methods described herein, and further provided that such desired method is first submitted to and approved by the building official.

**926.6 Shingle application:** Asphalt shingles laid with double coverage may be installed on slopes below four (4) to twelve (12) inches to as low as two (2) to twelve (12) inches, provided the shingles are approved self-sealing shingles or are hand sealed and are installed with an underlayment consisting of two layers of No. 15 felt, applied shingle fashion. In areas where the January daily average temperature is twenty-five (25) degrees F. or less, or where there is a possibility of ice forming along the eaves and causing a back up of water, the two layers of felt shall be cemented together from the eaves up the roof to overlie a point twenty-four (24) inches inside the interior wall line of the building.

**926.7 Re-roofing**

**926.7.1 Asphalt shingle application:** Not more than two (2) overlay of asphalt shingles shall be applied over an existing asphalt shingle roof. Not more than two (2) overlay 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 non-perforated felt.

**926.7.2 Wood shake application:** Not more than one (1) overlay of wood shakes shall be applied over an existing asphalt shingle or wood shingle roof. One (1) layer of eighteen (18) inch Type 30 felt shall be interlaced between each layer of shakes.

**926.7.3 Application over shakes:** New roof covering shall not be applied over an existing shake roof.

**926.7.4 Flashing and edgings:** Rusted or damaged flashing, vent caps and metal edgings shall be replaced with new materials as necessary.

# ARTICLE 10

## CHIMNEYS, FLUES AND VENT PIPES

### SECTION 1000.0 GENERAL

**1000.1 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 building and structures.

**1000.2 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 B shall be deemed to meet the requirements of this code.

**1000.3 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 1001.0 PLANS AND SPECIFICATIONS

**1001.1 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 exitways shall be clearly shown and described.

**1001.2 Appliances:** All appliances required to be vented shall be connected to a vent or chimney, except as provided in Section 1006.3 and as provided in the standards listed in Appendix B for special venting arrangements.

### SECTION 1002.0 PERFORMANCE TEST AND ACCEPTANCE CRITERIA

**1002.1 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.



**1002.2 Acceptance criteria:** The system shall be accepted if the following conditions are fulfilled.

1. There shall not be spillage at the draft hood when any one (1) or combination of appliances connected to the system is in operation.
2. Temperature on adjacent combustible surfaces shall not be raised more than limits acceptable to nationally recognized testing or inspection agencies.
3. Condensation shall not be developed in a way that would cause deterioration of the vent or chimney drip from joints or bottom end of the vent or chimney.
4. The draft reading taken at the place recommended in the installation instructions shall be within the range specified by the appliance manufacturer.

**1002.2.1 Approved installations:** Factory-built chimneys and gas vents which have been tested and listed by a nationally recognized testing or inspection agency shall be accepted as complying with the requirements of item 2 of Section 1002.2 when installed in accordance with the clearances specified in their listing.

### **SECTION 1003.0 CHIMNEYS**

**1003.1 Classification:** Chimneys as used in this article shall be classified as:

1. factory-built chimneys,
2. masonry chimneys, and
3. metal chimneys (smokestacks).

### **SECTION 1004.0 APPLIANCES REQUIRING CHIMNEYS**

**1004.1 General:** All heating appliances, except those appliances specifically exempted by the provisions of Section 1006.3 shall be connected to chimneys as specified in the Chimney selection chart contained in the mechanical code listed in Appendix B.

### **SECTION 1005.0 EXISTING BUILDINGS**

**1005.1 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 three (3) feet 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, either independently, or in his own building, all chimneys connected to fuel burning appliances. Vents within six (6) feet of any portion of the wall of

such adjoining building shall be extended two (2) feet above the roof or parapet of the adjoining building.

**1005.2 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.

**1005.3 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 (10) days before starting such work.

**1005.4 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.

**1005.5 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 1006.0 VENT SYSTEMS

**1006.1 Listed appliances:** For the purpose of determining vent requirements, gas-fired and oil-fired appliances shall be classified as "listed" or "unlisted." A listed appliance is one that is shown in a list published by an accredited authoritative testing agency, qualified and equipped for experimental testing of such appliances, and maintaining an adequate periodic inspection of current production of listed models and whose listing states either that the appliance or accessory complies with nationally recognized safety requirements or 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 unlisted 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 should be obtained before the appliance or accessory is installed.

**1006.2 Appliances required to be vented:** Appliances shall be connected to a listed 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 B.



**1006.3 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. listed gas ranges;
2. built-in domestic cooking units listed and marked as unvented units;
3. listed hot plates and listed laundry stoves;
4. listed domestic clothes dryers;
5. listed gas refrigerators;
6. counter appliances;
7. space (room) heaters listed 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 thirty (30) British thermal units (Btus) per hour per cubic foot of room or space in which they are installed, one (1) 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 thirty (30) Btus per hour per cubic foot 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 1007.0 FIREPLACES

**1007.1 General:** Fireplaces, barbecues, smoke chambers and fireplace chimneys shall be of solid masonry or reinforced concrete or other approved materials, and shall conform to requirements of this section.

**1007.2 Construction:** Structural walls of fireplaces shall be at least eight (8) inches thick. Where a lining of low duty refractory brick (ASTM C64) or the equivalent, at least two (2) inches thick laid in fire clay mortar (ASTM C105, medium duty), or the equivalent, or other approved lining is provided, the total thickness of back and sides, including the lining, shall be not less than eight (8) inches. Where such lining is not provided, the thickness of back and sides shall be not less than twelve (12) inches. The firebox shall be twenty (20) inches in depth and will be permitted to be open on all sides, provided all fireplace openings are located entirely within one (1) room.

**1007.3 Lining:** The lining shall extend from the throat of the fireplace to a point at least four (4) inches above the top of the enclosing masonry walls.

#### **1007.4 Clearance**

**1007.4.1 Distance:** The distance between fireplace and combustibles shall be at least four (4) inches; and such combustibles shall not be placed within six (6) inches 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; however, such facing or trim shall be furred out from the fireplace wall at least four (4) inches 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 twelve (12) inches thick, the facings or trim may be directly attached to the fireplace.

**1007.4.2 Metal hoods:** Metal hoods used as part of a fireplace or barbecue shall be at least eighteen (18) inches from combustible material unless approved for reduced clearances.

**1007.5 Metal:** Metal hoods used as a part of a fireplace or barbecue shall be at least No. 18 B&S (0.0403 inch) Gage sheet copper, No. 18 Galvanized Steel 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 forty-five (45) degrees or less from the vertical and shall extend horizontally at least six (6) inches beyond the limits of the firebox.

**1007.6 Metal heat circulators:** Approved metal heat circulators may be installed in fireplaces, provided the thickness of the fireplace walls is not reduced.

**1007.7 Smoke chamber:** All walls, including back walls, shall be at least eight (8) inches in thickness.

**1007.8 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 B. When dampers are used, damper openings shall be at least, when fully opened, equal to the required flue area and shall be of No. 12 Galvanized Steel Gage (0.018 in.) metal.

**1007.9 Lintel:** Masonry over the fireplace opening shall be supported by a noncombustible lintel.

**1007.10 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 six (6) square feet, the hearth shall extend not less



than sixteen (16) inches in front and not less than eight (8) inches on each side of the fireplace opening. For fireplaces with an opening of six (6) square feet or more, the hearth shall extend not less than twenty (20) inches in front and not less than twelve (12) inches on each side of the fireplace opening. Such hearths shall be supported on trimmer arches of brick, stone, tile or concrete not less than four (4) inches thick or other equally strong and fireresistance rated materials. All combustible forms or centering shall be removed after completion of the supporting construction.

**1007.11 Firestopping:** Firestopping between chimneys and wooden construction shall meet the requirements specified in Section 919.0 and the mechanical code listed in Appendix B.

**1007.12 Support:** Fireplaces shall be supported on foundations designed in conformity with Section 725.0.

**1007.13 Screens:** Screens or other acceptable protection devices shall be provided for all fireplace openings.

**1007.14 Other type fireplaces:** Other fireplaces not conforming to the requirements of this section shall be subject to approval by the department 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 seal of a nationally recognized testing or inspection agency.

**1007.15 Solid wastes:** Solid waste shall not be burned in a fireplace.

## **SECTION 1008.0 INCINERATORS**

**1008.1 Mechanical code:** Incinerators of all types shall be installed in accordance with the applicable provisions of the mechanical code listed in Appendix B.

## **SECTION 1009.0 CONSTRUCTION OF METAL DUCTS AND VENTS**

**1009.1 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 5 for ventilating and air-conditioning systems shall be constructed and installed in accordance with the requirements of the mechanical code listed in Appendix B.

**1009.2 Construction of ducts:** Ducts and plenums may be constructed of approved material constructed in accordance with the requirements of the mechanical code listed in Appendix B. Non-metallic ducts shall be

constructed and installed in accordance with their approval and the applicable standards listed in Appendix B. Aluminum ducts shall not be used in equipment rooms with fuel-fired equipment, encased in or under concrete slabs on grade, for kitchen or fume exhausts or in systems where air entering the duct is over two hundred fifty (250) degrees F.

#### **SECTION 1010.0 SPARK ARRESTORS**

**1010.1 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 B.



# ARTICLE 11

## MECHANICAL EQUIPMENT AND SYSTEMS

### SECTION 1100.0 GENERAL

**1100.1 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.

**1100.2 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.

**1100.3 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-1.

**1100.4 Mechanical code:** All mechanical equipment and systems not covered by 1100.2 or 1100.3 but which are required by other provisions of this code to be installed in accordance with the mechanical code listed in Appendix B, shall be constructed, installed and maintained in conformity with the BOCA Basic Mechanical Code/1978 including all applicable standards listed within Appendices B through E.

### SECTION 1101.0 PLANS AND SPECIFICATIONS

**1101.1 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 B and a permit shall be secured prior to the commencement of any work.

**1101.2 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.

**1101.3 Details:** An application for permit shall be accompanied by specifications and diagrammatic mechanical drawings in sufficient detail, com-

plying with the provisions of the mechanical code listed in Appendix B, before a permit shall be issued for the mechanical equipment and system. The plans shall be drawn to a scale of not less than one-eighth ( $\frac{1}{8}$ ) inch to the foot and shall show the location and arrangement of all equipment and distribution elements including safeties and pressure controlling devices.

#### **SECTION 1102.0 INSPECTIONS AND TESTS**

**1102.1 Inspection:** All mechanical equipment and systems requiring a permit shall be inspected in accordance with the mechanical code listed in Appendix B and shall not be placed in operation until it has been tested and approved.

**1102.2 Concealment:** It shall be unlawful for owners, contractors or workmen 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.

**1102.3 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.

**1102.4 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 1103.0 EXISTING BUILDINGS**

**1103.1 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 B. 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 1104.0 FEES**

**1104.1 General:** A permit to begin work for new construction or alteration shall not be issued until the application fee and permit fee prescribed 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 1105.0 BOILER ROOMS**

**1105.1 Boiler room:** Every boiler or combination boiler and cooling unit shall be installed in a space which allows a minimum clearance of



twenty-four (24) inches on all service sides. Such room shall be constructed of at least one (1) hour fireresistance rated construction, and the door shall be a Class C fire door or a one and three-quarter (1 $\frac{3}{4}$ ) inch solid wood core door. Such door shall be equipped with an automatic self-closer. Combustion air shall be provided to such room in conformance with the mechanical code listed in Appendix B. Storage or living quarters shall not be permitted in any boiler or similar heating equipment room.

**Exception:** One- and two-family dwellings, except for combustion air requirements as set forth in the mechanical code listed in Appendix B.

**1105.2 Boiler room location:** Boiler rooms shall not be located immediately below exitways; 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 1106.0 DRYING ROOMS

**1106.1 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 4 for special uses.

**1106.2 Piping clearance:** All overhead heating pipes shall have a clearance of not less than two (2) inches from combustible contents of the dryer.

**1106.3 Insulation:** When the operating temperature of the dryer is one hundred seventy-five (175) degrees F. or more, metal enclosures shall be insulated from adjacent combustible materials by not less than twelve (12) inches of air space, or the metal walls shall be lined with one-quarter ( $\frac{1}{4}$ ) inch asbestos mill board or other approved equal insulation.

**1106.4 Fire protection:** Drying rooms designed for high hazard materials and processes, including dry cleaning and other special uses provided for in Article 4, shall be protected by approved automatic sprinkler or fog systems, manually controlled steam smothering systems, or other approved fire-extinguishing equipment conforming to the provisions of Article 12 and the mechanical code listed in Appendix B.

### SECTION 1107.0 REFUSE CHUTES

**1107.1 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 (2) hour fireresistance rating, unless otherwise approved by the building official.

**1107.2 Chute enclosures:** Refuse chutes shall be enclosed with walls of

masonry of not less than two (2) hour fireresistance rating for interior chutes and of noncombustible (Type 2) construction for exterior chutes. All chutes shall be supported on substantial foundations complying with Article 7.

**1107.3 Chute height:** An interior refuse chute shall extend not less than four (4) feet above the roof and shall be covered with an approved ventilating skylight complying with Section 925.0.

**1107.4 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 (1) hour and in which the openings are equipped with fire doors or other approved protectives of not less than three-quarter ( $\frac{3}{4}$ ) hour fireresistance rating or their approved labeled equivalent.

**1107.5 Opening protectives:** All openings between refuse rooms, chutes and incinerator rooms shall be protected with one and one-half ( $1\frac{1}{2}$ ) hour fire doors or their approved labeled equivalent complying with Article 9.

#### **SECTION 1108.0 REFUSE VAULTS**

**1108.1 Refuse vault enclosures:** A vault for receiving combustible refuse from an exhaust system shall be constructed of not less than three (3) hour fireresistance rated assemblies.

**1108.2 Openings to boiler rooms:** The opening between a vault and a boiler room shall not exceed nine (9) square feet in area and shall be located at least eight (8) feet from the firing door of the boiler, and the bottom of the opening shall be not less than six (6) inches above the boiler room floor. All openings shall be equipped with approved automatic fire doors of not less than one and one-half ( $1\frac{1}{2}$ ) hour fireresistance rating or the approved labeled equivalent complying with Article 9.

**1108.3 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 1009.0.

**1108.4 Fire protection:** A vault for combustible refuse which exceeds three hundred sixty (360) cubic feet in volume shall be protected by an automatic fire suppression system conforming to Article 12 and the mechanical code listed in Appendix B.

#### **SECTION 1109.0 DUST, STOCK AND REFUSE CONVEYOR SYSTEMS**

**1109.1 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.

**1109.2 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 ten (10) feet 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 thirty (30) feet.

**1109.3 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 B. A delivery pipe from a cyclone collector shall not convey refuse directly into the fire-box of a boiler, furnace, dutch oven, refuse burner, incinerator or other appliance.

**1109.4 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.

**1109.5 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.

**1109.6 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 4.

**1109.6.1 Screens:** When a screen is used in a safety relief vent, it shall be so attached as to permit ready release under emergency pressure.

**1109.6.2 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 12

## FIRE PROTECTION SYSTEMS

### SECTION 1200.0 GENERAL

**1200.1 Scope:** The provisions of this article shall specify where fire protection systems are required in all buildings or structures or parts thereof.

**1200.2 Installation requirements:** The installation methods, repair, operation or maintenance of fire protection systems shall be in accordance with this code and the mechanical code listed in Appendix B.

**1200.3 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.

**1200.4 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.

**1200.5 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 four (4) inches in height and shall read *Sprinkler control valves* and/or *Standpipe control valves* or indicate other types of systems (see Section 1213.8 for additional signs).

**1200.6 Material and equipment:** All materials and equipment used in a fire protection system shall be approved, consistent with the requirements of this code (see Section 108.0) and the standards as listed in Appendices B, C or I.

**1200.7 Tests:** Where required by this article and the standards refer-



enced herein, all flow test connections and points of fluid discharge shall be reasonably accessible and acceptable to the administrative authority.

### SECTION 1201.0 PLANS AND SPECIFICATIONS

**1201.1 Required:** Plans shall be submitted to indicate conformance with this code and the mechanical code of this jurisdiction 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 his responsibility to enforce this article.

**1201.2 Plans:** The plans and specifications submitted to the department shall contain sufficient detail to evaluate the hazard and to evaluate the effectiveness of the system. The details on the hazards shall include materials involved, the location and arrangement, and the exposure to the hazard.

**1201.3 Calculations:** The details on the fire protection system shall include the design considerations, calculations and other information as required by this code and the mechanical code listed in Appendix B.

### SECTION 1202.0 FIRE SUPPRESSION SYSTEMS

**1202.1 Where required:** Fire suppression systems shall be installed and maintained in full operating condition, as specified in this code, in the following locations except one- and two-family dwellings, indicated in Sections 1202.2 through 1202.18.

**1202.2 Assembly (A-1) use:** In all buildings or portions thereof of A-1 (assembly, theatres) use group.

**Exception:** Auditoriums, foyers, lobbies and toilet rooms.

**1202.3 Assembly (A-2) use:** In all buildings or structures or portions thereof of use group A-2 (assembly, night clubs):

1. when more than five thousand (5,000) square feet in area; or
2. when more than one (1) story in height.

**1202.4 Assembly (A-3) use:** In all buildings or structures or portions thereof of use group A-3 (assembly) when more than twelve thousand (12,000) square feet in area.

**1202.5 Stages in assembly (A) use:** Stages of any size, in assembly occupancies (A) in the following locations:

1. over the stage;
2. stage gridirons except when side wall sprinklers with one hundred thirty-five (135) degrees F. rated heads with heat-baffle plates are installed around the entire perimeter of the stage at points not more

than thirty (30) inches below the gridiron, nor more than six (6) inches below the baffle plate;

3. under all fly galleries;
4. over the proscenium opening on the stage side;
5. under the stage;
6. in all basements, cellars, work rooms, dressing rooms, store rooms and property rooms; and
7. in toilet, lounge and smoking rooms.

**1202.6 High hazard (H) use:** In all buildings or structures or portions thereof of use group H (high hazard).

**1202.7 Institutional (I) use:** In all buildings or structures or portions thereof of use group I (institutional).

**Exceptions:**

1. One (1) story hospitals with patient rooms having direct egress to grade level at the exterior of the building.
2. In hospitals of Type I 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 six-hundred (600) square feet in area when each such room is protected by an automatic fire alarm system connected to a central annunciator panel.
3. One-story day nurseries housing one hundred (100) children or less with each room having an exit directly to the outside.
4. I-1 (institutional-restrained) occupancies having an occupancy load of less than six.
5. In I-1 (institutional-restrained) occupancies the fire suppression system shall be a sprinkler system which may be manual or automatic in operation.

**1202.8 Mercantile (M), moderate hazard storage (S-1), or factory and industrial (F) uses:** In all buildings or structures of use groups M, S-1, and F (mercantile, moderate hazard storage or factory and industrial):

1. when more than twelve thousand (12,000) square feet in area; or
2. when more than twenty-four thousand (24,000) square feet in total area on all floors; or
3. when more than three (3) stories in height.

**1202.9 Public garages:** In all public garages:

1. when more than ten thousand (10,000) square feet in area; or
2. when more than seven thousand five hundred (7,500) square feet in area and more than one (1) story in height; or
3. when more than five thousand (5,000) square feet in area, and more than two (2) stories in height; or
4. when more than three (3) 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 fifty (50) per cent below grade.

**Exception:** Open parking structures.

**1202.10 Bus garages:** In all bus garages:

1. when required by Section 1202.9; or
2. when used as passenger terminals for four (4) or more buses; or
3. when used for storage or loading of four (4) or more buses.

**1202.11 Unlimited area buildings:** In "unlimited area buildings" as required by Section 307.0.

**Exception:** Special industrial uses as indicated in Section 205.3.

**1202.12 Storage and workshop areas:** In all portions of use groups A (assembly), B (business), I (institutional) or R-1 and R-2 (residential, hotels and multi-family) occupied for storage, workshop or similar purposes.

**Exception:** Individual storage or work-shop areas located entirely within a dwelling unit.

**1202.13 Story, cellar or basement:** In every story, cellar or basement of all buildings where there is not provided at least twenty (20) square feet of opening entirely above the adjoining grade level in each fifty (50) lineal feet of exterior wall in the story, cellar or basement, on at least two (2) sides of the building. Openings shall have a minimum dimension of not less than twenty-two (22) inches. Such openings shall be unobstructed to allow fire-fighting and rescue operations from the exterior.

**Exception:** If the area of a cellar exceeds two thousand, five hundred (2,500) square feet, an automatic fire suppression system is required.

For purposes of this section, an opening in an exterior wall qualifies as follows:

1. doors or access panels may be included in the determination of openings;
2. windows may be included in the determination of openings if they provide a breakable glazed area of not less than twenty-two (22) inches in its least clear dimension.

**1202.14 Painting rooms:** In spray painting rooms or shops where painting, brushing, dipping, or mixing is regularly conducted using flammable materials.

**1202.15 Trash rooms and chutes:** In rooms or areas used for incineration, trash, laundry collection, or similar uses. At alternate floor levels and at the top of all chutes used in conjunction with these rooms or areas.

**1202.16 Furnace rooms:** In furnace rooms, boiler rooms and rooms for similar uses.

**Exception:** Such room located entirely within and serving a single dwelling unit.

**1202.17 Unenclosed vertical openings:** In unenclosed vertical openings between floors as required by Sections 520.0 and 616.10.

**1202.18 Range hoods:** In range hoods, in accordance with the following requirements listed below.

1. Where natural or liquefied petroleum gas is used as a fuel, a manual reset safety valve shall be installed on the gas service line to prevent fuel from flowing into the burner or pilot in the event of activation of any suppression (extinguishing) system.
2. Hood and duct suppression (extinguishing) systems shall provide for both automatic and manual actuation of the system.
3. A manual station for activation of the suppression (extinguishing) system shall be located at or near one (1) of the means of egress from the area, but not nearer than ten (10) feet to the range hood, unless otherwise specifically approved.
4. The manual station shall be securely mounted not less than four and one-half (4½) feet nor more than five (5) feet above the floor.
5. The system shall be maintained at full operating capacity by the owner or tenant and shall be serviced every six (6) months. A metallic sign with contrasting letters and background shall indicate the manual station of the system and the proper operating (actuation) procedure.
6. All nozzles shall be accessible for cleaning and replacement.
7. CO<sub>2</sub> (carbon dioxide) suppression (extinguishing) systems shall be installed in accordance with the above and Section 1208.6.
8. Dry chemical (approved dry chemical extinguishing media) suppression systems shall be installed in accordance with the above and Section 1210.6.

**1202.19 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.

**1202.19.1 Telephone central office equipment buildings:** Within telephone central office equipment buildings, automatic fire sprinklers 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 (1) hour fire-resistance rated wall and two (2) hour fire-resistance rated floor-ceiling assemblies, and are used exclusively for such equipment.



## SECTION 1203.0 SUPPRESSION SYSTEM SELECTION

**1203.1 General:** To guide the administrative authority with the selection of the proper type of fixed fire suppression system, and the extinguishing agent for each type of hazard, 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.

**1203.2 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.

**1203.3 Types:** Where a fire suppression system is required in this code, Table 1203 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.

Table 1203  
GUIDE FOR SUPPRESSION SYSTEM SELECTION

Hazard	Water sprinklers or spray 1204.0 to 1206.0	Foam 1207.0	Carbon dioxide or halogenated 1208.0 to 1209.0	Dry chemical 1210.0
Class A fire potential	X	X	X	X
Class B fire potential	X	X	X	X
Class C fire potential	X		X	
<b>SPECIAL FIRE HAZARD AREAS*</b>				
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

Table 1203 (cont'd)  
GUIDE FOR SUPPRESSION SYSTEM SELECTION

Hazard	Water sprinklers or spray 1204.0 to 1206.0	Foam 1207.0	Carbon dioxide or halogenated 1208.0 to 1209.0	Dry chemical 1210.0
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			
Fuel oil storage	X	X		
Hangar decks	X	X		
Hydraulic oil, lubricating oil	X		X	
Hydro-turbine 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	
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		

\*Within buildings or areas, so classified, as to require a suppression system.

**1203.4 Installation:** Fixed fire suppression systems shall be of an approved type designed and installed in accordance with the requirements of this code.

**1203.5 Tests:** All tests required by this code and the standards listed in Appendix B shall be conducted at the expense of the owner or his representative.



## SECTION 1204.0 WATER SPRINKLER SYSTEMS

**1204.1 General:** Water sprinkler extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and the standards listed in Appendices B or I.

**1204.2 Occupancy sprinkler system:** Within a building of mixed occupancies and where an occupancy is required by this code to be sprinklered with more than twenty (20) sprinklers, the area shall be enclosed by construction assemblies as required by this code and equipped with a complete sprinkler system.

**1204.3 Design:** The details on the system supplied with the plans and specifications shall include information and the calculations on 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.

**1204.4 Actuation:** Water sprinkler extinguishing systems shall be automatically actuated unless otherwise specifically provided in this code.

**1204.5 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 1205.5).

**1204.5.1 Additional alarms:** At least one (1) additional audible or visual alarm device shall be installed within the building.

**1204.6 Water control valve tags:** Identification tags shall be provided in accordance with the standards listed in Appendix I.

**1204.7 Sprinkler riser:** The sprinkler system riser(s) may also serve as the wet standpipe riser(s) in buildings required to have both systems or in buildings having both systems (see Section 1211.4.1).

**1204.8 Tests:** A completed system shall be tested hydrostatically for two (2) hours without visible leakage at not less than two hundred (200) pounds per square inch (psi), or at fifty (50) psi in excess of the maximum static pressure when the maximum static pressure is in excess of one hundred and fifty (150) psi.

## SECTION 1205.0 LIMITED AREA SPRINKLER SYSTEMS

**1205.1 General:** A limited area sprinkler system shall be of an approved type and installed in accordance with the provisions of this code and the standards listed in Appendices B or I.

**1205.2 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.

**1205.3 Design:** The detail on the system supplied with the plans and specifications shall include information and the calculations on 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.

**1205.4 Actuation:** A limited area sprinkler extinguishing system shall be automatically activated.

**1205.5 Sprinkler alarms:** Alarms and alarm attachments shall not be required.

**1205.6 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 (1) of the enclosed areas. When supplied by the domestic water system, the maximum number of sprinklers in any one (1) enclosed room or area shall not exceed twenty (20) sprinklers which must totally protect the room or area.

**1205.6.1 Fire department connections:** A fire department connection is not required for limited area sprinkler systems supplied from the domestic water system.

**1205.6.2 Standpipe connection:** The water supply for the limited area sprinkler system shall be from the building standpipe system when available (see Section 1211.4.1).

**1205.6.3 Cross connection:** A limited area sprinkler system may be supplied individually from the domestic water system or from the standpipe system. There shall not be a cross-connection between the domestic and standpipe system.

**1205.7 Use:** Limited area sprinklers shall be used only in rooms or areas enclosed with construction assemblies as required by this code.

## SECTION 1206.0 WATER SPRAY FIXED SYSTEMS

**1206.1 General:** Water spray extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFPA 15 listed in Appendix I.

**1206.2 Design:** The detail on the system supplied with the plans and specifications shall include information and the calculations on 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.



**1206.3 Actuation:** Waterspray extinguishing systems shall be the automatically actuated type with supplementary auxiliary manual tripping capability.

**1206.4 Tests:** All new system piping shall be hydrostatically tested in accordance with the provisions of the standard referenced above.

### SECTION 1207.0 FOAM EXTINGUISHING SYSTEMS

**1207.1 General:** Foam extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFIPA 11, 11A and 16 listed in Appendix I.

**1207.2 Design:** The detail on the system supplied with the plans and specifications shall include complete computations showing pressure drop in all system piping, friction loss calculations on liquid lines and a detailed layout of the entire hazard 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.

**1207.3 Actuation:** A foam extinguishing system shall be automatically actuated with supplementary auxiliary manual tripping capability.

**1207.4 Tests:** All piping except that piping which handles expanded foam shall be subjected to a two (2) hour hydrostatic pressure test at two hundred (200) psi or fifty (50) pounds 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 is fully protected in conformance with the design specification, and to determine the flow pressures, actual discharge capacity, foam quality, consumption rate of foam-producing materials, manpower requirements and other operating characteristics.

### SECTION 1208.0 CARBON DIOXIDE EXTINGUISHING SYSTEMS

**1208.1 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 I.

**1208.2 Design:** The detail on the system supplied with the plans and specifications shall include information and calculations on the amount of carbon dioxide; the location and flow rate of each nozzle including equivalent orifice area; 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 should be adequately explained.

**1208.3 Actuation:** Carbon dioxide extinguishing systems shall be automatically actuated with supplementary auxiliary manual tripping capability.

**1208.4 Safety requirements:** In any proposed use of carbon dioxide where there is a possibility that men may be trapped in, or enter into 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.

**1208.5 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 should 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 and analysis test should be made. All tests are to be conducted as indicated in the above standard.

**1208.6 Range hoods:** In addition to the above requirements and the requirements of Section 1202.18, range hood CO<sub>2</sub> systems shall conform to the following requirements listed below.

1. Where multiple hoods are served, each hood shall be provided with a separate manual station (actuator) and a separate CO<sub>2</sub> supply.
2. Total CO<sub>2</sub> requirements shall be calculated on the following accumulative basis:
  - a. open area of hood (sq. ft.)  $\div$  0.6 = pounds of CO<sub>2</sub>;
  - b. volume of hood (cu. ft.) (minimum depth of two feet)  $\div$  8.0 = pounds of CO<sub>2</sub>;
  - c. hoods located over liquid surface operations; liquid surface area (sq. ft.)  $\div$  0.4 = lbs. CO<sub>2</sub> (10 lbs. minimum);
  - d. volume of plenum (cu. ft.)  $\div$  8.0 = lbs. of CO<sub>2</sub>;
  - e. volume of duct of fire damper (cu. ft.)  $\div$  8.0 = lbs. of CO<sub>2</sub>;
  - f. duct above fire damper, minimum 10 lbs. CO<sub>2</sub>; and
  - g. in addition to the calculations, an additional 10 lbs. of CO<sub>2</sub> shall be provided as a safety factor.
3. Upon activation of the CO<sub>2</sub> system, the fan(s) shall cease to operate and the supply valve shall shut the pilot and burner(s) off.
4. Duct systems from range hoods shall not be equipped with fire dampers unless specifically approved for such use, or are required as part of an approved extinguishing system, or an approved fan bypass system.
5. CO<sub>2</sub> bottles shall be located at least fifteen (15) feet from the range



or range hood. The temperature in the storage area shall not exceed one hundred twenty (120) degrees F. or be less than thirty-two (32) degrees F.

6. An electric warning light of ten (10) watts or more shall be provided on the CO<sub>2</sub> 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 1209.0 HALOGENATED FIRE EXTINGUISHING SYSTEMS**

**1209.1 General:** Halogenated fire extinguishing systems shall be of an approved type and installed in accordance with the provisions of this code and NFPA 12A and 12B listed in Appendix I.

**1209.2 Design:** The detail on the system supplied with the plan 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 size of the storage facility. Information shall be submitted pertaining to the location and function 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 should be adequately explained.

**1209.3 Actuation:** Halogenated fire extinguishing systems shall be automatically actuated with supplementary auxiliary manual tripping capability.

**1209.4 Safety requirements:** In any proposed use of a halogenated fire extinguishing system where there is a possibility that men may be trapped in or enter into 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.

**1209.5 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 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 or concentration analysis should be made. All tests are to be conducted as indicated in the above standard.

#### **SECTION 1210.0 DRY CHEMICAL EXTINGUISHING SYSTEMS**

**1210.1 General:** Dry chemical extinguishing systems shall be of an

approved type and installed in accordance with the provisions of this code and NFPA 17 listed in Appendix I.

**1210.2 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 should be adequately explained.

**1210.3 Actuation:** A dry chemical extinguishing system shall be automatically actuated with supplementary auxiliary manual tripping capability.

**1210.4 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 of any trapped personnel.

**1210.5 Tests:** A completed system shall be tested by a discharge of expellant gas through the piping and nozzles. Observations for serious 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 should 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 the above standard.

**1210.6 Range hoods:** In addition to the above requirements and the requirements of Section 1202.18, range hood dry chemical systems shall conform to the following requirements listed below.

1. Dry chemical systems shall bear the label of a nationally recognized testing or inspection agency and shall be installed in accordance with their recommendations and shall be approved by the department and fire department.
2. The size of hood and duct covered by a single system shall not exceed the agency's recommendations.
3. Dry chemical agent used shall be non-toxic.
4. Multiple hoods may be protected by a common system if in conformance with a report of a nationally recognized testing or inspection agency.
5. Each duct system shall constitute an individual system serving only exhaust hoods on one (1) floor.



6. 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 a nationally recognized testing or inspection agency or as approved by the department and fire department.
7. A hand portable fire extinguisher shall be installed in the cooking area and shall have a rating of at least twenty (20) BC and be located not more than fifteen (15) feet and not less than (10) feet from the hazard. Dry chemical type extinguishers shall be of the alkaline type. Acidic base extinguishing materials such as multi-purpose dry chemical impede saponification; therefore, if cooking equipment being protected involves exposed liquified fat or oil in depth such as fryers, extinguishers employing acidic base materials are not recommended.

### SECTION 1211.0 STANDPIPE SYSTEMS

**1211.1 General:** All buildings and structures shall be equipped with two and one-half (2½) inch or larger standpipes, and shall be made to comply with the requirements of this section.

**1211.2 Where required:** Standpipes shall be installed and maintained in full operating condition, as specified in this article and the standards listed in Appendix I, in the locations described in Sections 1211.2.1 through 1211.2.3.

**1211.2.1 Assembly (A-1, A-2 or A-3):** In buildings two (2) or more stories in height of use group A-1, A-2, or A-3 (assembly) with an occupancy load of more than three hundred (300).

**1211.2.2 Three stories:** In buildings three (3) stories in height when:

1. of use groups B (business), F (factory and industrial), M (mercantile) or S-1 (moderate hazard storage) more than three thousand (3,000) square feet in area per floor; or
2. of use groups A (assembly), I (institutional), or R-1 (residential, hotels); or
3. of any use group more than ten thousand (10,000) square feet in area per floor.

**1211.2.3 Four stories:** In buildings four (4) stories or more in height regardless of the area per floor.

**1211.2.4 Public garages:** In all public garages:

1. when more than ten thousand (10,000) square feet in area; or
2. when more than seven thousand five hundred (7,500) square feet in area and more than one (1) story in height; or
3. when more than five thousand (5,000) square feet in area, and more than two (2) stories in height; or
4. when more than three (3) 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 fifty (50) per cent below grade.

**1211.3 Sizes:** Standpipes shall extend from the lowest portion of the building to a height five (5) feet above the finished floor of the topmost story and shall have a minimum diameter as described in the following Table 1211.

**Table 1211**  
**BUILDING HEIGHT AND STANDPIPE SIZE**

Maximum building height	Minimum standpipe size**
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* stories or 85 feet	6 inches
8* stories or 95 feet	6 inches
95* feet to 250 feet	6 inches
over 250* feet	8 inches

\*At least one (1) standpipe shall extend through the roof and terminate in a two-way, two and one-half (2½) inch hose connection.

\*\*In sprinklered buildings, the minimum standpipe diameter may be based on hydraulic calculations.

**1211.4 Number of risers:** The number of standpipe risers shall be such that all parts of every floor area can be reached by a thirty (30) foot hose stream from a nozzle attached to not more than one hundred (100) feet 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.

**1211.4.1 Combination:** The standpipe system riser(s) may also serve as the water sprinkler system riser(s) in buildings required to have both systems or in buildings having both systems. A control valve shall be installed in each sprinkler system or standpipe to allow the system to remain operational.

### **1211.5 Outlets**

**1211.5.1 Hose connections:** At each floor level, and not more than five (5) feet above the floor, there shall be connected to each standpipe a two and one-half (2½) inch hose connection and a one and one-half (1½) inch hose connection with valves and threads conforming to the local fire department's standard. Each one and one-half (1½) inch hose connection shall be equipped with not more than one hundred (100) feet of one and one-half (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 one and one-half (1½) inch hose connection, hose and cabinet are not required.

**1211.5.2 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 1213.0).

**1211.6 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 one hundred seventy-five (175) psi.

**1211.7 Capacity:** Each standpipe shall be sized for a minimum flow of five hundred (500) gallons per minute. Where only one standpipe is required, its supply piping shall be sized for a minimum flow of five hundred (500) gallons per minute. Where more than one standpipe is required, all common supply piping shall be sized for a minimum flow of five hundred (500) gallons per minute for the first standpipe plus two hundred fifty (250) gallons per minute for each additional standpipe, the total not to exceed twenty five hundred (2500) gallons per minute. The supply shall be sufficient to maintain a residual pressure of sixty-five (65) pounds per square inch at the topmost outlet of each standpipe with five hundred (500) gallons per minute flowing.

## SECTION 1212.0

### STANDPIPES FOR BUILDINGS UNDER CONSTRUCTION OR DEMOLITION

**1212.1 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.

**1212.2 Number required:** Every building or structure under construction five (5) or more stories in height above grade, shall be equipped with one (1) or more standpipes at least four (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 one hundred (100) feet of hose and a thirty (30) foot hose stream.

**1212.3 Construction:** All standpipes shall be constructed of approved materials. All pipe, fittings and valves shall be extra heavy pattern when the working pressure exceeds one hundred seventy-five (175) psi.

**1212.4 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 (1) floor below the highest forms or staging.

**1212.5 Fire department connections:** At the street level there shall be provided for each temporary or permanent standpipe installation one (1) or more two (2) way fire department inlet connections. Fire department inlet

connections shall be prominently marked and readily and easily accessible at all times (see Section 1213.8).

**1212.6 Outlets:** At each floor level and on each standpipe, there shall be provided one (1) two and one-half (2½) inch hose outlet and one (1) two and one-half (2½) inch hose valve with cap and chain. At each floor level and on each standpipe, there shall be provided a one and one-half (1½) inch hose outlet with one hundred (100) feet of approved hose. Outlets shall be located not more than five (5) feet above floor level.

**Exception:** In sprinklered buildings, the one and one-half (1½) inch outlet is not required, however, the one and one-half (1½) hose line shall be provided with a one and one-half (1½) to two and one-half (2½) reducer (see Section 1211.5.1).

**1212.7 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 the standpipe shall not be more than one (1) floor below the floor above being demolished.

## SECTION 1213.0 FIRE DEPARTMENT CONNECTIONS

(See Section 1212.5 for temporary standpipes)

**1213.1 Required:** All water sprinkler and standpipe systems shall be provided with at least one (1) two (2) way fire department connection. Each inlet of the fire department connection shall be at least two and one-half (2½) inches in diameter. The pipe from the standpipe system to the fire department connection shall not be smaller than four (4) inches. The pipe from the water sprinkler system to the fire department connection shall not be smaller than four (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 1205.6.1).

**1213.2 Connections:** Fire department connections shall be arranged in such a manner that the use of any one (1) water sprinkler connection will serve all the sprinklers, and the use of any one (1) standpipe connection will serve all the standpipes within the building.

**1213.3 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.

**1213.4 Height:** Fire department connections shall not be less than one (1) foot six (6) inches and not more than three (3) feet six (6) inches in elevation, measured from the ground level to the center line of the inlets.



**1213.5 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.

**1213.6 Hose threads:** Hose threads in the fire department connection shall be uniform with that used by the local fire department.

**1213.7 Fittings:** Fire department inlet connections shall be fitted with check valves, ball-drip valves, and caps and chains.

**1213.8 Signs:** A metal sign with raised letters at least one (1) inch in height shall be mounted on all fire department connections serving sprinklers and/or standpipes. Such signs shall read *Automatic sprinklers* and/or *Standpipe*.

#### **SECTION 1214.0 WATER SUPPLY AND OTHER EXTINGUISHING SUPPLY MEDIA**

**1214.1 Required:** All fire suppression and standpipe systems shall be provided with at least one (1) automatic supply of extinguishing material of adequate pressure, capacity and reliability to perform the function intended.

**1214.2 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. The connection shall not be made to any water main of this jurisdiction of less than four (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.

**1214.3 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.

**1214.4 Size:** The extinguishing material supply for fire suppression systems shall be sized in an approved manner in accordance with this code and the standards listed in Appendix I.

#### **1214.5 Standpipes**

**1214.5.1 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.

**1214.5.2 Interconnection:** The required water supply shall be connected to the base of each standpipe. Where more than one (1) 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 1215.0 YARD HYDRANTS

**1215.1 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 this jurisdiction and the fire department. Hydrants shall not be installed on a water main of less than six (6) inches in diameter.

### SECTION 1216.0 AUTOMATIC FIRE ALARM SYSTEMS

**1216.1 Plans and specifications:** Where required by this code, the plans and specifications for the automatic fire alarm system shall show location and number of all sending station 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 the requirements of this code and the applicable standards listed in Appendix I.

**1216.2 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 approved smoke detectors.

**1216.3 Where required:** An automatic fire alarm system shall be installed and maintained in full operating condition in the locations described in the following Sections 1216.3.1 through 1216.3.3.

**1216.3.1 Institutional (I) use:** In all buildings of use group I (institutional).

**1216.3.2 Residential (R-1) use:** In all buildings of use group R-1 (residential, hotels).

**Exception:** Buildings over six (6) stories or seventy-five (75) feet in height equipped with an automatic fire suppression system.

**1216.3.3 Residential use:** In each guest room, suite or sleeping area of use group R-1 (residential, hotel, motel, lodging house, boarding house and dormitory), dwelling unit within buildings of use groups R-2 (residential, multi-family) or R-3 (residential, one- and two-family) and R-4 (detached one- and two-family). Each dwelling unit shall be provided with a minimum of one (1) approved smoke detector 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 dwelling unit (see Section 1217.3.1).

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. Smoke detectors required by this section shall comply with the standard listed in Appendix I.

**1216.4 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 1217.0.

**1216.5 Manual pull stations:** A manual fire alarm system conforming to the requirements of Section 1217.0 shall be installed in conjunction with an automatic fire alarm system.

**Exception:** Automatic fire alarm system for use groups R-2 and R-3 as required by Section 1216.3.3.

**1216.6 Distances:** Approved fire detecting devices shall be installed not to exceed the lineal or square footage allowances specified, based on the generally accepted test standards under which they were tested and approved.

**1216.7 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 installation would be detrimental or dangerous to the specific use and occupancy (see Section 1202.19).

**1216.8 Power supply:** The power for the automatic fire alarm system shall be provided from an emergency electrical system.

**Exception:** Automatic fire alarm systems for use groups R-2 and R-3 as required by Section 1216.3.3.

**1216.9 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 1216.9.1 through 1216.9.3.

**1216.9.1 Wiring:** All wiring shall conform to the requirements of NFPA 72 as listed in Appendix I.

**1216.9.2 Audible alarms:** Audible alarms, of 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 other purpose than that of a fire alarm. They shall be located so as to be effectively heard above all other sounds, by all the occupants, in every occupied space within the building.

**1216.9.3 Zones:** Each floor shall be zoned separately. If the floor area exceeds twenty thousand (20,000) square feet, additional zoning shall be provided. The length of any zone shall not exceed two hundred (200)

feet 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.

**1216.10 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 (1) megohm.

## **SECTION 1217.0 MANUAL FIRE ALARM SYSTEMS (PULL STATIONS)**

**1217.1 Plans and specifications:** Where required by this code, the plans and specifications for the manual fire alarm system 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 the applicable standards listed in Appendix I.

**1217.2 Approval:** The manual fire alarm system shall be approved for the particular application and shall be used for the fire protection signaling purposes only. Alarm boxes shall be painted a distinctive red color.

**1217.3 Where required:** A manual fire alarm system shall be installed and maintained in full operating condition in the locations described in the following Sections 1217.3.1 through 1217.3.4.

**1217.3.1 Automatic alarm system:** In all buildings required to be equipped with an automatic fire alarm system (see Section 1216.5).

**Exception:** Automatic fire alarm system as required by Section 1217.3.3 for dwelling units in use groups R-2 and R-3.

**1217.3.2 Assembly (A-4) use:** In all new and existing buildings of use group A-4 (assembly, educational).

**Exception:** Sanctuary and nave areas of churches and similar religious buildings.

**1217.3.3 Business (B) use:** In all buildings of use group B (business) when three (3) or more stories in height.

**Exception:** Buildings equipped with an automatic fire suppression system and less than seven (7) stories in height.

**1217.3.4 Residential (R-2) use:** In all buildings of use group R-2 (residential, multi-family) when four (4) or more stories in height.

**1217.4 Location:** Manual pull stations shall be located in each common corridor of each story including basements or cellars, so that from each common corridor door, not more than two hundred (200) feet will be traversed in order to reach a manual station. Stations shall be located as near as possible and not more than five (5) feet from each exitway. Where



corridors are not provided, manual stations shall be located so that any point in the building is not more than two hundred (200) feet from a station. Where a stage is provided, a manual pull station shall be located adjacent to the lighting control panel.

**1217.5 Coding:** Coded stations shall be coded in conformance with the standards as listed in Appendix I.

**1217.6 Power supply:** The power for the fire alarm system shall be provided from an emergency electrical system.

**1217.7 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 1217.7.1 through 1217.7.5.

**1217.7.1 Wiring:** All wiring shall conform to the requirements of NFPA 72 as listed in Appendix I.

**1217.7.2 Alarms:** Audible alarms, of the approved type, shall be provided. In institutional occupancies, audible and visual alarms 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 other purpose than that of an alarm of fire. They shall be of such character and so located as to be effectively heard above all other sounds (or seen), by all the occupants, in every occupied space within the building.

**1217.7.3 Pre-signal system:** A pre-signal system may be installed in institutional occupancies. Pre-signal systems shall not be installed in other occupancies, unless approved by the department and by the fire department. Where a pre-signal system is installed, twenty-four (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.

**1217.7.4 Box height:** The height of the manual pull station boxes shall be not more than four (4) feet, measured vertically from the floor level.

**1217.7.5 Zones:** Each floor shall be zoned separately. If the floor area exceeds twenty-thousand (20,000) square feet, additional zoning shall be provided. The length of any zone shall not exceed two hundred (200) feet 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.

**1217.8 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 (1) megohm.

**SECTION 1218.0 SUPERVISION**

**1218.1 Fire suppression systems:** Valves controlling required fire suppression systems shall be supervised open by one (1) of the following methods:

1. approved central station system, proprietary system or remote station system of the jurisdiction;
2. local alarm service which will cause the sounding of an audible signal at a constantly attended location;
3. locking valves open; or
4. sealing of valves and approved weekly recorded inspection when valves are located within fenced enclosures under the control of the owner.

**Exceptions**

1. Underground gate valves with roadway boxes.
2. Halogenated extinguishing systems.
3. Carbon dioxide extinguishing systems.
4. Dry chemical extinguishing systems.

**1218.2 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 1218.1.
2. Standpipe systems.
3. Fire alarm systems in residential occupancies (use group R) when less than five (5) stories in height.
4. Automatic fire alarm devices protecting individual dwelling units as required by Section 1216.3.3.



# **ARTICLE 13**

## **PRECAUTIONS DURING BUILDING OPERATIONS**

### **SECTION 1300.0 GENERAL**

**1300.1 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. The execution of the detail requirements shall be regulated by the approved rules and the safety codes for building construction listed in Appendix B.

**1300.2 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 workmen 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.

**1300.3 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 1301.0 PLANS, SPECIFICATIONS AND SPECIAL PERMITS**

**1301.1 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; and the approval of the building official shall be secured before the commencement of any work.

**1301.2 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.

**1301.3 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 1302.0 TESTS

**1302.1 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 7 for allowable loads and working stresses.

**1302.2 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; provided, however, the building official may accept a strength test to two and one-half ( $2\frac{1}{2}$ ) 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 1303.0 INSPECTION

**1303.1 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 him to take the necessary remedial measures to remove the hazard or violation.

**1303.2 Failure to comply with orders:** Unless the owner so notified proceeds to comply with the orders of the building official within twenty-four (24) hours, the building official shall have full power to correct the unsafe conditions as provided in Sections 124.0 and 125.0. All expenses incurred in the correction of such unsafe conditions shall become a lien on the property.

**1303.3 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 1302.2 or until all danger is removed.

#### SECTION 1304.0 MAINTENANCE

**1304.1 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 workmen 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 1305.0 EXISTING BUILDINGS

**1305.1 Protection:** All existing and adjoining public and private property shall be protected from damage incidental to construction operations.

**1305.2 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 1005.0 and of soil and vent stacks and the location of window openings shall conform to the provisions of Section 1705.4.

**1305.3 Adjoining walls:** The owner of the new or altered structure shall preserve all adjoining independent and party walls from damage as provided herein. He shall underpin where necessary and support the adjoining building or structure by proper foundations to comply with Section 1307.0.

**1305.3.1 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 shall remain as safe and useful as it was before the excavation was commenced. During the demolition, the party wall shall be maintained weather-proof and structurally safe by adequate bracing until such time as the permanent structural supports shall have been provided.

**1305.3.2 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.

**1305.3.3 Party wall exitways:** 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.

**1305.4 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 1306.0 PROTECTION OF PUBLIC AND WORKMEN

**1306.1 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 workmen employed thereon shall be provided.

**1306.2 Fences:** Every construction operation located five (5) feet or less from the street lot line shall be enclosed with a fence not less than eight (8) feet high to prevent entry of unauthorized persons. When located more than five (5) feet 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 the wind pressure as specified in Section 715.0.

**1306.3 Sidewalk bridge:** Whenever the ground is excavated under the sidewalk, a sidewalk bridge shall be constructed at least four (4) feet 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.

**1306.4 Sidewalk shed**

**1306.4.1 Within ten feet of street lot line:** When any building or part thereof which is located within ten (10) feet of the street lot line is to be erected or raised to exceed forty (40) feet in height, or whenever a building more than forty (40) feet in height within ten (10) feet 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.

**1306.4.2 Within 20 feet of street lot line:** When the building being demolished or erected is located within twenty (20) feet of the street lot line and is more than forty (40) feet in height, exterior flare fans or catch platforms shall be erected at vertical intervals of not more than two (2) stories.

**1306.4.3 Buildings higher than six stories:** When the building being demolished or erected is more than six (6) stories or seventy-five (75) feet in height, unless set back from the street lot line a distance more than one-half ( $\frac{1}{2}$ ) its height, a sidewalk shed shall be provided.

**1306.4.4 Walkway:** An adequately lighted walkway at least four (4) feet wide and eight (8) feet 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 615.0.

**1306.5 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.

**1306.6 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 1307.0 EXCAVATIONS**

**1307.1 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.

**1307.1.1 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.

**1307.1.2 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, he shall forthwith report in writing to the building official. The building official shall inspect such premises, and if the structure is found unsafe, he shall order it repaired as provided in Section 124.0.

**1307.1.3 Responsibility of adjoining owner:** The person making or causing an excavation to be made shall, before starting the work, give at least one (1) week's 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, he 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; and for that purpose, he shall be afforded the license when necessary to enter the property where the excavation is to be made.

**1307.1.4 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.

**1307.2 Permanent Support**

**1307.2.1 Deep excavations:** Whenever an excavation is made to a depth of more than [number] feet 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; and 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.

**1307.2.2 Shallow excavations:** Wherever an excavation is made to a depth less than [number] feet 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, he shall be afforded a license to enter the premises where the excavation is contemplated.

**Note. Depth of excavations:** Provisions have been incorporated in this code for the support of neighboring buildings and structures; and to fix the responsibility for the safety of such buildings and structures by statute. When special legal provision is not made, the common law requires that an excavator is only responsible for reasonable care in the prosecution of his work to avoid damage to adjoining structures. The depth of excavation at which the excavator's responsibility should start is a matter of local policy and rule and varies in different jurisdictions. The jurisdiction should specify the limiting depth at which responsibility changes. In Niagara Falls, New York, it is fixed at three (3) feet, the assumed frost line, which is the minimum required legal depth for all foundations in that jurisdiction. In New York City, the statutory depth is ten (10) feet. When the neighboring land adjoining an excavation is in its natural state and there are not structures erected thereon, the owner of such land should also be entitled to permanent support as provided in this code; and the person proposing to excavate should not be relieved from the responsibility to maintain conditions that guarantee the safety of the public.

## SECTION 1308.0 REGULATION OF LOTS

**1308.1 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; and provisions shall be made to prevent the accumulation of water or damage to any foundations on the premises or the adjoining property.

**1308.2 Utility connections:** All service utility connections shall be discontinued and capped in accordance with the approved rules and the requirements of the authoritative agency having jurisdiction.



## SECTION 1309.0 RETAINING WALLS AND PARTITION FENCES

**1309.1 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 870.0 and shall be provided with a guard-rail or fence not less than forty-two (42) inches in height.

## SECTION 1310.0 STORAGE OF MATERIALS

**1310.1 General:** All materials and equipment required in construction operations shall be stored and placed so as not to endanger the public, the workmen or adjoining property.

**1310.2 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.

**1310.3 Special loading:** Unless the construction is designed for special loading, materials stored on sidewalk sheds and scaffolds shall not exceed one (1) day's 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.

**1310.4 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 highways and streets. The piles shall be arranged to maintain a safe walkway not less than four (4) feet wide, unobstructed for its full length, and adequately lighted at night and at all necessary times for the use of the public.

**1310.5 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 twenty (20) feet of a street intersection, or so placed as to obstruct normal observations of traffic signals or to hinder the use of street car loading platforms.

## SECTION 1311.0 REMOVAL OF WASTE MATERIAL

**1311.1 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 1312.0 PROTECTION OF ADJOINING PROPERTY

**1312.1 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 1307.0.

## SECTION 1313.0 PROTECTION OF FLOOR AND WALL OPENINGS

**1313.1 Noncombustible floor construction:** The arches, slabs or structural floor fillings of buildings of fireproof construction (Type 1) and noncombustible construction (Type 2) shall be installed as the building progresses.

**1313.2 Combustible floor construction:** In wood joist floor construction (Types 3 and 4) 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 (2) stories below the level where work is being performed.

**1313.3 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; and the steel work shall not advance more than six (6) floors ahead of the permanent floor construction.

**1313.4 Guard rails:** All floor and wall openings shall be protected with substantial guard rails and toe boards in accordance with accepted engineering practice.

## SECTION 1314.0 SCAFFOLDS

**1314.1 Load capacity:** Scaffolds and their components shall be capable of supporting without failure at least four (4) 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 (psf) of the platform area in accordance with the classifications described in the following Table 1314.

**1314.2 Erection:** Built-up, swinging, and suspended scaffolds shall be erected by competent workmen only.

### 1314.3 Fire-retardant construction

**1314.3.1 All buildings:** All scaffolding exceeding eighty-five (85) feet or seven (7) 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 903.0.



**Table 1314**  
**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
	Bricklayers	50
Medium duty	Stucco	50
	Lathers & plasterers	50
Heavy duty	Stone masons	75

**1314.3.2 Institutional buildings:** All scaffolding used in construction operations involving the repair or partial demolition of institutional buildings (use groups I-1 and I-2), during occupancy of the building shall be constructed of noncombustible or fire-retardant materials complying with the provisions of Section 903.0.

### SECTION 1315.0 HOISTS

**1315.1 Hoist protection:** All material hoists shall be adequately protected; and when erected on the outside of a building over eighty-five (85) feet or seven (7) stories in height, the structure shall be built of noncombustible or approved fire-retardant materials with the exception of the loading platform.

**1315.2 Passengers prohibited:** Persons shall not be permitted to ride a material hoist; and temporary elevators shall be installed when necessary to transport workmen as provided in Article 16.

**1315.3 Guarding of cables:** All hoisting cables and signal cords shall be guarded wherever they pass through or cross working spaces to prevent injury to persons.

**1315.4 Riggers 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 1316.0 STAIRWAYS AND LADDERS

**1316.1 Temporary stairways:** When a building has been constructed to a greater height than fifty (50) feet or four (4) stories, or when an existing building which exceeds fifty (50) feet in height is altered, at least one (1) temporary lighted stairway shall be provided unless one (1) or more of the permanent stairways are erected as the construction progresses.

**1316.2 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 forty-two (42) inches above the floor level which they serve.

#### SECTION 1317.0 LIGHTING

**1317.1 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 624.0 and 1501.2.5.

#### SECTION 1318.0 FIRE HAZARDS

**1318.1 General:** The provisions of this code and of the fire prevention regulations shall be strictly observed to safeguard against all fire hazards attendant upon construction operations.

**1318.2 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 904.0.

**1318.3 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 B. When located within a building or within ten (10) feet thereof, all such boilers shall be enclosed with approved noncombustible construction.

**1318.4 Storage of flammables:** Storage of gasoline for hoists, oils, paints and other highly flammable materials shall be permitted only as specified in Article 4 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.

**1318.5 Flame cutting and welding:** The use of oxyacetylene torches for cutting or welding shall be permitted only in accordance with the applicable standards for air and gas welding in building construction.

**1318.6 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.

**1318.7 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 12 and the fire prevention regulations.

**1318.8 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 1212.0. Free access from the street to such standpipes shall be maintained at all times; and materials shall not be stored within five (5) feet of any fire hydrant or in the roadway between such hydrant and the center line of the street.

**1318.9 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, and the entire premises and area adjoining and around the operation shall be kept in a safe and sanitary condition and free of accumulations of trash, rubbish, nuts, bolts, small tools and other equipment.

#### SECTION 1319.0 HEALTH HAZARDS

**1319.1 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.

**1319.2 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.

**1319.3 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 1320.0 WELDING SAFETY PRECAUTIONS

**1320.1 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.

**1320.2 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 1321.0 SANITATION**

**1321.1 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 B.

#### **SECTION 1322.0 DISPUTES**

**1322.1 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 him 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 (3) days of the receipt thereof, or within a reasonable time thereafter as determined by the building official, he 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 14***

RESERVED

# ARTICLE 15

## ELECTRIC WIRING AND EQUIPMENT

### SECTION 1500.0 GENERAL

**1500.1 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.

**1500.2 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.

**1500.3 Certificate of approval:** After the Kentucky Building Code becomes effective pursuant to KRS 198B.1100 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.

**1500.4 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 16**

### **ELEVATOR, DUMBWAITER AND CONVEYOR EQUIPMENT, INSTALLATION AND MAINTENANCE**

#### **SECTION 1600.0 GENERAL**

**1600.1 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, moving stairways, moving walks and special hoisting and conveying equipment 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 and amusement devices 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 (1) 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 Appendix B.

**1600.2 Standard code adopted:** 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 moving stairways shall be in conformity to the Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks listed in Appendix B.

**1600.3 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 permit the use of other methods, but only when it is clearly evident that reasonable safety is thereby secured.

#### **SECTION 1601.0 PLANS, SPECIFICATIONS AND PERMITS**

**1601.1 Application:** The person, firm or corporation responsible for the installation, relocation, or alteration of any equipment covered by this

article shall file an application for permit with the building official 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; and shall specify all materials to be employed and all loads to be supported or conveyed. Such plans and specifications shall be sufficiently complete to illustrate all details of construction and design.

**1601.2 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.

**1601.3 Identification of equipment:** In buildings containing more than one (1) elevator or device and where such devices are subject to periodic inspections, each such elevator or device shall be identified by a serial number attached to or painted, stenciled or otherwise registered on the crosshead of the elevator car and on the motor or machine; and on devices other than elevators, on the motor or machine, in figures not less than one (1) inch 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 1602.0 TESTS AND INSPECTIONS

**1602.1 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 and in the accepted standard.

**1602.2 Acceptance tests:** Acceptance tests and inspections shall be required on all new, relocated and altered equipment subject to the provisions of this article. The tests and inspection shall be of such nature as to determine whether the entire installation is designed, constructed and installed in compliance with this code and the accepted standards, and shall include all parts of the equipment and machinery. All such tests shall be made in conformity to the requirements of Section 1602.5, in the presence of the building official, by the person, firm or corporation installing such equipment.

**1602.3 Maintenance tests and periodic inspections:** Maintenance 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.

**1602.3.1 Maintenance tests:** Maintenance tests shall be made by a qualified agent or agency approved by and in the presence of the building



official, and shall be made at the expense and responsibility of the owner.

**1602.3.2 Periodic inspections:** Periodic inspections shall be made by the building official or by a qualified agent or agency approved by him. Where such inspections are not made by the building official, the approved agent or agency shall submit a detailed report of the inspection to the building official on forms approved by him not more than thirty (30) days following the completion of such inspection.

#### **1602.4 Frequency of tests and inspections**

**1602.4.1 Periodic inspection intervals:** Periodic inspections shall hereafter be made at intervals of not more than six (6) months for all elevators, manlifts and moving stairways; at intervals of not more than twelve (12) months for power dumbwaiters and all dumbwaiters with a capacity of one hundred (100) pounds and over. Miscellaneous hoisting and elevating equipment, conveyors and amusement devices shall be inspected at such intervals as may be deemed necessary by the building official to insure reasonable safety of operation.

**1602.4.2 Maintenance test intervals:** Maintenance tests shall be made at intervals not exceeding the following:

1. power elevator car and counterweight safeties, governors and oil buffers, every five (5) years; and
2. hydraulic elevator and dumbwaiter pressure tanks and piston rods of roped hydraulic elevators and dumbwaiters, every three (3) years.

**1602.5 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.

**1602.5.1 Elevators, dumbwaiters and moving stairways:** The equipment and machinery of elevator, dumbwaiter and moving stairways shall be inspected and tested to the requirements of the standard listed in Appendix B.

**1602.5.2 Material lifts, conveyors and amusement devices:** Material lifts, conveyors and amusement devices shall be inspected and subjected to tests to insure the load capacity and safety of operation. The tests shall cover all operating protectives and safety devices, structural adequacy of the supports and anchorage to floors, walls, ceilings and foundations.

**1602.5.3 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, belt tension and emergency stopping device. Acceptance tests shall also include a load capacity test as provided in the accepted standard listed in Appendix B.

**1602.5.4 Miscellaneous hoisting and elevating equipment:** All miscellaneous hoisting and elevating equipment shall be subjected to such tests and inspections as may be required by the building official to insure safe operation.

### SECTION 1603.0 CERTIFICATE OF COMPLIANCE

**1603.1 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.

**1603.2 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 test and inspection. The final certificate shall also include the necessary space for inserting the information indicated below.

1. The name of the person who made the periodic inspection and witnessed the periodic and maintenance tests.
2. The date of the periodic inspection and test and of the maintenance test.

**1603.3 Limited certificate of compliance:** The building official may within his discretion issue 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 and shall bear the dates of issue, renewal and expiration, and shall designate the class of service allowed.

**1603.3.1 Tests and minimum safeguards required:** A limited certificate shall not be issued for an elevator until such elevator has satisfactorily passed the following tests: 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 reasonable safe operation for the limited service specified.

**1603.3.2 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 the safety code 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.

**1603.3.3 Time limitation:** Limited certificates of operation shall be issued for periods of not more than thirty (30) days; but may be renewed



within the discretion of the building official for additional periods of not more than thirty (30) days each.

**1603.4 Posting certificates of compliance:** The owner or lessee shall post the last issued certificate of compliance in a conspicuous place inside all elevator cars and on, or immediately adjacent to, the entrance to all other approved equipment.

#### **SECTION 1604.0 MAINTENANCE AND ACCIDENTS**

**1604.1 Owner responsibility:** The owner or his legal agent of 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 him. He shall make or cause to be made all maintenance tests and service inspections and shall maintain all equipment in a safe operating condition.

**1604.2 Contractor responsibility:** The person, firm or corporation 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 his legal agent.

**1604.3 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 the standard listed in Appendix B.

**1604.4 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 must 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; and 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 an extension of time secured from him in writing.

**1604.4.1 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 for the following reasons: when in case of emergency in the opinion of the building official, any such device is in a condition to render it totally unsafe for operation; or for willful failure to comply with recommendations and orders issued by the building official.

**1604.4.2 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.

**1604.4.3 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, and any defacing or removal of the sign or tag, or any tampering with or removal of the seal without approval of the building official, shall constitute a violation of this article.

**1604.5 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 or 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.

**1604.6 Removal of damaged parts:** It shall be unlawful to remove any part of the damaged construction or operating mechanism of elevators, or other equipment subject to the provisions of this article, from the premises until permission to do so has been granted by the building official.

## SECTION 1605.0 EXISTING INSTALLATIONS

**1605.1 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, he shall notify the owner or lessee in writing of the existing condition and shall recommend such alterations or additions as he may deem necessary to eliminate the dangerous condition.

### 1605.2 General requirements

**1605.2.1 Projections into hoistway:** All ledges, floor beams, saddles, timbers and other projections, 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, that project more than two (2) inches 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. The angle of the bevels or guard plates shall preferably be not less than seventy-five (75) degrees but never less than sixty (60) degrees from the horizontal.

**1605.2.2 Emergency interlock release switch:** Glass or other breakable type covers of car emergency release switches, where provided, shall be maintained in place, and, if not so maintained, the building official shall require that the existing emergency release switch be replaced with one (1) of the key-operated continuous-pressure type.

**1605.2.3 Lighting:** The cars and entrances of all elevators shall be properly lighted at all times when in service. The minimum illumination shall be not less than one (1) foot candle at the landing edge of the platform.

**1605.2.4 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 devices 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.

**1605.2.5 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.

**1605.2.6 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.

### **1605.3 Existing passenger elevators**

**1605.3.1 Hoistway enclosure:** All existing passenger elevator hoistways shall be fully enclosed from floor to ceiling on all floors to comply with Section 1609.0.

**1605.3.2 Hoistway doors and interlocks:** All existing electric and electrically controlled and operated hydraulic 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 closers 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 side shall conform to the requirements of the safety code listed in Appendix B.

**1605.3.3 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 the standard listed in Appendix B.

**1605.3.4 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.

**1605.3.5 Emergency signal or telephone:** Existing power-passenger and freight elevators shall be provided with emergency signal devices conforming to the requirements of the standard listed in Appendix B.

#### **1605.4 Existing freight elevators**

**1605.4.1 Hoistway enclosure:** If not now enclosed, an enclosure shall be required on existing freight elevators as required for existing passenger elevators in Section 1605.3, except as provided in Section 1605.4.3.

**1605.4.2 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 the safety code listed in Appendix B, or with fusible links and automatic self-closing devices.

**1605.4.3 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 five and one-half (5½) feet high provided with either hoistway gate interlocks, or with hoistway gate electric contacts and mechanical locks conforming to the safety code listed in Appendix B.

**1605.4.4 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 five and one-half (5½) feet 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.



**1605.4.5 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 four (4) inches. 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 the standard listed in Appendix B.

### **SECTION 1606.0 ALTERATIONS**

**1606.1 General:** Alterations to existing elevators shall conform to the standards listed in Appendix B. Alterations to all other devices subject to this article shall conform to such requirements as the building official considers necessary for safe operation.

**1606.2 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 1607.0 POWER ELEVATOR OPERATION**

**1607.1 Designated operator:** Every power elevator except automatic and continuous-pressure operation types and sidewalk elevators shall be in charge of a competent designated operator.

**1607.2 Fire department use:** In all structures where elevators are to be installed, there shall be at least one (1) elevator provided for fire department emergency access to all floors. Elevator operation shall be in accordance with ANSI A17.1, listed in Appendix B, and said elevator cab shall have a minimum inside car platform of four (4) feet three (3) inches wide by six (6) feet eight (8) inches deep with a minimum clear opening width of forty-two (42) inches, unless otherwise designed and approved to provide equivalent utility and shall be of such size to accommodate an ambulance cot having a minimum size of twenty-two (22) inches by seventy-eight (78) inches in its horizontal position. In every structure over one hundred and fifty (150) feet 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.

**1607.3 Passenger restriction**

**1607.3.1 Freight operators:** Except as provided in Section 1607.3.2, 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; and it shall be unlawful for the owner or other responsible person to permit any individual other than above specified to ride on any elevator other than a passenger elevator.

**1607.3.2 Other employees:** Employees of the owner may ride on a freight elevator, subject to approval of the building official and the requirements of the safety code.

### **SECTION 1608.0 ELEVATOR SPEED LIMITS**

**1608.1 Maximum:** The car speed limits herein specified shall be the maximum permitted for the types listed.

**1608.2 Non-counterweighted drum elevators:** The speed of all non-counterweighted drum elevators shall be not more than fifty (50) feet per minute.

**1608.3 Sidewalk elevators:** The speed of sidewalk elevators shall not exceed fifty (50) feet per minute where a drum type machine is used, or where the car raises and lowers doors or covers in the sidewalk or other exterior area.

**1608.4 Continuous-pressure elevators:** The speed of continuous-pressure operation elevators shall be not more than one hundred and fifty (150) feet per minute.

### **SECTION 1609.0 HOISTWAY ENCLOSURES AND VENTING**

#### **1609.1 Fire-resistance rating of hoistway enclosures**

**1609.1.1 Elevator enclosures:** All elevator and other hoistway enclosures other than dumbwaiter shafts shall be constructed to afford at least the fire-resistance rating specified in Table 214 with approved opening protectives conforming to Section 1613.0 and Article 9.

**1609.1.2 Dumbwaiter enclosures:** Shaft enclosures and dumbwaiters having a car area of more than three (3) square feet which travel through more than one (1) story and serve more than two (2) adjacent floors shall be of one (1) hour fire-resistance rated construction with approved three-quarter (¾) hour opening protectives or the approved labeled equivalent complying with Article 9, except that when the load capacity exceeds one hundred (100) pounds per square foot (psf) the enclosure and opening protectives shall comply with the requirements of Section 1609.1.1 for fire-resistance rating.

**1609.1.3 Special dumbwaiter enclosures:** The enclosure of dumbwaiters not more than three (3) square feet in area with a load capacity of not



more than twenty-five (25) pounds and all dumbwaiters serving not more than two (2) adjacent levels shall be enclosed with approved noncombustible materials.

**1609.2 Limiting number of elevators in one hoistway enclosure:** The number of elevators permitted in one (1) hoistway shall conform to the standards listed in Appendix B.

**1609.3 Vents required:** Hoistways of elevators and dumbwaiters serving more than three (3) stories shall be provided with means for venting smoke and hot gases to the outer air in case of fire, except as listed below.

1. In buildings other than hotels, apartment houses, hospitals, 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 to an approved automatic fire suppression system conforming to Section 1204.0 in lieu of the required vents.
2. Sidewalk elevator hoistways are not required to be vented.

**1609.4 Location of vents:** Vents shall be located 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 in the wall or roof of the penthouse or overhead machinery space above the roof, provided that vent openings of at least equivalent area are provided in the floor or floors at the top of the hoistway. Cable slots entering the machine room shall be sleeved beneath the machine room floor and extended to not less than twelve (12) inches below the shaft vent to inhibit the passage of smoke into the machine room.

**1609.5 Area of vents:** Except as herein provided, the area of the vents shall be not less than three and one-half ( $3\frac{1}{2}$ ) per cent of the area of the hoistway nor less than three (3) square feet for each elevator car, and not less than three and one-half ( $3\frac{1}{2}$ ) per cent nor less than one-half ( $\frac{1}{2}$ ) square foot for each dumbwaiter car, in the hoistway, whichever is greater. Of the total required vent area, not less than one-third ( $\frac{1}{3}$ ) shall be of the permanently-open type. Where mechanical ventilation conforming to the mechanical code listed in Appendix B and providing equivalent venting of the hoistway is provided in the overhead elevator machine room, the required vent area may be reduced, provided the following conditions are met.

1. The building is not a hotel, apartment house, hospital or similar building with overnight sleeping quarters.
2. The machine room is so located that it does not have outside exposure.
3. The hoistway does not extend to the top story of the building.
4. The machine room exhaust fan is automatically re-activated by thermostatic means.

**1609.6 Closed vents:** Closed portions of the required vent area shall consist of windows, skylights or duct openings glazed with plain glass not more than one-eighth ( $\frac{1}{8}$ ) inch thick.

**1609.6.1 Skylights:** Skylights used as required vents shall conform to Section 925.3.

**1609.6.2 Windows:** Windows used as required vents shall conform to Section 916.0, except that they shall be glazed with one-eighth ( $\frac{1}{8}$ ) inch plain glass.

#### **SECTION 1610.0 ELEVATOR-EXITWAY RESTRICTIONS**

**1610.1 General:** Elevators shall not be accepted as a required element of an exitway. Elevators shall not be installed in a common enclosure with a stairway, and the path of travel on any exitway stairway shall not pass directly in front of any elevator hoistway door.

#### **SECTION 1611.0 ELEVATOR AND DUMBWAITER MACHINERY AND EQUIPMENT**

**1611.1 General:** Elevator and dumbwaiter machinery and equipment shall conform to the standard listed in Appendix B.

#### **SECTION 1612.0 HOISTWAYS AND RELATED CONSTRUCTION FOR PASSENGER AND FREIGHT ELEVATORS AND DUMBWAITERS**

**1612.1 General:** The construction of hoistways, machine rooms and related construction for passenger and freight elevators and dumbwaiters shall conform with the standards listed in Appendix B.

#### **SECTION 1613.0 ELEVATOR OPENING PROTECTIVES**

**1613.1 General:** All hoistway enclosure doors for elevators, dumbwaiters and other hoisting equipment shall be constructed in accordance with the provisions of Article 9 and as herein required.

**1613.2 Fire doors:** Door openings of elevator hoistway enclosures shall be equipped with protective assemblies having a fire-resistance rating of not less than one and one-half ( $1\frac{1}{2}$ ) hours or their approved labeled equivalent; except that when the shaft opens into a vestibule enclosed with not less than two (2) hour fire-resistance rated construction in which all vestibule openings are protected with assemblies having a fire-resistance rating of not less than one (1) hour, the fire-resistance rating of the shaftway doors may be reduced to three-quarter ( $\frac{3}{4}$ ) hour. Elevator hoistway fire doors shall not be required to be self-closing.

**1613.3 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.

**1613.4 Door operation on dangerous floors:** Each elevator lobby shall be provided with an approved 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 and be under the manual control only. 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 and be under manual control only. The smoke detector is to operate before the optical density exceeds three-hundredths (0.03) per foot. The detector may serve to close the lobby doors.

**Exception:** Freight elevators located in or at openings into industrial areas.

#### **SECTION 1614.0 ELEVATOR CAR EMERGENCY SIGNALS**

**1614.1 General:** Elevator cars shall be provided with car emergency signals conforming to the standard listed in Appendix B.

#### **SECTION 1615.0 MANLIFTS**

**1615.1 Restricted use:** Manlifts shall be accessible and their use 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.

**1615.2 Enclosures:** When the clear vertical distance between mounting platform and ceiling guard is less than seven and one-half (7½) feet, the manlift shall be completely enclosed to comply with Section 1609.0 without access openings.

**1615.3 Accessibility:** An entrance to manlifts shall not be provided from any floor or level with a clear ceiling height of less than nine (9) feet, and the minimum clearance between the head pulley and the roof or other overhead obstruction shall be not less than four (4) feet.

**1615.4 Speed:** The speed of manlifts shall not exceed ninety (90) feet per minute.

##### **1615.5 Manlift safeties**

**1615.5.1 Manlift manual stops:** An approved manually operated stopping device shall be provided to permit passengers riding on a manlift to control the operation of the lift at all floors and at any level in the travel of the device.

**1615.5.2 Manlift automatic stops:** An approved safety device shall be provided which will automatically stop the lift in the event that a rider

fails to alight at the top landing; but such automatic device shall not be capable of restoring the operating circuit when it has been interrupted for any cause.

**1615.5.3 Secondary manlift stop:** All new installations shall be provided with a secondary safety stop to act immediately after and in the event of a failure of the automatic stop brake or other device required in Section 1615.5.2.

**1615.6 Manlift construction**

**1615.6.1 Floor openings:** Floor openings shall be circular and not less than twenty-four (24) inches in dimension from belt to perimeter. The floor openings shall be provided with bevel guards underneath the landing with a slope of not less than forty-five (45) degrees from the horizontal, extending not less than forty-two (42) inches back from the handhold.

**1615.6.2 Guards:** The floor opening shall be protected with a railing or guard of metal or other approved noncombustible material, forty-two (42) inches in height, located not less than twelve (12) inches from the edge of the opening.

**1615.6.3 Entrance and exit:** The entrance and egress to and from the manlift shall be equipped with a gate at all floors and landings, hung to swing away from the opening and located not less than two (2) feet from the floor openings. The landings shall be constructed to provide safe footing and shall be kept clear of obstructions and lighted to an intensity of not less than three (3) foot candles. The runs of the manlift shall be illuminated throughout the entire height to an intensity of not less than one (1) foot candle.

**1615.6.4 Steps:** Manlift steps shall be uniform in size and not less than twelve (12) inches deep from the plane of the belt to the edge of the tread and of adequate strength to support a load of four hundred (400) pounds. The vertical distance between step treads shall be not less than fifteen (15) feet.

**1615.6.5 Belts:** All manlift belts shall be of approved types, not less than twelve (12) inches wide and of adequate strength to support a load of two hundred (200) pounds on each step of one (1) run without loss of traction.

**1615.6.6 Handholds:** Manlift handholds shall be located not less than four (4) nor more than four and two-thirds ( $4\frac{2}{3}$ ) feet above each step tread on both runs of the manlift with a two (2) inch clearance from the belt. Such handholds shall be not less than nine (9) inches in length in the clear.

**1615.7 Final acceptance:** All manlifts shall be subject to acceptance by the building official and periodic tests and inspections as provided in Section 1602.0.



**1615.8 Manlift instruction signs**

**1615.8.1 Landing signs:** Approved signs shall be provided on each landing and stenciled on the belt at approximately eye level above each step giving the following instructions: *For employees only. Face the belt. Use the handhold. To stop, pull rope.*

**1615.8.2 Terminal sign:** The top landing shall be provided with an illuminated warning sign in block letters not less than two (2) inches high which shall be located within easy view of ascending passengers at a level of not more than two (2) feet above the top landing, reading: *Top floor, get off.*

**SECTION 1616.0 INDUSTRIAL LIFTS AND LOADING RAMPS**

**1616.1 General:** Except as exempted by Section 1600.0 or as may be otherwise provided by statute, the provisions of this section and Section 1617.0 shall control the design, construction, installation, maintenance and operation of all automotive lifts, industrial lifts and loading dock ramps hereafter installed, relocated or altered in all buildings and structures. All such equipment shall be constructed, operated and maintained in compliance with accepted engineering practice. 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 permit the use of other methods, but only when it is clearly evident that reasonable safety is thereby secured.

**1616.2 General requirements**

**1616.2.1 Markings and labels:** All material lifts and loading ramps shall be marked with the name of manufacturer, model number, serial number, and rated capacity; and such markings shall be legibly stamped or etched on a metal plate which shall be permanently secured in a convenient place for inspection. Such nameplates shall not be obscured, obliterated or changed.

**1616.2.2 Controls:** The controls shall be so located that the operator has a full and unobstructed view of the lift area at all times. All control devices shall be accessible to the operator without exposing him to danger. Alterations or changes shall not be made in the control device, or its manner of use, which will render its normal functioning inoperative.

**1616.2.3 Lift control:** When the device used for controlling the travel of the lift in either direction is not continuous pressure or deadman type, an emergency stop button shall be provided and so located as to be readily accessible to the operator at all times.

**1616.3 Maintenance**

**1616.3.1 Owner responsibility:** The owner or his agent 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 him or its approval by the building official. The owner, or his agent, shall not permit the equipment to be used unless it is, to the best of his knowledge, in safe operating condition.

**1616.3.2 Housekeeping:** The spaces around, or beneath the equipment shall be kept clean; rubbish or oil shall not be allowed to accumulate therein, nor shall any part of this space be used for storage of materials or equipment. All parts, except such parts as require freedom of movement, shall be kept tight at all times. All mechanical working parts shall be kept free of rust, and properly lubricated and adjusted. The owner, or his agent, shall be responsible for inspecting the oil level in all hydraulic systems to insure that it is at, or above, the manufacturer's prescribed minimum level.

**1616.3.3 Lighting:** The entire operating area shall be illuminated to provide a distributed intensity of not less than three (3) foot-candles over the area of operating floor and platform.

**1616.4 Pressure tanks:** All separate tanks for liquid storage under pressure, not an integral part of the cylinder assembly, shall conform to the provisions of ASME code for unfired pressure vessels listed in Appendix B and shall be marked with a securely attached metal label to indicate the approved operating pressure. For hydro-pneumatic systems, the storage capacity shall be such that with the lift in fully elevated position there shall remain not less than three (3) inches of usable oil in the storage tank. Adequate means shall be provided to determine that the oil level in reservoir, with lift in the lowest position, is at or above the safe minimum operating level as prescribed by the manufacturer.

**1616.5 Design and construction:** The construction and installation of all power industrial lifts and loading ramps shall comply with the provisions of this section and the accepted standards listed in Appendix B.

**1616.5.1 Rated load:** The lifting capacity of the lift shall be not less than fifty (50) pounds per square foot (psf) of gross platform area.

**1616.5.2 Platform construction:** The platform and its supports shall be designed for the loads to be transmitted within the strength and deflection limitations herein specified, when one-half ( $\frac{1}{2}$ ) the capacity load is applied as a static center concentration within twelve (12) inches of the loading edge, the lift platform shall not deflect more than one-half ( $\frac{1}{2}$ ) inch at any edge point.

#### **1616.6 Platform and hoist protection**

**1616.6.1 Unprotected space not more than five feet:** When the lift rise is such that the unprotected vertical distance from the landing to the bottom edge of the vertical side of the platform is not more than five (5) feet, protection shall be provided as described below.



1. **Toe guards:** A toe guard plate not less than eight (8) inches in width shall be provided on all unprotected sides. It shall be made of steel, not less than No. 11 Manufacturers' Standard Gage (0.120 in.) in thickness, attached flush with the vertical edge of the platform, and slanted inwardly at an angle of approximately thirty (30) degrees from the vertical. Skirts may be used in lieu of toe guards.
2. **Skirts:** For automatic operation, the unprotected sides of the platform shall be provided with metal or wood sheathing or skirts attached to the platform to protect the exposed vertical openings.
3. **Enclosures:** When toe guard or skirt protection is not provided the unprotected sides may be provided with solid or mesh enclosures to the full height of the lift rise. Mesh enclosure shall, by test, reject a two (2) inch ball.

**1616.6.2 Unprotected space more than five feet:** When the unprotected space exceeds that set forth in Section 1616.6.1, protection shall be provided as described below.

1. Sides used for loading or unloading at the lower level shall be protected with skirts as described in Section 1616.6.1, or by a landing gate with electrical contact, or an automatic landing gate.
2. Sides not used for loading or unloading shall be protected with skirts or enclosures as described in Section 1616.6.1.

**1616.6.3 Lift rise more than five and one-half feet:** When the lift rise exceeds five and one-half (5½) feet above the lowest level, additional protection shall be provided as described below.

1. The upper landing shall be provided with a landing gate equipped with mechanical lock and electrical contact.
2. The sides of the platform not used for loading or unloading shall be provided with railings, mesh, or solid enclosures not less than three and one-half (3½) feet high.

**1616.6.4 Surface installations:** When the lift is surface mounted, toe clearance space shall be provided on all unprotected sides. Such toe clearance shall provide not less than three (3) inches vertical and four (4) inches horizontal clearance when the platform is at its lowest position.

**1616.7 Platform protection, loading ramps:** The sides or edges of the loading ramps which rise above the surrounding platform shall be provided with skirt or toe guards protecting the opening under the sides of the ramp.

#### **1616.8 Overload protection**

**1616.8.1 Electric-hydraulic operation:** Hydraulic overload protection shall be provided by means of a relief valve that will prevent raising of the elevating device when it is loaded to one hundred twenty-five (125) per cent of rated capacity. The relief valve shall be so located that its operation will not cause the platform to lower.

**1616.8.2 Electric operation:** Electric overload protection shall be provided by means of a thermal cutout or other suitable device.

### SECTION 1617.0 AUTOMOTIVE LIFTS

**1617.1 General:** All electric, hydraulic and hydro-pneumatic automotive lifts shall comply with the requirements of Sections 1606.0 and 1606.1, and the applicable standards listed in Appendix B.

**1617.2 Types:** Lifts shall be classified as semi-hydraulic, full hydraulic or mechanical lifts according to their operation as described in the following Sections 1617.2.1 through 1617.2.3.

**1617.2.1 Semi-hydraulic hydro-pneumatic:** A semi-hydraulic lift is an automotive lift of the plunger type which employs compressed air as the primary lifting and load sustaining agent; such compressed air acts continuously against a column of liquid to provide the lifting and load sustaining effort.

**1617.2.2 Full hydraulic:** A full hydraulic lift is an automotive lift of the plunger type that employs a liquid under pressure as the direct lifting and load sustaining agent. Such a lift is so designed and constructed that the full weight of the load and lifting assembly rests on a continuous column of liquid which extends from the cylinder to the liquid control valve.

**1617.2.3 Mechanical lifts:** A mechanical lift is an automotive lift so designed that the motive power is transmitted to the lifting frame by mechanical means. There are three principal types: cable and drum; rack and pinion; and screw type.

**1617.3 Chassis and axle supports:** Only those chassis and axle supports complying with the requirements of Commercial Standard CS142 listed in Appendix B may be used.

**1617.4 Safeties:** All mechanical automotive lifts shall be equipped with approved safeties as specified in the following Sections 1617.4.1 through 1617.4.3.

**1617.4.1 Limit stop:** Every mechanical automotive lift shall be equipped with an automatic overtravel device to stop the motor or drive machine before the lifting frame reaches safe limits of travel.

**1617.4.2 Holding brake:** When the friction of the gear train of the driving mechanism is insufficient to hold the load, the mechanical automotive lift shall be equipped with a brake or other locking device to automatically hold the lift at any level immediately on failure of the lifting power for any cause.

**1617.4.3 Stopping brake:** When the structural members of the lifting frame are so designed that they interfere with open doors or other projections from the vehicle, the automotive lift shall be provided with a quick acting automatic brake to stop the ascent of the lift in case of emergency.



**1617.5 Controls**

**1617.5.1 Automatic release:** The direct control device shall be of a type that will automatically return itself to the neutral or off position upon release by the operator.

**1617.5.2 Speed control:** A speed control device shall be provided to control the descent of the lift at a speed of not more than twenty (20) feet per minute (fpm) under rated load.

**SECTION 1618.0 CONVEYORS**

**1618.1 Enclosures:** All package elevators, boosters or lifts connecting successive floors or levels shall be enclosed in fireresistance rated construction in conformity to the requirements of Sections 1612.0 and 1609.0 and Article 9.

**1618.2 Opening protectives**

**1618.2.1 Plans and specifications:** Whenever conveyor or other material-handling devices are designed to pass through floors, ceilings, partitions or walls, the plans and specifications shall give the necessary details of the opening protectives in respect to location, structural strength and fire-resistance rating.

**1618.2.2 Fire curtains:** Openings in partitions and walls through which conveyors pass shall have automatic fire dampers or curtains to prevent the spread of fire when, in the opinion of the building official, such protection is necessary due to the hazard of operation of the conveyors.

**1618.2.3 Fire doors:** All opening protectives shall meet the fireresistance rating requirements of Article 9 for the location, type of construction and use of the building or structure.

**1618.3 Machinery guards:** All conveying devices shall be manufactured, installed, and guarded in accordance with the American National Standards Institute's Safety Standards for Conveyors and Related Equipment (ANSI B20.1).

**1618.4 Chute enclosures:** All slides and chutes shall be enclosed with fireresistance rated construction or protected with approved automatic shutters of noncombustible construction to insure a full firestop between floors of the building or structure.

**1618.5 Conveyor safeties:** All power-operated conveyors, belts and other material moving devices shall be equipped with automatic limit switches which will shut off the power in an emergency and automatically stop all operation of the conveyors.

**SECTION 1619.0 MOVING STAIRWAYS**

**1619.1 General:** All moving stairways and their enclosures shall comply

with the provisions of this section and the safety code. When serving as a required exitway element, moving stairways shall meet the additional requirements of Section 620.0.

#### **1619.2 Construction materials**

**1619.2.1 Enclosures:** When not approved as a required exitway element, the stairwell may be open when protected with an exhaust system of ventilation and water curtains as provided in Section 520.0, or with a power-operated shutter conforming to Section 1619.3; except that the machine room shall be enclosed with one (1) hour fire-resistance rated construction and shall be properly lighted and ventilated. When such stairway serves as a required exitway element, the complete enclosure including the machine room shall be constructed with a fire-resistance rating of not less than two (2) hours complying with the requirements of Section 616.0 for interior stairways.

**1619.2.2 Noncombustible materials:** All parts of the moving stairway and equipment shall be constructed entirely of noncombustible and fire-retardant materials except electrical equipment, wiring, wheels, handrails and the use of one-twenty-eighth ( $\frac{1}{28}$ ) inch wood veneers on balustrades backed-up with noncombustible materials.

**1619.3 Automatic fire shutter:** Unenclosed moving stairways that do not meet the requirements of Article 6 for exitway stairways and which are not protected with an approved exhaust system and automatic water curtain specified in Section 520.0, shall be equipped with a power-operated automatic shutter at every floor pierced thereby, constructed of noncombustible materials with a fire-resistance rating of not less than one and one-half ( $1\frac{1}{2}$ ) hours as provided in Section 520.5.

**1619.3.1 Construction:** The shutter shall be so constructed 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 thirty (30) fpm; 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 17

## STATE PLUMBING CODE

### SECTION 1700.0 GENERAL

**1700.1 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

**Necessity and Function.** The department is directed by KRS 318.130 through the State Plumbing Code Committee to adopt and put into effect a State Plumbing Code. This regulation relates to the definitions needed to interpret other sections of the subsequent regulations or comprising the State Plumbing Code.

#### 1. Definition of Terms

- (1) **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.
- (2) **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.
- (3) **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.
- (4) **Anchors.** See supports.
- (5) **Approved.** Accepted or acceptable under an applicable specification stated or cited in this Code.

- (6) **Area drain.** A receptacle designed to collect surface or storm water from an open area.
- (7) **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.
- (8) **Autopsy table.** A fixture or table used for post-mortem examination of a body.
- (9) **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.
- (10) **Backflow connection.** Any arrangement whereby backflow can occur.
- (11) **Backflow preventer.** A device or means to prevent backflow.
- (12) **Backflow preventer, reduced pressure zone type.** An assembly of differential valves and check valves including an automatically opened spillage port to the atmosphere.
- (13) **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.
- (14) (a) **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.  
(b) **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.
- (15) **Battery of fixtures.** Any group of two (2) or more similar adjacent fixtures which discharge into a common horizontal waste or soil branch.
- (16) **Bedpan hopper.** See clinical sink.
- (17) **Bedpan steamer or boiler.** A fixture used for scalding bedpans or urinals by direct application of steam or boiling water.
- (18) **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.
- (19) **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.



- (20) **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.
- (21) **Boiler blow-off.** An outlet on a boiler to permit emptying or discharge of sediment.
- (22) **Boiler blow-off tank.** A vessel designed to receive the discharge from a boiler blow-off outlet and to cool the discharge to a temperature which permits its safe discharge to the drainage system.
- (23) **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.
- (24) **Branch, fixture.** (See fixture branch.)
- (25) **Branch interval.** A distance along a soil or waste stack corresponding in general to a story height, but in no case less than eight (8) feet, within which the horizontal branches from one floor or story of a building are connected to the stack.
- (26) **Branch vent.** A vent connecting one or more individual vents with a vent stack or stack vent.
- (27) **Building.** A structure having walls and a roof designed and used for the housing, shelter, enclosure, or support of persons, animals or property.
- (28) **Building classification.** The arrangement of buildings in classes according to occupancy.
- (29) **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 (2) feet outside the building wall.
- (30) **Building drain — combined.** A building drain which conveys both sewage and storm water or other drainage.
- (31) **Building drain — sanitary.** A building drain which conveys sewage only.
- (32) **Building drain — storm.** A building drain which conveys storm water or other drainage but not sewage.
- (33) **Building gravity drainage system.** A drainage system which drains by gravity into the building sewer.
- (34) **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.

- (35) **Building sewer — combined.** A building sewer which conveys both sewage and storm water or other drainage.
- (36) **Building sewer — sanitary.** A building sewer which conveys sewage only.
- (37) **Building sewer — storm.** A building sewer which conveys storm water or other drainage but no sewage.
- (38) **Building subdrain.** That portion of a drainage system which does not drain by gravity into the building sewer.
- (39) **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.
- (40) **Circuit vent.** A branch vent that serves two or more traps and extends from the down-stream side of the highest fixture connection of a horizontal branch to the vent stack.
- (41) **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 (3) inches.
- (42) **Code.** Means the State Plumbing Code.
- (43) **Combination fixture.** A fixture combining one (1) sink and laundry tray or a two (2) or three (3) compartment sink or laundry tray in one (1) unit.
- (44) **Combined building drain.** (See building drain — combined.)
- (45) **Combined building sewer.** (See building sewer — combined.)
- (46) **Combination waste and vent system.** A specially designed system of waste piping embodying the horizontal wet venting of one (1) 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.
- (47) **Common vent.** A vent connecting at the junction of two (2) fixture drains and serving as a vent for both fixture drains.
- (48) **Conductor.** A pipe inside the building which conveys storm water from the roof to a storm or combined building drain.
- (49) **Continuous vent.** A vertical vent that is a continuation of the drain to which it connects.
- (50) **Continuous waste.** A drain from two (2) or more fixtures connected to a single trap.
- (51) **Cross connection.** Any physical connection or arrangement between two (2) otherwise separate piping systems, one (1) 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 (1) system to the other, the direction of flow depending on the pressure dif-



ferential between the two (2) systems. (See backflow and back-siphonage.)

- (52) **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 (2) feet or more by means of a plug, cap, or other closed fitting.
- (53) **Developed length.** The length of a pipe line measured along the center line of the pipe and fittings.
- (54) **Diameter.** The nominal diameter as designated commercially.
- (55) **Domestic sewage.** The water-borne wastes derived from ordinary living processes.
- (56) **Double offset.** Two (2) changes of direction installed in succession or series in a continuous pipe.
- (57) **Downspout.** (See leader.)
- (58) **Drain.** Any pipe which carries waste water or waterborne wastes in a building drainage system.
- (59) **Drainage pipe.** (See drainage system.)
- (60) **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.
- (61) **Drainage system (building gravity).** A drainage system which drains by gravity into the building sewer.
- (62) **Drainage system, (sub-building).** (See building subdrain.)
- (63) **Dry well.** (See leaching well.)
- (64) **Dual vent.** (See common vent.)
- (65) **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.
- (66) **Dwelling unit.** One (1) or more rooms with provision for living, sanitary and sleeping facilities arranged for the use of one (1) family or individual.

- (67) **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.
- (68) **Ejector.** (See aspirator.)
- (69) **Existing Work.** A plumbing system or any part thereof installed prior to the effective date of this Code.
- (70) **Fire line.** A system of pipes and equipment used exclusively to supply water for extinguishing fires.
- (71) **Fixture.** (See plumbing fixture.)
- (72) **Fixture branch.** A fixture branch is the piping distance between a soil, waste and vent stack and the fixture trap.
- (73) **Fixture drain.** The drain from the trap of a fixture to the junction of that drain with any other drain pipe.
- (74) **Fixture supply.** The water supply pipe connecting a fixture to a branch water supply pipe or directly to a main water supply pipe.
- (75) **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 (1) drainage fixture-unit approximates one (1) cubic foot per minute.)
- (76) **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.
- (77) **Flood level.** (See flood level rim.)
- (78) **Flood level rim.** The edge of the receptacle from which water overflows.
- (79) **Flooded.** The condition which results when the liquid in a container or receptacle rises to the flood-level rim.
- (80) **Floor drain.** A floor drain is a drain placed in the floor of a building for the purpose of receiving sanitary waste water.
- (81) **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.
- (82) **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.
- (83) **Flush valve.** A device located at the bottom of a tank for flushing water closets and similar fixtures.



- (84) **Flushing type floor drain.** A drain which is equipped with an integral water supply enabling flushing of the drain receptor and trap.
- (85) **Flushometer valve.** A device which discharges a predetermined quantity of water to fixtures for flushing purposes and is closed by direct water pressure.
- (86) **Frostproof closet.** A hopper with no water in the bowl and with the trap and water supply control valve located below frost line.
- (87) **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.
- (88) **Grease interceptor.** (See interceptor.)
- (89) **Grease trap.** (See interceptor.)
- (90) **Hangers.** (See supports.)
- (91) **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 (1) or more fixture drains and conducts it to the soil or waste stack or to the building drain.
- (92) **Horizontal pipe.** Any pipe or fitting which makes an angle of less than forty-five (45) degrees with the horizontal.
- (93) **Hot water.** Water at a temperature of not less than 120 degrees F.
- (94) **House drain.** (See building drain.)
- (95) **House sewer.** (See building sewer.)
- (96) **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.
- (97) **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.
- (98) **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.
- (99) **Individual water supply.** A supply other than an approved public water supply which serves one (1) or more families.
- (100) **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.
- (101) **Industrial Wastes.** Liquid wastes resulting from the processes employed in industrial and commercial establishments.
- (102) **Insanitary.** Contrary to sanitary principles — injurious to health.

- (103) **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.
- (104) **Installed.** Altered, changed or a new installation.
- (105) **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.
- (106) **Leaching well or pit.** A pit or receptacle having porous walls which permit the contents to seep into the ground.
- (107) **Leader.** An exterior drainage pipe for conveying storm water from roof or gutter drains.
- (108) **Liquid waste.** The discharge from any fixture, appliance, area or appurtenance, which does not contain fecal matter.
- (109) **Load factor.** The percentage of the total connected fixture unit flow which is likely to occur at any point in the drainage system.
- (110) **Local vent stack.** A verticle 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 device used on bedpan washers.
- (111) **Local ventilating pipe.** A local ventilating pipe is a pipe through which foul air is removed from a room or fixture.
- (112) **Loop vent.** A circuit vent which loops back to connect with a stack vent instead of a vent stack.
- (113) **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.
- (114) **Main sewer.** (See public sewer.)
- (115) **Main vent.** The principal artery of the venting system to which vent branches may be connected.  
\*Manufacturer's Floor Drain (see 100)
- (116) **Multiple dwelling.** Building containing more than two (2) dwelling units.
- (117) **Non-potable water.** Water not safe for drinking, personal or culinary use.
- (118) **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, sewerred, 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.



- (119) **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.
- (120) **Offset.** A combination of elbows or bends which bring one (1) section of the pipe out of line but into a line parallel with the other section.
- (121) **Oil interceptor.** (See interceptor.)
- (122) **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.
- (123) **Pitch.** (See grade.)
- (124) **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 (5) 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 (2) feet outside of the building and private sewage disposal systems other than those which have a treated effluent.
- (125) **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 (1) 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.
- (126) **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.

- (127) **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.
- (128) **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.
- (129) **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.
- (130) **Pool.** (See swimming pool.)
- (131) **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.
- (132) **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.
- (133) **Private sewer.** A sewer, serving two (2) or more buildings, privately owned, and not directly controlled by public authority.
- (134) **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.
- (135) **Public sewer.** A common sewer directly controlled by public authority.



- (136) **Public water main.** A water supply pipe for public use controlled by public authority.
- (137) **Receptor.** A fixture or device which receives the discharge from indirect waste pipes.
- (138) **Relief vent.** An auxiliary vent which permits additional circulation of air in or between drainage and vent systems.
- (139) **Return offset.** A double offset installed so as to return the pipe to its original alignment.
- (140) **Revent pipe.** (See individual vent.)
- (141) **Rim.** An unobstructed open edge of a fixture.
- (142) **Riser.** A water supply pipe which extends vertically one (1) full story or more to convey water to branches or to a group of fixtures.
- (143) **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.
- (144) **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.
- (145) **Safe waste.** (See indirect waste.)
- (146) **Sand interceptor.** (See interceptor.)
- (147) **Sand trap.** (See interceptor.)
- (148) **Sanitary sewer.** A sewer which carries sewage and excludes storm, surface, and ground water.
- (149) **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.
- (150) **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.
- (151) **Separator.** (See interceptor.)
- (152) **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.
- (153) **Sewage.** Any liquid waste containing animal or vegetable matter in suspension or solution, and may include liquids containing chemicals in solution.

- (154) **Sewage ejectors.** A device for lifting sewage by entraining it in a high velocity jet of steam air or water.
- (155) **Side vent.** A vent connecting to the drain pipe through a fitting at an angle not greater than forty-five (45) degrees to the vertical.
- (156) **Size of pipe and tubing.** (See diameter.)
- (157) **Slope.** (See grade.)
- (158) **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.
- (159) **Soil vent.** (See stack vent.)
- (160) **Special wastes.** Wastes which require special treatment before entry into the normal plumbing system.
- (161) **Special waste pipe.** Pipes which convey special wastes.
- (162) **Stack.** A general term for any vertical line of soil, waste or vent piping.
- (163) **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.
- (164) **Stack vent.** The extension of a soil or waste stack above the highest horizontal drain connected to the stack.
- (165) **Stack venting.** A method of venting a fixture or fixtures through the soil or waste stack.
- (166) **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.
- (167) **Sterilizer, instrument.** A device for the sterilization of various instruments.
- (168) **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.
- (169) **Sterilizer, pressure (autoclave).** A fixture (pressure vessel) designed to use steam under pressure for sterilizing. Also called an Autoclave.
- (170) **Sterilizer, utensil.** A device for the sterilization of utensils as used in hospital services.
- (171) **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.



- (172) **Sterilizer water.** A water sterilizer is a device for sterilizing water and storing sterile water.
- (173) **Still.** A device used in distilling liquids.
- (174) **Storm drain.** (See building storm drain.)
- (175) **Storm sewer.** A sewer used for conveying rain water, surface water, condensate, cooling water, or similar liquid wastes.
- (176) **Subsoil drain.** A drain which collects sub-surface water and conveys it to a place of disposal.
- (177) **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.
- (178) **Sump pump.** A mechanical device other than an ejector or bucket for removing sewage or liquid waste from a sump.
- (179) **Supports.** Devices for supporting and securing pipe, fixtures, and equipment.
- (180) **Swimming pool.** Any structure, basin, chamber, or tank containing any artificial body of water for swimming, diving, wading or recreational bathing.
- (181) **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.
- (182) **Trap seal.** The vertical distance between the crown weir and the top of the dip of the trap.
- (183) **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.
- (184) **Vacuum.** Any pressure less than exerted by the atmosphere.
- (185) **Vacuum breaker.** (See backflow preventer.)
- (186) **Vacuum breaker, non pressure type (atmospheric).** A vacuum breaker which is not designed to be subjected to static line pressure.
- (187) **Vacuum breaker, pressure type.** A vacuum breaker designed to operate under conditions of static line pressure.
- (188) **Vent pipe.** A vent pipe is any pipe provided to ventilate a house drainage system and to prevent tray siphonage and back pressure.
- (189) **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.

- (190) **Vertical pipe.** Any pipe or fitting which makes an angle of forty-five (45) degrees or less with the vertical.
- (191) **Wall hung water closet.** A wall mounted water closet installed in such a way that no part of the water closet touches the floor.
- (192) **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.
- (193) **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.
- (194) **Water lifts.** (See sewage ejector.)
- (195) **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.
- (196) **Water riser pipe.** (See riser.)
- (197) **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.
- (198) **Water supply stub.** A vertical pipe less than one (1) story in height supplying one or more fixtures.
- (199) **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.
- (200) **Well, bored.** A well constructed by boring a hole in the ground with an auger and installing a casing.
- (201) **Well, drilled.** A well constructed by making a hole in the ground with a drilling machine of any type and installing casing and screen.
- (202) **Well, driven.** A well constructed by driving a pipe in the ground. The drive pipe is usually fitted with a well point and screen.
- (203) **Well, dug.** A well constructed by excavating a large diameter shaft and installing a casing.
- (204) **Wet vent.** A vent which receives the discharge of wastes other than from water closets.
- (205) **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. (PC-2-2; 1 Ky.R. 476; eff. 3-12-75; Am. 3 Ky.R. 357; eff. 9-1-76; Recodified from 401 KAR 1:010, 7-5-78.)



## 20:020 PARTS OR MATERIALS LIST

**Necessity and Function.** The Department is directed by KRS 318.130 through the State Plumbing Code Committee to adopt and put into effect a State Plumbing Code. This regulation will allow the Department to permit the use of new parts and materials without amending specific regulations for each new item. This regulation will eliminate the repetitious amending of the Plumbing Code now required to include new materials item by item.

**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.

**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.

**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 fourteen (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 thirty (30) days thereafter its recommended disposition to the department. Provided, however, that a hearing will be held before the committee if requested, within thirty (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.

**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 (10) cents per page. (3 Ky.R. 337; Am. 488· eff. 12-1-76; Recodified from 401 KAR 1:011, 7-5-78.)

#### **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  $\frac{3}{4}$  inch hot and cold water connectors for hot water heaters, minimum wall thickness .032.
- (2) Flushmate water closet tank.
- (3) Tubular 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; provided the units are followed with a ten foot by ten foot intermittent sand filter before it discharges into a lateral system sized in accordance with the standards of the United States Public Health Service standards for lateral systems.
- (6) Envirovac Vacuum Sewage Systems — limited for use for mobile facilities and not permanent applications.
- (7) Multi-flow Sewage Systems; provided the units are followed



with a ten foot by ten foot intermittent sand filter before it discharges into a lateral system sized in accordance with the standards of the United States Public Health Service standards for lateral systems.

- (8) Pure Spray Sewage Treatment System; provided the units are followed with a ten foot by ten foot intermittent sand filter before it discharges into a lateral system sized in accordance with the standards of the United States Public Health Service standards for lateral systems.
- (9) Whirl Air Sewage System; provided the units are followed with a ten foot by ten foot sewage intermittent sand filter or a MKI micron tertiary filter before it discharges into a lateral system sized in accordance with the standards of the United States Public Health Service standards for lateral systems.
- (10) Jet Air Sewage System; provided the units are followed with a ten foot by ten foot intermittent sand filter before it discharges into a lateral system sized in accordance with the standards of the United States Public Health Service standards for lateral systems.
- (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% when the equilibrium rate of a percolation test is one-half ( $\frac{1}{2}$ ) 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 (1) inch or more. The length of the block lines for the disposal of the effluent in this system may be reduced by 50%.
- (13) The sewage systems listed below may be substituted for the septic tank when the equilibrium rate of a percolation test is one (1) 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" x 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 (6) inches in all directions from the base of a stack and shall have a boot with a pre-formed **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 F-409, 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.

## 20:040 TRUCK IDENTIFICATION

**Necessity and Function.** The department is directed by KRS 318.170 to enforce the provisions of the state plumbing laws and code. It is difficult to maintain adequate surveillance for persons who are installing or constructing plumbing systems without their trucks being properly identified. Identification as set forth in this regulation would greatly assist the department in carrying out this function.

**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 three (3) inches high and must be kept legible at all times.

Adopted: September 7, 1978.

## 20:050 INSTALLATION PERMITS

**Necessity and Function.** The department is directed by KRS 318.134 to adopt a reasonable schedule of fees and charges to be paid for plumbing installation permits and the necessary inspections incident thereto. This regulation is to assure uniformity of fees and charges for plumbing installation permits throughout the state.



**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 provided:
  - (a) Application is made for the permit prior to the beginning of the work;
  - (b) All work is performed in compliance with the state plumbing law and code and the rules and regulations thereunder promulgated;
  - (c) The work is not performed for monetary gain;
  - (d) All the work is personally performed by the owner and he does not employ any other person to assist him.
- (4) No permit shall be required for the repairing of leaks, cocks, valves, or for cleaning out waste or sewer pipes.

**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 (1) 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.

**3. Plumbing Installation Permit Fees.**

- (1) The fee for each plumbing installation permit shall be twelve dollars (\$12) plus:
  - (a) three dollars (\$3) 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) three dollars (\$3) for each domestic water heater.
- (2) In the event only a new domestic water heater is installed or replaced, the fee for the plumbing installation permit shall be ten dollars (\$10).
- (3) In the event only a new water service is constructed or replaced the fee for the plumbing construction permit shall be ten dollars (\$10).
- (4) In the event only a new house sewer is constructed or replaced the fee for a plumbing construction permit shall be ten dollars (\$10).
- (5) In the event only a new private sewage disposal system is constructed or replaced the fee for a plumbing construction permit shall be ten dollars (\$10).
- (6) 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.
- (7) All plumbing installation permits issued under this regulation shall expire one (1) year after date of issuance thereof; provided, however, if construction is begun within one (1) year after date of issuance the permit shall not expire until completion of the planned plumbing installation.
- (8) Plumbing fixtures may be replaced without procuring a plumbing installation permit provided the county plumbing inspector is notified of the installation.

**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. (PC-1-3; 1 Ky.R. 10; eff. 9-11-74; Am. 2 Ky.R. 449; eff. 4-14-76; Recodified from 401 KAR 1:020, 7-5-78.)

## 20:060 QUALITY AND WEIGHT OF MATERIALS

**Necessity and Function.** The department is directed by KRS 318.130 through the State Plumbing Code Committee to adopt and put into effect a State Plumbing Code. This regulation relates to quality and weights of materials that will be used in the installation of plumbing systems.

**1. Materials, Quality of.** All materials used in any drainage or plumbing system or part thereof, shall be free of defects.

**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.



**3. Vitrified Clay Pipe, Cement Asbestos Pipe, Concrete Pipe, Bituminous Fiber 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 A.S.T.M. Standard specifications C-200.
- (2) Cement asbestos pipe shall conform to A.S.T.M. Standard Specifications C-428.
- (3) Concrete pipe shall conform to A.S.T.M. Standard Specifications C-14.
- (4) Bituminous fiber pipe shall conform to A.S.T.M. Standard Specifications D-1861.
- (5) Truss pipe shall conform to A.S.T.M. Standard Specifications D-2680-74. (Solid wall shall conform to A.S.T.M. Standard Specifications D-2751-74.)
- (6) Extra Heavy SDR 35 sewer piping shall conform to A.S.T.M. Standard Specifications D-3033-74 and D-3034-74.
- (7) Polyethylene sewer piping shall conform to A.S.T.M. D-3350 and is limited for use **between a septic tank and a distribution box or boxes.**
- (8) Polyethylene and corrugated polyethylene subsoil drainage tubing shall conform to A.S.T.M. Standard Specifications F-405-74 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 A.S.T.M. D-2729.** They shall have two (2) rows of three-fourth ( $\frac{3}{4}$ ) inch holes within an arch of 120 degrees of circumference of the piping and shall be on four (4) inch centers. Such tubing shall be visibly marked with the name of the manufacturer and the commercial standard number at ten (10) feet intervals.

**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 conform to A.S.T.M. A-174.**

**5. Wrought-Iron Pipe.** All wrought-iron pipe shall conform to the latest A.S.T.M. "standard specifications for welded wrought-iron pipe".

**6. Mild-Steel Pipe.** All steel pipe shall conform to the latest A.S.T.M. "standard specifications for welded and seamless steel pipe".

**7. Brass Pipe; Copper Pipe; and Brass Tubing.** Brass pipe, copper pipe and brass tubing shall conform respectively to the latest standard specifications of A.S.T.M. for "brass pipe, copper pipe, and brass tubing, standard sizes".

**8. Borosilicate Pipe.**

- (1) Borosilicate pipe shall conform to the latest A.S.T.M. 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-D-2665-69, as amended, for PVC and ASTM-D-2661-76 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 thirty (30) 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 D-1204-62T.
- (5) **Polypropylene Pipe.** Polypropylene pipe used in acid waste systems shall conform to A.S.T.M. D-2146-65T.

**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 In.	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 one eighth ( $\frac{1}{8}$ )



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.

**10. Sheet Lead.** Sheet lead for shower pans shall weigh not less than four (4) lbs. per sq. ft. and shall weigh not less than three (3) lbs. per sq. ft. for vent pipe flashings.

**11. Sheet Copper or Brass.** Sheet copper or brass shall not be lighter than No. 18 B. & S. gauge, except that for local and interior ventilating pipe it shall not be lighter than No. 26 B. & S. gauge.

**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.

**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	2 1/4	2 1/2	1 lb. 0 oz.
3	3 1/4	4 1/2	1 lb. 12 oz.
4	4 1/4	4 1/2	2 lb. 8 oz.

**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.

**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 one-eighth (1/8) inch thick. Cast iron and galvanized malleable iron shall be not less than one-fourth (1/4) inch thick and shall have a two (2) inch caulking depth.

**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.

Adopted: July 20, 1978.

## 20:070 PLUMBING FIXTURES

**Necessity and Function.** This regulation permits the use of a new concept for the treatment and purification of air in bath and toilet rooms. The cartridges in the fan unit contains a citrus by-product which removes bacteria and mold and eliminates the need to discharge and exhaust air to the outside of a building. It would also eliminate a certain amount of heat loss. This regulation also permits the use of acrylic-faced bathtubs, a new concept for the protective coating used in the manufacture of fiberglass bathtubs. The test records that were submitted by the manufacturer of this product indicates that this coating is an improvement over the gelcoating that is presently being used.

**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.

**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 twelve (12) inches except laundry trays or similar fixtures.

**3. Water Closet Bowls.** Water closet bowls shall be made of one (1) 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.

**4. Frost-Proof Closet.** A frost-proof water closet may be installed only in a building that has at least a twelve (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, four (4) inches in diameter and shall be light colored porcelain enamel on the inside. The building must have a non-absorbent floor. Each frost-proof water closet shall have a four (4) inch vent.

**5. (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 (4) pounds per square foot, non-plasticized chlorinated polyethylene conforming to ASTM D-412-66, D-1204-54 and D-568-61 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 six (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 E-84B or E-162.** Fiberglass shower stalls and shower receptors shall conform to Commercial Standards CS 222-59.
- (4) **Metamorphosed Carbonate Aggregate Polyester Resinous Matrix-Marbleoid Bathtubs, Lavatories and Shower Stalls.** Metamorphosed carbonate aggregate polyester resinous matrix-marbleoid bathtubs, lavatories and shower stalls shall conform to Commercial Standards CS 111-43.

**6. 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 in accessible places. They shall be either caulk or screw type.

**7. 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.

**8. 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.

**9. 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 two and one-fourth ( $2\frac{1}{4}$ ) square feet of opening. Where forced ventilation is used, the minimum change of air shall be six (6) 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 Underwriter's 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 make available cartridges that will be replaced on a six (6) month basis;
- (6) A unit be provided for each 800 cubic feet of room volume.

**10. 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.

**11. 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 thirty (30) days upon written notice from the department.

**12. 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 two (2) feet above the roof and be properly flashed and shall not terminate within six (6) feet of a door or window. If a water heater is placed in a closed room or closet the door must be a louver door. (PC-4-4; 1 Ky.R. 480; eff. 3-12-75; Am. 2 Ky.R. 450; eff. 4-14-76; 3 Ky.R. 447; eff. 1-5-77; Recodified from 401 KAR 1:040, 7-5-78.)

## 20:080 WASTE PIPE SIZE

**Necessity and Function.** The department is directed by KRS 318.130 through the State Plumbing Code Committee to adopt and put into effect a State Plumbing Code. This regulation relates to the sizes of waste piping that is needed to serve various types of plumbing fixtures and appurtenances.

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
Sink: Clinic	3"	4"	6
Sinks: Kitchen, residence	1½"	1½"	1½"
Sink: Plaster	2"	2"	2
Sink: Service	3"	3"	3
Sink: 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"	4"	6
Water closet on 3" stack only	3"	3"	6

(PC-5-1; 1 Ky.R. 481; eff. 3-12-75; Recodified from 401 KAR 1:050, 7-5-78.)

## 20:090 SOIL, WASTE AND VENT SYSTEMS

**Necessity and Function.** The department is directed by KRS 318.130 through the State Plumbing Code Committee to adopt and put into effect a State Plumbing Code. This regulation relates to material and the design of the soil, waste and vent systems that will be used in all types of plumbing systems that are constructed throughout the Commonwealth.

**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 one-eighth ( $\frac{1}{8}$ ) inch per foot, and shall be supported or anchored in accordance with the manufacturer's recommendations but in no instance to exceed ten (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 forty (40) horizontal piping shall be supported at intervals not to exceed five (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.

**2. Change in Direction.** All changes in direction shall be made by the appropriate use of forty-five (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 forty-five (45) degrees.

**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.

**4. Dead Ends.** In the installation of any drainage system dead ends shall be avoided.

**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.

**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 B-586-73, Types R-K, R-L, R-DWV brass tubing, DWV brass tubing conforming to ASTM B-587-73, seamless stainless steel tubing, Grade G or H conforming to CS-268-68, polyvinyl chloride schedule 40 or 80 conforming to ASTM D-2665-76 and D-1784-75, acrylonitrile-butadiene-styrene schedule 40 or 80 conforming to ASTM D-2661-76 and D-1788-73, 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, Type K or L copper pipe, Type R-K, R-L brass tubing, lead, silicon iron or borosilicate.

**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

**8. Size of Combined Soil and Waste Pipe Per Fixture Unit on Any One (1) 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 (2) water closets or two (2) bathroom groups.

**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 ( $\frac{1}{2}$ ) of the fixture units set forth in the table in Section 8, above.

**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 (2) water closets shall discharge into a three (3) inch stack.

**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.

**12. House Drain.** When a three (3) inch house drain enters a building it shall be provided with a three (3) inch stack. One (1) floor drain may be added to the house drain with a three (3) inch trap provided that it conforms with the requirements of Sections 26 and 29 of this regulation, without counting toward the fixture units of the system. Eight and one-half ( $8\frac{1}{2}$ ) fixture units may be added to the three (3) inch house drain if an additional two (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 ten (10) feet (horizontal measures) from the center line of the house drain and these fixtures are installed on a lower level than the other fixtures in the system.

**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 three (3) inch closet bends shall have a four (4) inch by three (3) inch flange.

**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.

**15. Prohibited Connections.** No fixture connection 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.

**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 (1) layer of heavy hair felt and at least two (2) layers of two (2) 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.

**17. Roof Extensions.** All roof extensions of soil and waste stacks shall be run full size at least one (1) foot above the roof, and when the roof is used for other purposes than weather protection, such extensions shall not be less than five (5) feet above the roof. All stacks less than three (3) inches in diameter shall be increased to a minimum of three (3) inches in diameter before passing through a roof. When a change in diameter is made the fitting must be placed at least one (1) foot below the roof.

**18. Terminals.** If a roof terminus of any stack or vent is within ten (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 two (2) feet above the top edge of the window or opening.

**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 ten (10) feet of any existing vent stack on the lower building.

**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.

**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 ninety (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**

1 1/4"	2'6"
1 1/2"	3'6"
2	5'
3	6'
4	10'

- (2) A fixture branch on a water closet shall not be more than three (3) feet.

**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 re-connected with the main soil or vent stack at least six (6) inches above the rim of the highest fixture. This section shall not apply to one (1) and two (2) 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.

**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 as 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.

**MAXIMUM PERMISSIBLE LENGTHS OF VENTS**

Pipe Size (In Inches)	Maximum Length (In Feet)	Fixture Units
1 1/4"	30'	2
1 1/2"	150'	8
2"	200'	18
2 1/2"	250'	36
3"	300'	72
4"	400'	240
5"	600'	420
6"	800'	720

- (2) If a fixture opening is installed more than twenty-five (25) feet of developed length from the point where it is connected to the main soil or waste systems, or, if more than ten (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.

**24. Branch and Individual Vents.** In no instance shall a branch or individual vent be less than one and one-fourth (1 1/4) inches in diameter and shall not exceed the maximum length permitted for a main vent.

**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 of forty-five (45) degrees to the vertical, to a point six (6) inches above the fixture it is venting before offsetting horizontally or connecting to the branch, main, waste, soil or vent.

**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 five (5) feet to the stack, nor farther than twenty (20) feet. The floor drain line shall be four (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.

**27. When Common Vent Permissible.** Where two (2) water closets, two (2) lavatories or two (2) 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.

**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 ten (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.

**29. 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 five (5) feet from the main.

**30. 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.

**31. 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.



**32. Bar and Soda Fountain Wastes.** Bar and soda fountain wastes, sinks and receptacles shall have a one and one-half (1½) inch P trap and branches. The main shall not be less than two (2) inches. The fresh air pipe shall not be less than one and one-half (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 one (1) inch above the finished floor line.

**33. Open Receptacles.** Soil or waste piping receiving the discharge from an open receptacle shall be at least six (6) inches above the surface of the ground when it discharges into a septic system.

**34. Refrigerator Wastes.** Refrigerator waste pipes shall not be less than one and one-half (1½) inches for one (1) to three (3) openings, and at least two (2) inches from four (4) to eight (8) openings. Each opening shall be trapped. Such waste piping shall be provided with sufficient cleanouts to allow for thorough cleaning.

**35. 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.

**36. 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.

**37. 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 twelve (12) inches from the bottom of the sink. Two (2) 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 five (5) feet from the center of one (1) fixture to the center of the other.

**38. 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 D-2146-65T, 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 or reinforced thermo-setting resin pipe conforming to ASTM D-2996 (green or poly-thread).

**39. 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. (PC-6-6; 1 Ky.R. 481; eff. 3-12-75; Am. 2 Ky.R. 148; eff. 8-13-75; 3 Ky.R. 772; 4 Ky.R. 100; eff. 8-3-77; 4 Ky.R. 186; 539; eff. 6-7-78; Recodified from 401 KAR 1:060, 7-5-78.)

## 20:100 JOINTS AND CONNECTIONS

**Necessity and Function.** The department is directed by KRS 318.130 through the State Plumbing Code Committee to adopt and put into effect a State Plumbing Code. This regulation relates to the methods the must be used in joining certain types of piping materials together as well as denoting the methods that must be used in securing plumbing fixtures to waste piping outlets.

**1. Water and Air-Tight Joints.** All joints and connections shall be made permanently gas and water tight.

**2. Vitrified Pipe Joints; Concrete Pipe Joints; House Sewers-Combined Sewers.** Joints in vitrified clay pipe shall conform to ASTM specification C-425. Joints in concrete pipe shall conform to commercial standard C-443. 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 pre-formed 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 (2) 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 C-443, C-425, C-594, C-564 and D-1829 or elastomeric polyvinyl chloride coupling.

**3. Caulked Joints.** All caulk joints shall be firmly packed with oakum or hemp and shall have at least one (1) inch of pure lead properly caulked. No paint, varnish or putty will be permitted until tests have been performed.

**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 D-735-61, 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 D-735-61, 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 D-2665-69. Joints in acrylonitrile-butadiene-styrene pipe and fittings shall be solvent welded joints and shall conform to ASTM D-2661-69. Acrylonitrile-butadiene-styrene and polyvinyl chloride sewer piping that conforms to ASTM 3033 and 3034 shall be joined by solvent cement conforming to ASTM C-2665-69 for acrylonitrile-butadiene-styrene and ASTM D-2661-69 for polyvinyl chloride or with an elastomeric joint conforming to D-3212-73.
- (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.

**5. Cast Iron Soil Pipe Joints.** 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 C-564-70 or CS-301-72. Joints that conform to commercial standard 301-69T shall have a stainless steel clamp.

**6. Borosilicate Joints.** Joints and gaskets used for borosilicate pipe shall be made in a manner approved by the department.

- 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 C-564-70.** 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.

**8. Lead Pipe.** Joints in lead pipe or between lead pipe and brass or copper pipes, ferrules, soldering nipples, or trap, shall be fullwiped joints, with an exposed surface of the solder at each side of the joint of not less than three-quarters ( $\frac{3}{4}$ ) 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.

**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.

**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.

**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.

**12. Slip Joints.** Slip joints shall be permitted only on the inlet side of a trap.

**13. Unions.** Unions shall be ground faced and shall not be concealed or enclosed.



**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 six (6) inches from the pipe in all directions and shall extend upward twelve (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.

**15. Increases and Reducers.** When different size pipes or pipes and fittings are to be concealed, the proper size increaser or reducer pitched at an angle of forty-five (45) degrees between the two (2) sizes, shall be used.

**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.

**17. Hangers and Supports.** All piping and fixtures shall be adequately supported by hangers or anchors securely attached to the building construction.

**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.

Adopted: October 30, 1978.

## 20:110 TRAPS AND CLEANOUTS

**Necessity and Function.** The department is directed by KRS 318.130 through the State Plumbing Code Committee to adopt and put into effect a State Plumbing Code. This regulation relates to the quality, location and the placing of traps and clean-outs to prevent harmful gases and odors from entering buildings and homes that are served by plumbing systems.

**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 F-409, cast brass, cast iron, lead or schedule 40 PVC (polyvinyl chloride) or ABS (acrylonitrile-butadiene-styrene) 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 seventeen (17) gauge. No tubular brass, tubular PVC or ABS or schedule 40 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.

**2. Traps, Prohibited.** A trap which depends upon the action of movable parts or concealed interior partitions for its seal shall not be used.

**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 ten (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.

**4. Water Seal.** A fixture trap shall have a water seal of not less than two (2) inches nor more than four (4) inches.

**5. Trap Clean-Outs.** Trap clean-outs are optional.

**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.

**7. Pipe Clean-Outs.** The bodies of clean-out ferrules shall be made in standard pipe sizes, conforming in thickness to that of pipe and fittings and shall extend not less than one-quarter ( $\frac{1}{4}$ ) inch above the hub in which it is placed. The clean-out cap, or plug shall be heavy red brass not less than one-eighth ( $\frac{1}{8}$ ) inch thick and shall have a raised nut or recessed pocket for removal.

**8. Pipe, Clean-Outs, Where Required.** A clean-out easily accessible, shall be provided at the base of each vertical waste or soil stack. There shall be at least two (2) clean-outs in the house drain, one (1) at or near the base of the stack and the other with full size Y branch inside the wall or outside the building at a point not beyond two (2) feet from the foundation wall. Cleanouts shall be of the same nominal size as the pipe it serves up to four (4) inches, and not less than four (4) inches for larger pipe.

**9. Manholes.** All underground clean-outs in a building, except where clean-outs are flush with the floor or wall, shall be made accessible by a manhole or with a proper cover.

**10. Clean-Outs (Equivalents).** Any floor or wall connection of a fixture trap whether bolted or screwed to the floor or wall, shall be regarded as a clean-out with the exception of the clean-out where the house drain enters a building.

**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.

**12. Sand Traps.** Sand traps shall be designed and located so as to be readily accessible and shall meet the requirements of the department.

**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 back flow or back pressure, such drains shall be equipped with an adequate back-water valve. The trap seal shall be at least four (4) inches above the flow line of the house drain.



**14. Back Water Valves.** A back water valve shall be of non-corrosive metals and so constructed as to insure a positive mechanical seal except when discharging wastes.

**15. Utility Room Floor Drains.** A utility room floor drain with an individual waste shall be provided with a two (2) inch vent increased to three (3) inches before passing through the roof of a building.

**16. Directional Flow Fittings and Continuous-Waste.** Kitchen sink units, or fixtures with more than one (1) unit may be connected with a continuous-waste, provided a directional flow fitting is used. Continuous-waste shall be either seventeen (17) gauge tubular brass or schedule 40 ABS or PVC tubular ABS or PVC material. (PC-8-4; 1 Ky.R. 484; eff. 3-12-75; Am. 2 Ky.R. 456; eff. 4-14-76; Recodified from 401 KAR 1:080, 7-5-78.)

Adopted: February 13, 1976.

## 20:120 WATER SUPPLY AND DISTRIBUTION

**Necessity and Function.** The department is directed by KRS 318.130 through the State Plumbing Code Committee to adopt and put into effect a State Plumbing Code. This regulation relates to the types of piping, pipe sizes for a potable water supply system and the methods to be used to protect and control it.

**1. Quality.** The bacteriological and chemical quality of the water supply shall comply with the regulations of the department.

**2. Distribution.** The water supply shall be distributed through a piping system entirely independent of any other piping system.

**3. Water Service.** The water service piping to any building shall be not less than three fourths ( $\frac{3}{4}$ ) 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 eighteen (18) inches above the sewer.

**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 four (4) gallon flushing capacity for a water closet and at least a two (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.

**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.

**6. Sizing of Water Supply Piping.**

- (1) The minimum size water service from the property line to the water heater shall be three-fourths ( $\frac{3}{4}$ ) inch. The hot and cold water piping shall extend three-fourths ( $\frac{3}{4}$ ) 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 (2) one-half ( $\frac{1}{2}$ ) inch fixture branches are supplied from any one-half ( $\frac{1}{2}$ ) inch pipe.
- (2) The following schedule shall be used for sizing the water supply piping to fixtures:

Fixture Branches	Size Minimum Inches
Sill Cocks .....	$\frac{1}{2}$
Hot water boilers .....	$\frac{3}{4}$
Laundry trays .....	$\frac{1}{2}$
Sinks .....	$\frac{1}{2}$
Lavatories .....	$\frac{3}{8}$
Bathtubs .....	$\frac{1}{2}$
Water closet tanks .....	$\frac{3}{8}$
Water closet flush valves .....	1

**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 B-586-73, fusion welded copper tubing conforming to ASTM B-447-72 and ASTM B-251, DWV welded brass tubing conforming to B-587-73, seamless stainless steel tubing, Grade H conforming to CS A-268-68, reinforced thermosetting resin pipe conforming to ASTM D-2996 (red thread for cold water use and silver and green thread for hot and cold). Polyethylene plastic pipe conforming to ASTM D-2239-69, PVC plastic pipe conforming to ASTM 1785, and CPVC plastic pipe conforming to CS D-2846-70, (PVC SDR 21 and SDR 26 conforming to ASTM D-2241) 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.



**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 non-scald protection. Such devices shall be installed on all installations other than in homes or apartment complexes.

**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.

**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 thirty (30) inches in depth.

**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 three (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 two (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 four (4) inches of the surface of the ground. Relief devices shall be installed on a pneumatic water system.

**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.

**13. 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 four (4) inches above the ground with two (2) three-fourths ( $\frac{3}{4}$ ) inch valve outlets with screw connections, one (1) 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 eight (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.

Adopted: July 20, 1978.

## 20:130 HOUSE SEWERS AND STORM WATER PIPING; METHOD OF INSTALLATION

**Necessity and Function.** The department is directed by KRS 318.130 through the State Plumbing Code Committee to adopt and put into effect a State Plumbing Code. This regulation relates to outlining the materials that may be used in the construction of house sewers, storm water piping as well as the methods of installation.

**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.

**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 (1) 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.

**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.

**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.

### **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 one-eighth ( $\frac{1}{8}$ ) inch nor more than one-fourth ( $\frac{1}{4}$ ) inch per foot. All sewers must have at least an eighteen (18) inch cover. Sewer piping under a superimposed load condition shall have at least three (3) feet cover unless constructed of cast iron piping. Sewers shall be backfilled by hand and tamped six (6) inches above the piping, or in lieu thereof may be filled with



six (6) inches grillage above the piping. All joints in cast iron, bituminous fiber, vitrified clay pipe and cement asbestos pipe shall be made in a manner to conform to other sections of this code.

**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.

**7. Materials for House Sewers.** House sewers or combined sewers, beginning two (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, bituminous fiber, cement asbestos, PVC or ABS plastic pipe schedules 40 and 80, **truss pipe and extra heavy SDR 35 pipe.**

**8. Material for Storm Sewers Inside Buildings.** Material for storm sewers inside of buildings to a point two (2) feet outside a building in sizes eight (8) inches and smaller shall be cast iron pipe or Schedule 40 ABS or PVC DWV pipe. Storm sewers in sizes of ten (10) inches and larger may be either cast iron, vitrified clay or concrete conforming to appropriate commercial standards with approved joints.

**9. Change of Direction.** Change in direction of a sewer shall be made with long curves, one-eighth ( $\frac{1}{8}$ ) bends or Y's.

**10. Size of House Sewers and Horizontal Branches.** The minimum size of a house sewer shall not be less than four (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 015 KAR 20:090.)

**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 two (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, $\frac{1}{8}$ " fall to 1'	Slope, $\frac{1}{4}$ " fall to 1'		Slope, $\frac{1}{8}$ " fall to 1'	Slope, $\frac{1}{4}$ " 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 four (4) inches per hour.

**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 corresponding to the drained area and the total fixture units, adding the product to the drained area and apply the sum to the preceding table for storm-water sewers. No combined house drain or house sewer shall be less than five (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.

**CONVERSION FACTORS  
FOR COMBINED STORM AND SANITARY SYSTEM**

**Number of fixture units on sanitary system**

Drained roof area in square feet	Up to	7 to	19 to	37 to	61 to	97 to	145 to	217 to
	6	18	36	60	96	144	216	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

**Number of fixture units on sanitary system**

Drained roof area in square feet	325 to	487 to	733 to	1099 to	1645 to	2467 to	3703 to	Over 5556
	486	732	1098	1644	2466	3702	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



Number of fixture units on sanitary system

Drained roof area in square feet	325 to 486	487 to 732	733 to 1098	1099 to 1644	1645 to 2466	2467 to 3703	3703 to 5556	Over 5556
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

**13. House Sewer in Undisturbed or Made Ground.** House sewers laid in undisturbed ground must be laid on at least four (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 four (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 ten (10) feet centers to a solid footing, either undisturbed earth or rock. House sewers constructed of flexible thermoplastic sewer piping or **bituminous fiber** must be installed with at least six (6) inches of gravel on the bottom, top and sides of the piping.

**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 four (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 ten (10) feet centers to a solid footing, either undisturbed earth or rock.

**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.

**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 provided with a two (2) inch vent which may also act as a waste and vent for a laundry tray. The pump shall discharge into a two (2) inch cast iron pipe extended inside the building at least twelve (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 connection shall be provided with a four (4) inch by two (2) inch soil tee extended to the grade, with a vent cap and a four (4) inch trap properly connected to the house sewer.

**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.

**18. Ejectors, Vented.** All ejectors shall be vented with a three (3) inch vent. Fixtures or appliances connected thereto shall be vented in accordance with other sections of this code.

**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 two (2) pounds for each foot of height through which sewage is raised.

**20. Ejectors for Sub-Soil Drainage.** When sub-soil catch basins are installed below the sewer level, automatic ejectors, of an approved type, may be used. Such ejectors or any device raising sub-soil water shall discharge into a properly trapped fixture or into a storm-water drain.

**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 ten (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.

**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

**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 D-2996 (red and silver threads). The vertical distance of PVC



or ABS conductors shall not exceed thirty (30) feet from the base through the terminous through the roof.

**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 one (1) foot above the grade line. Along public driveways, without side walks, they shall be placed in niches in the walls, protected by wheel guards, or enter the building through the wall at a forty-five (45) degree slope at least twelve (12) inches above the grade.

**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.

**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.

**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.

**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.

Adopted: July 20, 1978.

## 20:150 INSPECTION AND TESTS

**Necessity and Function.** The department is directed by KRS 318.130 through the State Plumbing Code Committee to adopt and put into effect a State Plumbing Code. This regulation relates to tests and inspections that are necessary in order to cause compliance with other regulations of this code.

**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.

**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.

### 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 the 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.

#### 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 and 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 ten (10) ft. head of water or with five (5) pounds of air pressure. In testing successive sections, at least the upper ten (10) ft. 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 twenty (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 ten (10) inches in height. The pressure shall be maintained for fifteen (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 one (1) inch water column. It shall be maintained for at least a fifteen (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 two (2) feet of earth cover**, it shall be retested. A four (4) inch test tee or Y connection shall be provided at the property line for testing.

**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.

**6. Tests of Alterations, Extensions or Repairs.** Any alterations, extensions, or repairs that **require** more than ten (10) feet of soil, waste and or vent piping, shall be inspected and tested **as required by Section 3 (2)**.

**7. Covering of Work.** No part of a plumbing system shall be covered until it has been inspected, tested, and approved as herein provided.

**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.

**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.

**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.

**11. Inspections and Test 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.

**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.

**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. (PC-11-1; 1 Ky.R. 487; eff. 3-12-75; Am. 2 Ky.R. 459; 3 Ky.R. 362; eff. 9-1-76; Recodified from 401 KAR 1:110, 7-5-78.)

Adopted: September 1, 1976.

## 20:160 PRIVATE AND COMMERCIAL SEPTIC SYSTEMS

**Necessity and Function.** The department is directed by KRS 318.130 through the State Plumbing Code Committee to adopt and put into effect a State Plumbing Code. This regulation relates to the size, type and construction of private and commercial septic systems.

1. (1) The design, structure and material used in the construction of all septic tanks must be approved by the department. Written approval must be obtained for the manufacturer of prefabricated and commercial septic tanks. Septic tanks shall have a minimum working capacity of 500 gallons. If a garbage grinder is used, the septic tank capacity shall be increased fifty (50) percent.
- (2) A disposal field serving a septic tank shall consist of not less than 200 feet of lateral drain with a two (2) feet trench having 400 square feet of ditch bottom. The lateral system shall be constructed of either four (4) inch farm tile, perforated bituminous fiber pipe or other approved material laid in not less than six (6) inches of No. 3 rock, top and bottom of the piping. All lateral lines shall be laid level. If farm tile is used, the top of the joints shall be covered with a three (3) inch strip of tar paper. If two (2) or more lines are laid parallel, the trenches shall be at least six (6) feet apart. A distribution box shall be installed following a septic tank and in installations placed in other than level terrain. The minimum size shall be eighteen (18) inches square and the bottom shall be six (6) inches lower than the outlets to the drain field. Distribution boxes shall be constructed with a tight cover and shall be of concrete, brick, or salt glaze tile or other approved material. Roof drains shall not discharge into a septic tank or drain field.
- (3) The location of a septic tank shall not be closer than ten (10) feet from a building nor fifty (50) feet from a well or cistern. The location of a lateral drainage system shall not be closer than twenty (20) feet from a building, nor five (5) feet from a property line, nor seventy (70) feet from a well or cistern. The location of a seepage pit shall not be closer than twenty-five (25) feet from a building nor 100 feet from a well or a cistern.
- (4) A house sewer shall not be installed within a radius of fifteen (15) feet of a well or cistern. All house sewers in between a



fifteen (15) feet and fifty (50) feet radius of a well or cistern shall be constructed of extra heavy or service weight cast iron pipe with approved joints. All house sewers beyond a fifty (50) feet radius of a well or cistern may be salt glazed vitrified pipe, bituminous fiber pipe, cement asbestos pipe or other material approved by the department with approved joints. (PC-12; 1 Ky.R. 488; eff. 3-12-75; Recodified from 401 KAR 1:120, 7-5-78.)

## 20:170 MOBILE HOME PARK WASTE SYSTEMS AND CONNECTIONS

**Necessity and Function.** The department is directed by KRS 318.130 through the State Plumbing Code Committee to adopt and put into effect a State Plumbing Code. This regulation relates to mobile home park waste systems and connections and it specifies the material as well as the method that will be used in installing the necessary plumbing to serve mobile homes.

**1. Materials.** All materials shall conform to other sections of this code.

**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 watertight. Clean-outs shall be provided at intervals not to exceed 100 feet for main and branch sewers in sizes six (6) inches and smaller. They shall be extended to the grade with cast iron soil pipe and shall be provided with a brass clean-out plug. A four (4) inch concrete pad, eighteen (18) inches square, shall be provided around each clean-out. All main and branch sewers eight (8) inches and larger will not require clean-outs 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 four (4) inch sewer. A three (3) inch waste connection shall be provided and extended one (1) inch above the grade with cast iron pipe using a cast iron ferrule with a three (3) inch standard thread. A four (4) inch concrete pad twenty-four (24) inches square shall be provided around the waste opening. A three (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.

**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 three (3) inch cast iron soil pipe waste connection to the house sewer. All piping that does not have at least an eighteen (18) inch cover shall be cast iron pipe. Waste connections be-

tween 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. (PC-13-1; 1 Ky.R. 488; Am. 1350; eff. 6-11-75; 3 Ky.R. 705; eff. 7-7-77; Recodified from 401 KAR 1:130, 7-5-78.)

## 20:180 SPECIAL CONNECTIONS

**Necessity and Function.** The department is directed by KRS 318.130 through the State Plumbing Code Committee to adopt and put into effect a State Plumbing Code. This regulation concerns itself with waste other than sanitary wastes.

**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 four (4) inch trap, with a full size vent. The trench shall be constructed of a material resistant to alkaline waste.

**2. Semi-Commercial Laundries (Automatic).** Waste from semi-commercial laundries shall discharge into a four (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 four (4) inch trap shall be provided in the waste line to serve not more than two (2) washing machines. Floor drains may be placed in the waste line. If they are the pump type, a stand pipe shall be provided to the height of the machine. Each four (4) inch trap shall constitute four (4) fixture units. In no instance shall such washing machines be permitted to discharge into a trench.

**3. Washing Machines, Automatic, Residential (New Buildings).** When an automatic washing machine is installed in a new building, it shall have a two (2) inch trap and shall be vented in accordance with other sections of this code. The trap shall be installed twelve (12) inches above the floor with a two (2) inch stand pipe extended to the height of the washer. If a washing machine discharges into a private disposal system, fifty (50) feet additional lateral must be added to the sewage system.

**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 four (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 three (3) inches above the grade line. A four (4) inch by two (2) inch tee shall be installed in the inlet side of the trap with a two (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.



**5. Air Conditioning Equipment.** Air conditioning equipment installed with a water supply and waste shall conform with the other sections of this code.

**6. Garage Sand Trap.** A garage sand trap shall be constructed of concrete with a heavy cover or grate. The minimum size shall be two (2) feet by four (4) feet and it shall have sufficient depth so that there is at least a ten (10) inch vertical distance between the bottom of the outlet ell and the bottom of the trap. Sand traps shall be provided with a four (4) inch vent.

**7. Inflammable Waste.** Liquid waste from buildings using gasoline, benzene, 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 three (3) inch vent.

**8. Hot Water, Steam Blow-Offs or Exhaust.** Hot water or steam or exhaust blow-offs 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 four (4) inch vent independent of any other venting system.

**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. (PC-14; 1 Ky.R. 488; eff. 3-12-75; Recodified from 401 KAR 1:140, 7-5-78.)

## 20:190 PUBLIC BUILDINGS

**Necessity and Function.** The department is directed by KRS 318.130 through the State Plumbing Code Committee to adopt and put into effect a State Plumbing Code. This regulation denotes the kind and quantity of plumbing fixture needed in various types of public buildings.

**1. Theatres, Assembly Halls, Libraries, Museums and Art Galleries.** Theatres, and assembly halls having seating capacities or other accommodations shall be provided with sanitary facilities conforming to the following schedule.

- (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 level for each four hundred (400) persons or fractions thereof.
- (3) Toilet rooms shall be provided in the auditorium in each tier or level and they shall be provided as follows:
  - (a) One (1) water closet and one (1) lavatory for each 150 females or less.
  - (b) One (1) water closet and one (1) lavatory for each 300 males or less.

- (c) One (1) urinal for each 200 males or less.
- (d) The number of fixtures shall be based upon the maximum seating capacity assuming it will be equally divided between males and females.
- (4) In libraries, museums and art galleries there shall be provided the following:
  - (a) One (1) water closet and one (1) lavatory for each 100 females or less.
  - (b) One (1) water closet and one (1) lavatory for each 200 males or less.
  - (c) One (1) urinal for each 200 males or less.
  - (d) The above shall be based upon the actual number of persons to be accommodated.
- (5) Toilet rooms for males shall be clearly marked "men" and for females, "women".

**2. School Buildings.**

- (1) A drinking fountain shall be provided on each floor of a building and additional drinking fountains shall be provided for each seventy-five (75) pupils or fraction thereof. They shall be provided with a protective cowl and the orifice shall be one (1) inch above the overflow rim of the fountain.
- (2) Grade school buildings shall be provided with the following:
  - (a) Water closets for males shall be installed in the following proportions:
    - 1. One (1) water closet for each twenty-five (25) pupils or fraction thereof.
    - 2. Two (2) water closets for each fifty (50) pupils or fraction thereof.
    - 3. Two (2) water closets for each 100 pupils or fraction thereof.
    - 4. Three (3) water closets for each 200 pupils or fraction thereof.
    - 5. Four (4) water closets for each 300 pupils or fraction thereof.
    - 6. Five (5) water closets for each 400 pupils or fraction thereof.
    - 7. Six (6) water closets for each 500 pupils or fraction thereof.
    - 8. One (1) water closet for each 100 pupils or fraction thereof in excess of 500.
  - (b) Urinals for males shall be installed in the following proportions:
    - 1. One (1) urinal for each twenty-five (25) pupils or fraction thereof.
    - 2. Two (2) urinals for each fifty (50) pupils or fraction thereof.



3. Four (4) urinals for each 100 pupils or fraction thereof.
  4. Six (6) urinals for each 200 pupils or fraction thereof.
  5. Eight (8) urinals for each 300 pupils or fraction thereof.
  6. Ten (10) urinals for each 400 pupils or fraction thereof.
  7. Twelve (12) urinals for each 500 pupils or fraction thereof.
  8. One (1) urinal for each fifty (50) pupils or fraction thereof in excess of 500.
- (c) Water closets for females shall be installed in the following proportions:
1. Two (2) water closets for each twenty-five (25) pupils or fraction thereof.
  2. Three (3) water closets for each fifty (50) pupils or fraction thereof.
  3. Six (6) water closets for each 100 pupils or fraction thereof.
  4. Eight (8) water closets for each 200 pupils or fraction thereof.
  5. Ten (10) water closets for each 300 pupils or fraction thereof.
  6. Twelve (12) water closets for each 400 pupils or fraction thereof.
  7. Fourteen (14) water closets for each 500 pupils or fraction thereof.
  8. One (1) water closet for each forty (40) pupils or fraction thereof in excess of 500.
- (d) Lavatories for male or female pupils shall be installed in the following proportions:
1. One (1) lavatory for each twenty-five (25) pupils or fraction thereof.
  2. Two (2) lavatories for each fifty (50) pupils or fraction thereof.
  3. Three (3) lavatories for each 100 pupils or fraction thereof.
  4. Five (5) lavatories for each 200 pupils or fraction thereof.
  5. Six (6) lavatories for each 300 pupils or fraction thereof.
  6. Eight (8) lavatories for each 400 pupils or fraction thereof.
  7. Nine (9) lavatories for each 500 pupils or fraction thereof.
  8. One (1) lavatory for each seventy-five (75) pupils or fraction thereof in excess of 500.

- (3) High School buildings shall be provided with the following:
  - (a) Water closets for males shall be installed in the following proportions:
    1. One (1) water closet for each twenty-five (25) pupils or fraction thereof.
    2. One (1) water closet for each fifty (50) pupils or fraction thereof.
    3. Two (2) water closets for each 100 pupils or fraction thereof.
    4. Three (3) water closets for each 200 pupils or fraction thereof.
    5. Four (4) water closets for each 300 pupils or fraction thereof.
    6. Five (5) water closets for each 400 pupils or fraction thereof.
    7. Six (6) water closets for each 500 pupils or fraction thereof.
    8. One (1) water closet for each 100 pupils or fraction thereof in excess of 500.
  - (b) Urinals for males shall be installed in the following proportions:
    1. One (1) urinal for each twenty-five (25) pupils or fraction thereof.
    2. Two (2) urinals for each fifty (50) pupils or fraction thereof.
    3. Four (4) urinals for each 100 pupils or fraction thereof.
    4. Six (6) urinals for each 200 pupils or fraction thereof.
    5. Eight (8) urinals for each 300 pupils or fraction thereof.
    6. Ten (10) urinals for each 400 pupils or fraction thereof.
    7. Twelve (12) urinals for each 500 pupils or fraction thereof.
    8. One (1) urinal for each fifty (50) pupils or fraction thereof in excess of 500.
  - (c) Water closets for females shall be installed in the following proportions:
    1. One (1) water closet for each twenty-five (25) pupils or fraction thereof.
    2. Two (2) water closets for each fifty (50) pupils or fraction thereof.
    3. Five (5) water closets for each 100 pupils or fraction thereof.
    4. Seven (7) water closets for each 200 pupils or fraction thereof.
    5. Nine (9) water closets for each 300 pupils or fraction thereof.



6. Eleven (11) water closets for each 400 pupils or fraction thereof.
  7. Thirteen (13) water closets for each 500 pupils or fraction thereof.
  8. One (1) water closet for each forty-five pupils or fraction thereof in excess of 500.
- (d) Lavatories for male and female pupils shall be installed in the following proportions:
1. One (1) lavatory for each twenty-five (25) pupils or fraction thereof.
  2. One (1) lavatory for each fifty (50) pupils or fraction thereof.
  3. Two (2) lavatories for each 100 pupils or fraction thereof.
  4. Four (4) lavatories for each 200 pupils or fraction thereof.
  5. Five (5) lavatories for each 300 pupils or fraction thereof.
  6. Seven (7) lavatories for each 400 pupils or fraction thereof.
  7. Eight (8) lavatories for each 500 pupils or fraction thereof.
  8. One (1) lavatory for each seventy-five (75) pupils or fraction thereof in excess of 500.
- (4) One (1) slop sink shall be installed on each floor of a building.
- (5) In accordance with the foregoing schedule, water closets, lavatories and urinals shall be installed as shown by the following table:

### WATER CLOSETS, LAVATORY AND URINAL REQUIREMENTS

#### GRADE SCHOOLS

FOR MALE PUPILS				FOR FEMALE PUPILS		
No. of Pupils	Water Closets	Urinals	Lav.	No. of Pupils	Water Closets	Lav.
25	1	1	1	25	2	1
50	2	2	2	50	3	2
100	2	4	3	100	6	3
200	3	6	5	200	8	5
300	4	8	6	300	10	6
400	5	10	8	400	12	8
500	6	12	9	500	14	9

## HIGH SCHOOLS

## FOR MALE PUPILS

## FOR FEMALE PUPILS

No. of Pupils	Water Closets	Urinals	Lav.	No. of Pupils	Water Closets	Lav.
25	1	1	1	25	1	1
50	1	2	1	50	2	1
100	2	4	2	100	5	2
200	3	6	4	200	7	4
300	4	8	5	300	9	5
400	5	10	7	400	11	7
500	6	12	8	500	13	8

- (6) Toilet accommodations for males and females shall be placed in separate rooms, with a traveling distance between the entrance doors of not less than twenty (20) feet.
- (7) Juvenile or short closets shall be provided in pre-grade school buildings.
- (8) In buildings accommodating males and females it shall be presumed that the occupants will be equally divided between males and females.
- (9) All types of buildings shall be provided with toilet rooms on each floor. The number of plumbing fixtures shall be in ratio to the number of persons to be accommodated.
- (10) Toilet rooms for males shall be clearly marked "BOYS" or "MEN" and for females "GIRLS" or "WOMEN".

**3. Public Garages and Service Stations.** Separate toilet rooms with at least a water closet and lavatory shall be provided for men and women. These floors in these rooms must be made of a non-absorbent material. The traveling distance between the entrance doors to male and female employee's toilet rooms shall be not less than 20 feet.

**4. Churches.**

- (1) Sanitary facilities shall be provided in churches as follows:
  - (a) One (1) drinking fountain for each 400 persons or fraction thereof.
  - (b) One (1) water closet for each 150 females or fraction thereof.
  - (c) One (1) water closet for each 300 males or fraction thereof.
  - (d) One (1) urinal for each 150 males or fraction thereof.
- (2) The above schedule is based upon the maximum seating capacity of the church, assuming that the occupants will be equally divided between males and females. Toilet accommodations for males and females shall be located in separate rooms and shall be clearly marked "men" or "women".



**5. Hotels and Motels.** Sanitary facilities shall be provided on each floor level and shall conform to the following:

- (1) One (1) lavatory for each twenty (20) persons or fraction thereof.
- (2) One (1) water closet for each twenty (20) females or fraction thereof.
- (3) One (1) water closet for each twenty-five (25) males or fraction thereof.
- (4) One (1) urinal or one (1) additional water closet for each fifty (50) males or fraction thereof.
- (5) One (1) drinking fountain on each floor level.

**6. Hospitals, Nursing Homes and Institutions.**

- (1) Sanitary facilities shall be provided on each floor level and shall conform to the following:
  - (a) One (1) water closet for each twenty (20) persons or fraction thereof.
  - (b) One (1) lavatory for each ten (10) persons or fraction thereof.
  - (c) One (1) bath tub or shower for each fifteen (15) persons or fraction thereof.
  - (d) One (1) drinking fountain on each floor level.
- (2) Floors shall be of a non-absorbent material and the walls and ceilings shall be smoothly finished. The traveling distance between the entrance doors to male and female employee's toilet rooms shall be not less than twenty (20) feet.

**7. Workshops, Factories, Mercantile and Office Buildings.**

- (1) Sanitary facilities shall be provided on each floor level and shall conform to the following:
  - (a) One (1) water closet for each twenty-five (25) males or fraction thereof.
  - (b) Two (2) water closets for each fifty (50) males or fraction thereof.
  - (c) Three (3) water closets for each seventy-five (75) males or fraction thereof.
  - (d) Four (4) water closets for each 100 males or fraction thereof.
  - (e) One (1) lavatory for each twenty-five (25) males or fraction thereof.
  - (f) Two (2) lavatories for each fifty (50) males or fraction thereof.
  - (g) Three (3) lavatories for each seventy-five (75) males or fraction thereof.
  - (h) Four (4) lavatories for each 100 males or fraction thereof.

- (i) One (1) urinal for each twenty-five (25) males or fraction thereof.
- (j) One (1) urinal for each fifty (50) males or fraction thereof.
- (k) Two (2) urinals for each seventy-five (75) males or fraction thereof.
- (l) Two (2) urinals for each 100 males or fraction thereof.
- (m) One (1) drinking fountain for each fifty (50) employees.
- (n) When employees are in excess of 100, one (1) water closet for each thirty (30) males or fraction thereof and one (1) lavatory for each additional fifty (50) males thereof.
- (o) One (1) lavatory for each twenty-five (25) females or fraction thereof.
- (p) Two (2) lavatories for each fifty (50) females or fraction thereof.
- (q) Three (3) lavatories for each seventy-five (75) females or fraction thereof.
- (r) Four (4) lavatories for each 100 females or fraction thereof.
- (s) One (1) water closet for each fifteen (15) females up to 100.
- (t) When in excess of 100, one (1) water closet per thirty (30) females or fraction thereof.
- (2) Sanitary facilities should never be more distant from place of employment than one (1) floor above or one (1) floor below.
- (3) One (1) drinking fountain in each story for each 100 persons or fraction thereof.
- (4) Individual sinks or wash troughs may be used in lieu of lavatories. If troughs are used, faucets shall be placed on eighteen (18) inch centers and will be considered the equivalent of an equal number of lavatories. Toilet rooms shall be clearly marked "men" or "women."
- (5) No sanitary toilet or urinal shall be located within twenty (20) feet of an occupied building.

**8. Toilet Floor Construction Requirements.** Toilet room floors in all public buildings and places of employment shall be constructed of non-absorbent materials. When more than (1) water closet and one (1) lavatory is installed, such a toilet room shall have at least one (1) floor drain and one (1) accessible hose bibb. (PC-15; 1 Ky.R. 489; eff. 3-12-75; Recodified from 401 KAR 1:150, 7-5-78.)



# ARTICLE 18

## PREFABRICATED CONSTRUCTION

### SECTION 1800.0 GENERAL

**1800.1 Scope:** The provisions of this article shall govern the materials and methods of construction of all prefabricated buildings, prefabricated subassemblies and prefabricated building units as herein defined.

**Note. Mass and industrialized production:** Prefabrication as herein used is not restricted to housing for one- and two-family dwellings, 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, 719.0 and 800.0, 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.

**1800.2 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 and accepted engineering practice as listed in Appendix B shall be permitted.

**1800.3 New materials:** All new materials or assemblies not specifically provided for shall be tested and evaluated in accordance with the provisions of this code; or the building official may accept duly authenticated Research Reports from the Building Officials and Code Administrators International or from other recognized authoritative sources complying with the approved rules to assist him in his determination.

**1800.4 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.

**1800.5 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 of [name of jurisdiction] 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 1801.0 PLANS AND SPECIFICATIONS

**1801.1 Application:** Complete legible dimensioned drawings to a scale of not less than one-eighth ( $\frac{1}{8}$ ) inch per foot and specifications covering every type of prefabricated construction complying with the administrative provisions of Section 112.0 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.

**1801.2 Plot diagram:** A plot plan complying with Section 112.6 shall be filed for each individual building or structure.

**1801.3 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; or, if not included in the general application for approval, such information shall be furnished for each specific installation.

**1801.4 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.

**1801.5 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; and material essential to the structural strength of the unit or assembly shall not thereafter be removed from structural elements during installation on the site.

**1801.6 Service equipment requirements:** All service equipment shall comply with the requirements of Article 10 for heating, Article 12 for fire protection, Article 15 for electrical, Article 17 for plumbing, and



the mechanical code listed in Appendix B for air-conditioning and ventilating systems and equipment.

### **SECTION 1802.0 TESTS OF PREFABRICATED ASSEMBLIES**

**1802.1 General:** When not capable of design by accepted engineering analysis, all prefabricated assemblies or subassemblies constructed as in practice shall be subjected to the unit assembly tests prescribed in Articles 7 and 8 and the test standards listed in Appendixes C, D, E, F and G. All assembly tests shall meet the strength requirements of Section 803.0 within the limits of deflection therein provided.

### **SECTION 1803.0 EVALUATION AND FOLLOW-UP INSPECTION SERVICES**

**1803.1 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 data necessary for the building official to determine conformance with this code.

**1803.2 Evaluation service:** The building official may designate the Evaluation Service of the Building Officials and Code Administrators International or other independent qualified agency as the evaluation agency and review that agency's evaluation report for adequacy and conformance to this code.

**1803.3 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 qualified 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.

**1803.4 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.

**1803.5 Fees:** All fees associated with the Evaluation and Follow-up Inspection Services shall be borne by the applicant.

## SECTION 1804.0 PREFABRICATED UNITS

**1804.1 General:** Approved prefabricated individual units for use in floor, roof, ceiling or wall construction which are designed to meet all prescribed structural provisions of Articles 7 and 8, including connection and anchorage details, may be used in all at-site construction types and building use groups within the height, area and fireresistance rating limitations of Tables 214 and 305.

## SECTION 1805.0 EXISTING SYSTEMS AND APPROVALS

**1805.1 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 or is not specifically prohibited by the provisions of this code.

**1805.2 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; but the 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 1806.0 APPROVALS BASED ON DESIGN

**1806.1 Engineering analysis:** When capable of design by accepted 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 7 and 8 and Appendix K.

### 1806.2 Ordinary materials

**1806.2.1 Average working stress:** 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 material with the average working stresses prescribed in Appendix K shall be permitted in prefabricated construction.

**1806.2.2 Field inspection:** 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 he may accept the report of a qualified licensed engineer or architect in respect thereto. All prefabricated subassemblies shall be certified by the authorized representative of the manufacturer for compliance with this code.

**1806.3 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 his determination; or he



may accept the recommendations of Building Officials and Code Administrators International, Inc., in respect thereto.

**1806.4 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 701.3, or he shall accept certified reports of such tests from accredited testing authorities.

### SECTION 1807.0 APPROVALS BASED ON TESTS

**1807.1 Tests required:** When not capable of design by accepted engineering analysis, every system of prefabricated building, sub-assembly or unit and its connections shall be subjected to the tests and conditions of approval prescribed by Article 8, or to any other tests acceptable to the building official that simulate the actual loads and conditions of application that the completed structure will be required to resist in normal use; or certified reports of such tests conducted by an approved and recognized testing authority 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.

**1807.2 Field connections:** All field splices and structural connections of floor, wall, ceiling and roof subassemblies shall be of sufficient strength to transmit two and one-half ( $2\frac{1}{2}$ ) times the design live loads without failure, and shall be so constructed as to insure weather-tightness in exterior wall and roof panels.

**1807.3 Weather resistance:** In the absence of reliable experience records, the building official may require accelerated tests on the prefabricated assemblies as prescribed by Article 8 and Appendix F to determine durability, weather tightness and weather resistance; or he shall accept certified reports of approved and recognized testing authorities in respect thereto.

**1807.4 Comparative tests:** When not available from existing authoritative 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 1808.0 MATERIALS, DIMENSIONS AND METHODS OF FABRICATION

**1808.1 Accepted standards:** The provisions of Articles 7 and 8 and the approved standards listed in the appendices shall control the selection of materials, design and fabrication of all prefabricated structures; or in the absence of such standards of accepted engineering practice, the minimum requirements shall be regulated by the approved rules.

**1808.2 Below-grade construction:** The prefabricated construction cov-

ered by these provisions shall not be permitted in 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 Article 8; or the subgrade walls and floors shall be constructed of approved durable, water-resisting materials of adequate strength.

**1808.3 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 Article 2 for the construction type and use group of the building or structure within the limitations of Tables 214 and 305. When not required to meet fireresistance rating requirements, interior wall and partition surfaces shall be constructed to comply with Section 854.10.

**1808.4 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 854.0. In structures two (2) stories or more in height, the weather boarding shall be constructed of noncombustible or approved protected-combustible materials as regulated by Tables 214 and 305.

**1808.5 Condensation and weather resistance:** Exterior frame walls of buildings shall be constructed or ventilated to avoid condensation and leakage of moisture to comply with Sections 854.4 and 854.9.

**1808.6 Roofing:** All roof covering shall be of approved types meeting the requirements of Sections 903.3 and 926.0.

**1808.7 Connections:** All connections and accessories shall be proportioned to transmit the loads and stresses imposed in accordance with accepted engineering practice and as provided in Section 1807.2.

**1808.8 Waterproofing, ratproofing and termite protection:** All installations shall comply with the provisions of Sections 872.0 for waterproofing, 873.0 for ratproofing and 874.0 for termite protection.

## **SECTION 1809.0 LIGHT GAGE STEEL FRAME CONSTRUCTION**

**1809.1 General:** The fabrication of light gage steel frame structures shall comply with the requirements of Sections 827.0 governing formed steel and 828.0 governing steel joists.

## **SECTION 1810.0 LIGHT WOOD FRAME CONSTRUCTION**

**1810.1 General:** The fabrication of light wood frame structures shall comply with the requirements of Section 854.0.



### SECTION 1811.0 LIGHT REINFORCED CONCRETE FRAME CONSTRUCTION

**1811.1 General:** The fabrication of light reinforced concrete frame structures shall comply with the provisions of Sections 840.0 to 848.0 inclusive.

**1811.2 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.

**1811.3 Test cylinders:** Not less than three (3) compression specimens shall be tested at the age of shipment of the prefabricated member for each one hundred (100) yards 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 1812.0 LIGHT REINFORCED GYPSUM FRAME CONSTRUCTION

**1812.1 General:** The fabrication of light reinforced gypsum frame structures shall comply with the requirements of Section 849.0.

**1812.2 Test cylinders:** Not less than three (3) compression specimens for each one hundred (100) yards 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.

**1812.3 Protection of units:** Continual protection from the weather and from contact with water shall be furnished for the prefabricated units or subassemblies during shipment, storage and after erection in the structure.

**1812.4 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.

**1812.5 Grade construction:** The ventilated space underneath first floor construction shall be not less than two (2) feet high and the underside

of first floor construction shall be dampproofed with an approved protective covering.

#### **SECTION 1813.0 FIRERESISTANCE RATING AND FIRESTOPPING**

**1813.1 General:** Provision shall be made to comply with all the requirements of Sections 875.0 and 919.0 for fire protection and firestopping, and the provisions for fireresistance rated construction of Article 9.

#### **SECTION 1814.0 LIGHT AND VENTILATION**

**1814.1 General:** Means of light and ventilation shall comply with the provisions of Article 5 governing habitable and occupiable rooms, bathrooms and toilet rooms, attic and crawl spaces.

#### **SECTION 1815.0 EGRESS FACILITIES**

**1815.1 General:** The requirements of Article 6 shall control the number, size, and construction of all means of egress as specified therein for the use and occupancy of the building.

**1815.2 Fireresistance rating requirements:** Where fireresistance rated construction is required, the fireresistance ratings shall be regulated by Table 214 for the respective type of construction. Required exitways, public hallways, interior trim and finish shall be constructed to comply with Article 9.

#### **SECTION 1816.0 PLUMBING, PIPING AND SANITARY EQUIPMENT**

**1816.1 General:** All installations of plumbing, drainage and gas piping systems shall comply with the provisions of Article 17 and the plumbing code listed in Appendix B.

#### **SECTION 1817.0 HEATING AND AIR-CONDITIONING**

**1817.1 General:** The applicable provisions of Article 10 and the mechanical code listed in Appendix B shall control the construction and installation of chimneys, flues and heating appliances as therein provided for liquid and solid fuel and gas-fired heating equipment and service-water heaters; and the provisions of the mechanical code listed in Appendix B shall apply for air-conditioning installations.



# ARTICLE 19

## LIGHT-TRANSMITTING PLASTIC CONSTRUCTION

### SECTION 1900.0 GENERAL

**1900.1 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 920.0.

**1900.2 Approved materials:** The use of all plastics which meet the strength, durability, sanitary and fireresistive requirements of this code, ASTM D635 Standard Method of Test for Flammability of Self-Supporting Plastics, ASTM D374 Method of Test for Thickness, ASTM D1929 Method of Test for the Ignition Properties of Plastics, and ASTM D2843 Standard Method of Test for Measuring the Density of Smoke from the Burning or Decomposition of Plastics as listed in Appendix C, and ASTM E84 Method of Test for Surface Burning Characteristics of Building Materials in Appendix G, shall be permitted subject to the limitations of this article.

#### 1900.2.1 Definitions:

**Approved plastic:** An approved plastic shall be any thermoplastic, thermosetting, or reinforced thermosetting plastic material which has a self-ignition temperature of six hundred fifty (650) degrees F. or greater when tested in accordance with ASTM D1929 Method of Test for Ignition Properties of Plastics listed in Appendix C, a smoke density rating no greater than four hundred fifty (450) when tested in the way intended for use by ASTM E84 listed in Appendix G or a smoke density rating no greater than seventy-five (75) when tested in the thickness intended for use according to ASTM D2843 Standard Method of Test for Measuring the Density of Smoke from the Burning or Decomposition of Plastics listed in Appendix C, products of combustion no more toxic than those of untreated wood when burned under similar conditions, and which meet one of the following combustibility classifications:

**Class C-1:** Plastic materials which have a burning extent of one

(1) inch or less when tested in nominal point sixty thousandths (.060) inch thickness, or in the thickness intended for use, by ASTM D635 listed in Appendix C; or

**Class C-2:** Plastic materials which have a burning rate of two and one-half (2.5) inches per minute or less when tested in nominal point sixty thousandths (.060) inch thickness, or in the thickness intended for use, by ASTM D635.

**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.

**Glass fiber reinforced plastic:** Plastic reinforced with glass fiber having not less than twenty (20) per cent of glass fibers by weight.

**Thermosetting materials:** A plastic material which is capable of being changed into a substantially non-reformable 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.

**1900.2.2 Application for approval:** Applicants for approval of a plastic material shall furnish, in accordance with Section 804.0, all necessary technical data required by the building official. The data may include the chemical composition; pertinent physical, mechanical and thermal properties such as fire resistance, flammability, and flamespread; weather resistance; electrical properties; products of combustion and coefficients of expansion.

**1900.3 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 1901.0 DESIGN AND INSTALLATION

**1901.1 Structural requirements:** All plastic materials and their assemblies shall be of adequate strength and durability to withstand the loads and forces specified in Article 7 for their approved use.



**1901.2 Connections and supports:** All fastenings, connections and supports shall be proportioned to safely transmit two and one-half ( $2\frac{1}{2}$ ) 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 1902.0 GLAZING OF UNPROTECTED OPENINGS

**1902.1 Use in Type 4B construction:** Doors, sash and framed openings which are not required to be fire-resistance rated may be glazed with approved plastic materials in buildings of Type 4B (unprotected, frame) construction.

**1902.2 Use group F:** In all types of construction of use group F (factory and industrial), doors, sash and framed openings which are not required to be fire-resistance rated may be glazed with approved plastic materials.

**1902.3 Other classes of construction and use group:** In other classes of construction and use, such openings not required to be fire-resistance rated by Section 914.0 may be glazed or equipped with approved plastic materials subject to the requirements listed below.

1. The area of such glazing shall not exceed twenty-five (25) per cent of the wall face of the story in which it is installed (see Section 1902.4).
2. The area of a unit or pane of glazing installed above the first story shall not exceed sixteen (16) square feet and the vertical dimension of a unit or pane shall not exceed four (4) feet. There shall be a minimum three (3) feet vertical spandrel wall between stories.
3. Approved plastics shall not be installed more than seventy-five (75) feet above grade level.
4. Approved thermoplastic materials may be installed in areas up to fifty (50) per cent of the wall area of each story in structures less than one hundred fifty (150) feet in height which are provided on each floor above the first floor with continuous architectural projections constituting an effective fire canopy extending at least three (3) feet 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.

**1902.4 Automatic fire suppression:** When a complete approved automatic fire suppression system is provided in the building, the permissible area of glazing permitted by Section 1902.3 (1) may be increased one hundred (100) per cent.

### SECTION 1903.0 EXTERIOR PANEL WALLS

**1903.1 General:** Approved plastic materials may be used as wall

panels, in exterior walls not required to have a fireresistance rating (except in use groups A-1, A-2, H and I) subject to the requirements listed in the following Sections 1903.1.1 through 1903.3.

**1903.1.1 Installation:** Exterior wall panels installed as provided herein shall not alter the type-of-construction classification of the building.

**1903.1.2 Height limitation:** Approved plastics shall not be installed more than seventy-five (75) feet above grade level, except as allowed by Section 1903.2.

**1903.1.3 Area limitation and separation:** Area limitation and separation requirements of exterior wall panels shall be as provided in Table 1903.

**Table 1903**  
**AREA LIMITATION AND SEPARATION REQUIREMENTS FOR PLASTIC WALL PANELS<sup>1</sup>**

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
6 ft. or less	—	NP <sup>3</sup>	NP	—	—
6 ft. or more but less than 11 ft.	C1 C2	10 NP	50 NP	8 —	4 —
11 ft. or more but less than 30 ft.	C1 C2	25 15	90 70	6 8	4 4
Over 30	C1 C2	50 50	Not limited 100	3 <sup>2</sup> 6 <sup>2</sup>	0 3

**Note 1.** See Section 1903.3 for combination of glazing and wall panel areas permitted.

**Note 2.** See Section 1903.1.5.

**Note 3.** Not permitted.

**1903.1.4 Spandrel separation:** Vertical spandrel wall separation between stories shall be as follows:

1. three (3) feet for Class C1 plastic wall panels, and
2. four (4) feet for Class C2 plastic wall panels.

**1903.1.5 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 thirty-six (36) inches 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.

**1903.2 Automatic fire suppression:** When a complete approved automatic fire suppression system is provided in the building, the maximum per cent area of exterior wall in plastic panels and the maximum square feet of single area given in Table 1903 may be increased one hundred (100) per cent but the area of plastic wall panels shall not exceed fifty



(50) per cent of the wall area. These uses shall be exempt from height limitations.

**1903.3 Combinations of glazing and wall panels:** Combinations of plastic glazing and plastic wall panels shall be subject to the area, height and percentage limitations, and separation requirements applicable to the class of plastics as prescribed for wall panel installations.

### SECTION 1904.0 ROOF PANELS

**1904.1 General:** Approved plastic roof panels may be installed (except in 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 214; or
3. where the roof panels meet the requirements for roof coverings of the particular occupancy group.

**1904.2 Separations:** Individual roof panels shall be separated from each other by a distance of not less than four (4) feet measured in a horizontal plane.

**1904.3 Location:** Where exterior wall openings are required to be fire-resistance rated by Section 914.0, a roof panel or unit shall not be installed within six (6) feet of such exterior wall.

**1904.4 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 1904.

**Table 1904**  
**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

**1904.5 Exceptions:** The uses listed below shall be exempt from the requirements of Section 1904.4.

1. One (1) story buildings not more than sixteen (16) feet in height and not exceeding twelve hundred (1200) square feet in area and not closer than eleven (11) feet to another building are exempt from the limitations of Section 1904.4.
2. Low hazard use buildings such as swimming pool shelters, greenhouses, etc., are exempt from the area limitations of Section 1904.4

provided the buildings do not exceed five thousand (5,000) square feet in area and are not closer than eleven (11) feet to the property line or adjacent buildings.

3. Roof coverings over terraces and patios of one- and two-family dwellings shall be permitted with approved plastics.

## SECTION 1905.0 SKYLIGHT ASSEMBLIES

**1905.1 Skylight assemblies:** Skylight assemblies may be glazed with approved plastic materials (except in use group H) in accordance with the following provisions.

**1905.1.1 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 four (4) inches above the plane of the roof. Edges of plastic skylights or domes shall be protected by metal or noncombustible material.

**1905.1.1.1 Dome-shape:** Dome-shape skylights shall rise above the mounting flange a minimum distance equal to ten (10) per cent of the maximum span of the dome, but not less than five (5) inches.

**1905.1.2 Maximum area of skylight units:** Each skylight unit shall have a maximum area within the curb of one hundred (100) square feet.

**1905.1.3 Aggregate area of skylights:** The aggregate area of skylights shall not exceed thirty-three (33) per cent when Class C-1 materials are used, and twenty-five (25) per cent when Class C-2 materials are used, of the floor area of the room or space sheltered by the roof in which they are installed.

**1905.1.4 Separation:** Skylights shall be separated from each other by a distance of not less than four (4) feet measured in a horizontal plane.

**1905.1.5 Location:** Where exterior wall openings are required to be fire-resistance rated by Section 914.0, a skylight shall not be installed within six (6) feet of such exterior wall.

**1905.1.6 Exceptions:** a) Except for use groups H and I, the aggregate area of approved plastic skylights may be increased one hundred (100) per cent beyond the limitations set forth in Section 1905.1.3 if the skylights are used as a fire venting system, or if the building is equipped with a complete approved automatic fire suppression system. b) The provisions of 1905.1 need not be applied if the building on which the skylights are located is not more than one (1) story in height, the building has an exterior separation from other buildings of at least thirty (30) feet and the room or space sheltered by the roof is not classified in a group of high hazard or institutional uses or as a means of egress, or the plastic material meets the fire-resistive requirements of the roof.



**1905.1.7 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 1906.0 LIGHT-DIFFUSING SYSTEMS**

**1906.1 General:** Light-diffusing systems shall not be installed in use groups H and I, nor in exitways, unless protected with a 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.

**1906.2 Installation:** Approved plastic diffusers shall comply with Section 920.0 (interior finish) unless the plastic panels will fall from their mountings before igniting and at an ambient temperature of at least two hundred (200) degrees F. below their ignition temperature. The panels must, however, remain in place at an ambient room temperature of one hundred seventy-five (175) degrees F. for a period of not less than fifteen (15) minutes.

**1906.3 Size limitations:** Individual panels or units shall not exceed ten (10) feet in length nor thirty (30) square feet in area.

**1906.4 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 light-diffusing system. Areas of light-diffusing systems shall not be limited if properly protected by an approved fire suppression system.

**1906.5 Electrical lighting fixtures:** Plastic light-transmitting panels and light-diffuser panels installed in approved electrical lighting fixtures shall comply with Section 920.0 unless the plastic panels meet the requirements of Section 1906.2. The area of approved plastic materials when used in required fire exits or corridors shall not exceed thirty (30) per cent of the aggregate area of the ceiling in which they are installed, unless the occupancy is protected by an approved fire suppression system.

### **SECTION 1907.0 PARTITIONS**

**1907.1 General:** Approved light-transmitting plastics may be used in or as partitions provided the requirements of the occupancy class as given in Section 920.0 are met. Such partitions may be installed as provided in Section 909.3.

### **SECTION 1908.0 BATHROOM ACCESSORIES**

**1908.1 Use of plastics:** Approved plastics shall be permitted as glazing

in shower stalls, shower doors, bathtub enclosures, and similar accessory units (see Section 857.5.6).

#### **SECTION 1909.0 AWNINGS AND SIMILAR STRUCTURES**

**1909.1 General:** Approved light-transmitting plastics may be used on awnings and similar structures in conformity with general performance provisions of other sections of the code.

#### **SECTION 1910.0 GREENHOUSES**

**1910.1 General:** Approved light-transmitting plastics may be used in lieu of plain glass in greenhouses.



# ARTICLE 20

## ENERGY CONSERVATION

### SECTION 2000.0 GENERAL

**2000.1 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 one (1) watt per square foot or three and four-tenths (3.4) Btuh per square foot of floor area for all purposes.

**2000.2 Other standards:** Compliance with the applicable provisions of the ASHRAE Standard 90 listed in Appendix B shall be deemed to meet the requirements of this article, unless otherwise specifically provided herein.

### SECTION 2001.0 PLANS AND SPECIFICATIONS

**2001.1 General:** Plans, specifications and necessary computations shall be submitted to indicate conformance with this section and other applicable sections of this code, the mechanical code and the plumbing code listed in Appendix B.

**2001.2 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 2002.0 EXTERIOR ENVELOPE REQUIREMENTS

**2002.1 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 the ASHRAE Standard 90 listed in Appendix B shall be used, except where otherwise noted, to determine conformance with the requirements herein, in accordance with recognized standards.

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.

**2002.1.1 Thermal performance:** All building 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 value ( $U_o$ ) 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.

**2002.1.2 Different requirements:** A building that is designed to be both heated and cooled shall meet the more stringent of the heating or cooling requirements of the exterior envelope as provided in this section when requirements differ.

**2002.1.3 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.

**2002.1.4 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.

**2002.1.4.1 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.

**2002.1.4.2 Ceiling plenums:** Where air ceiling plenums are employed, the roof/ceiling assembly shall:

- a. For thermal transmittance purposes not include the ceiling proper nor the plenum space as part of the assembly, and
- b. For gross area purposes be based upon the interior face of the upper plenum surface.



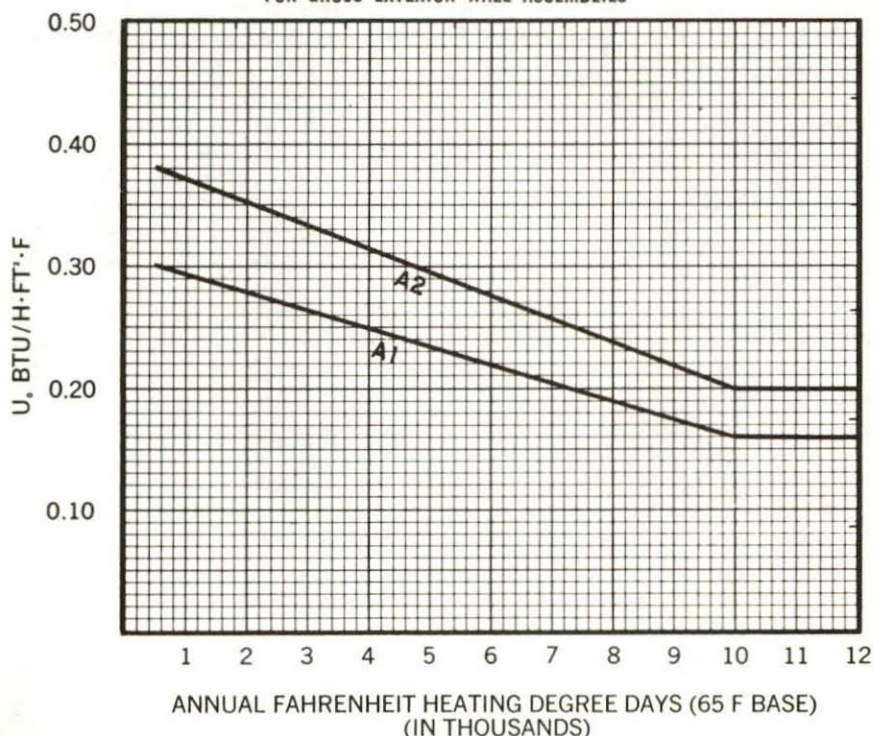
**2002.2 Criteria for residential buildings:** The requirements herein shall apply to all buildings and structures or portions thereof of use group R (residential) that are heated or mechanically cooled when not more than three (3) stories in height.

**2002.2.1 Walls:** The gross area of exterior walls above grade, including foundation walls, shall have a combined thermal transmittance value ( $U_o$ ) not exceeding those specified in the following Figure 2002.2.1a.

**Exceptions:**

1. In locations with less than five hundred (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 ( $U$ ) values in conjunction with glazed opening areas in accordance with Figures 2002.2.1b and 2002.2.1c.

Figure 2002.2.1a  
MAXIMUM ALLOWABLE  $U_o$  VALUES  
FOR GROSS EXTERIOR WALL ASSEMBLIES



\*As specified in Chapter 43 of the ASHRAE Handbook-Systems listed in Appendix B.

**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 (3) stories in height.

Figure 2002.2.1b  
SINGLE GLAZED OPENINGS

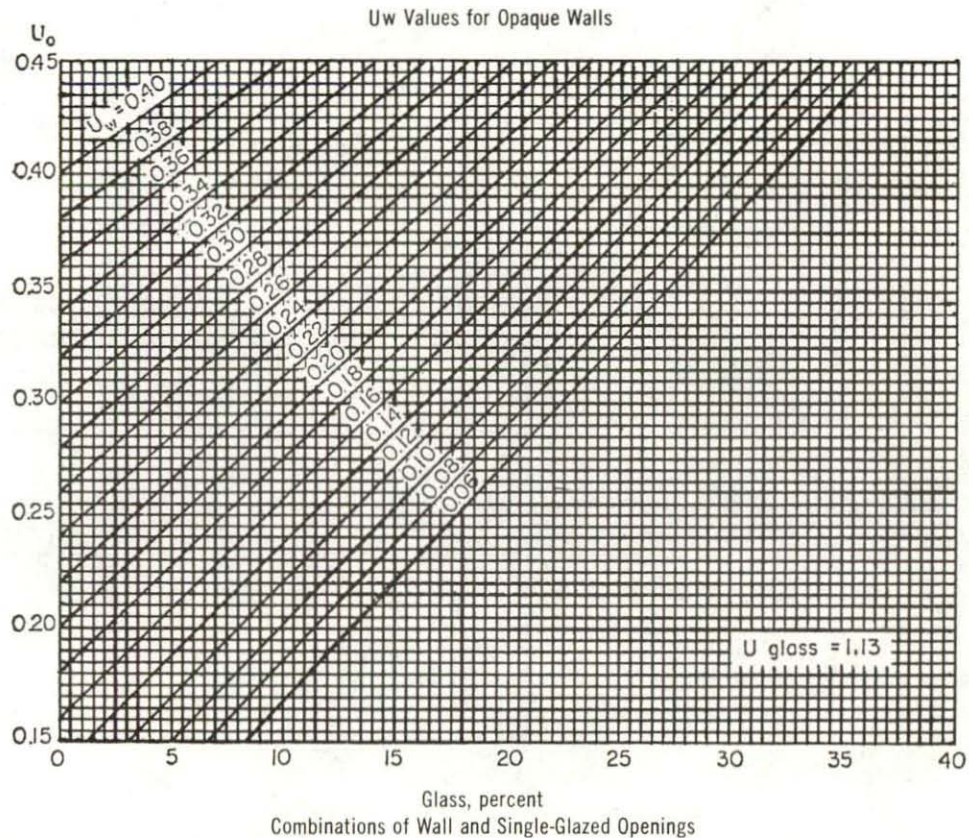
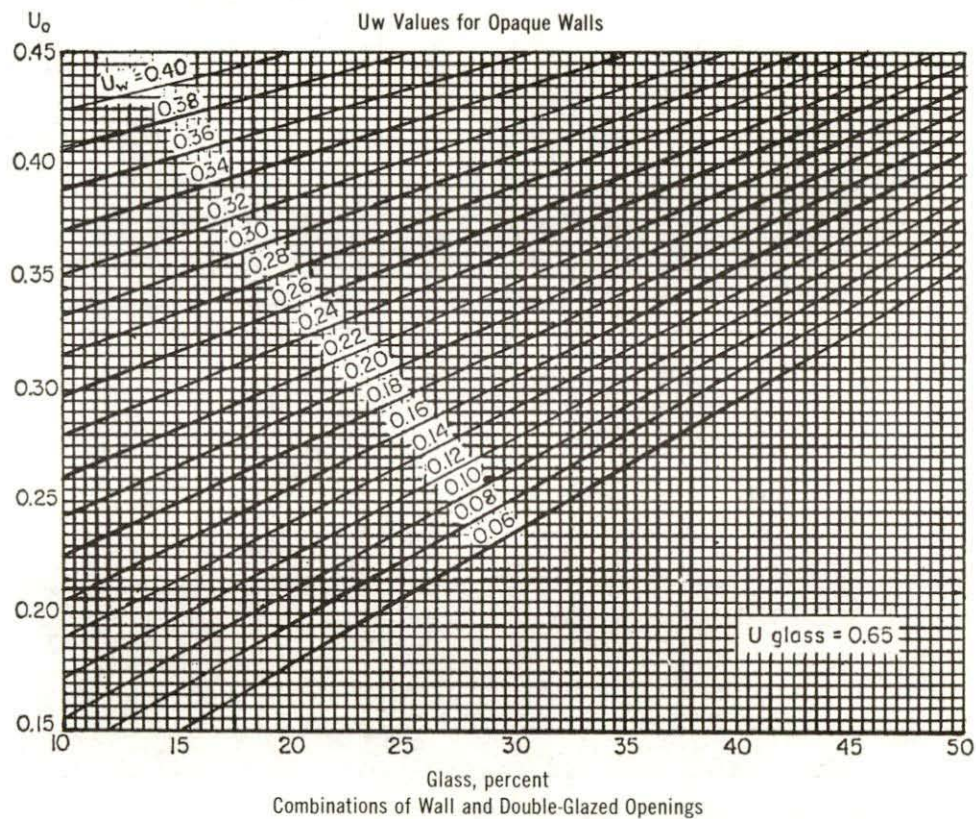




Figure 2002.2.1c  
DOUBLE GLAZED OPENINGS



**2002.2.2 Roof/ceiling:** The roof/ceiling assemblies shall have a combined thermal transmittance value ( $U_o$ ) as specified in the following Table 2002.2.2.

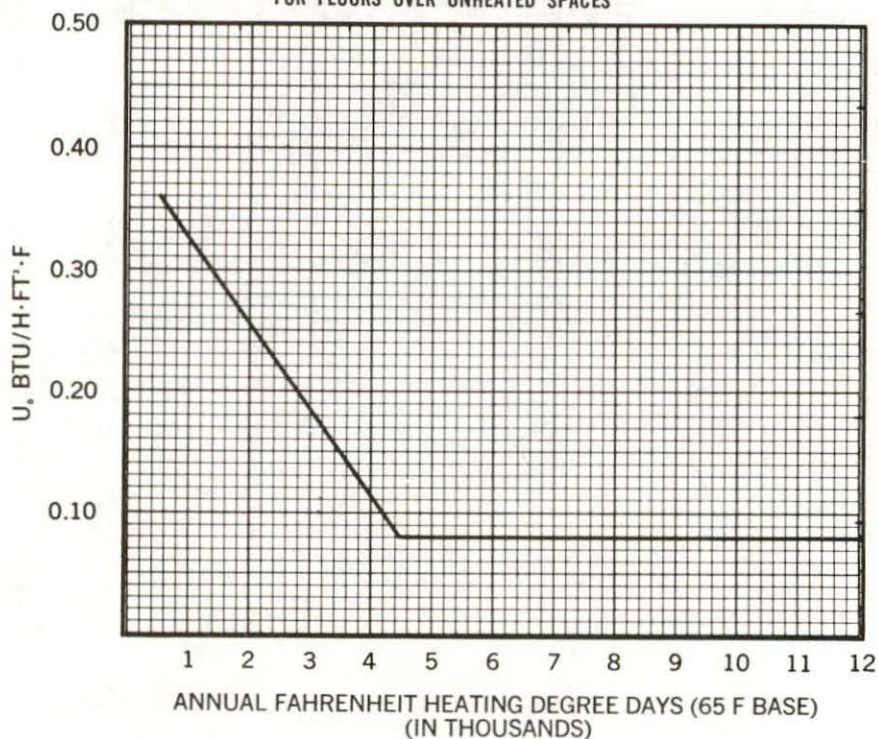
**Exception:** Roof/ceiling assemblies in which the finished interior surface is essentially the underside of the roof deck, such as a wooden cathedral ceiling, may have a " $U_o$ " value not to exceed 0.08 Btu per hour per square foot per degree F. for any Heating Degree Day area.

Table 2002.2.2  
MAXIMUM ALLOWABLE " $U_o$ " VALUES  
FOR ROOF/CEILING ASSEMBLIES

Annual heating degree days	Maximum " $U_o$ "
8000 or Less	0.05
More than 8000	0.04

**2002.2.3 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 2002.2.3.

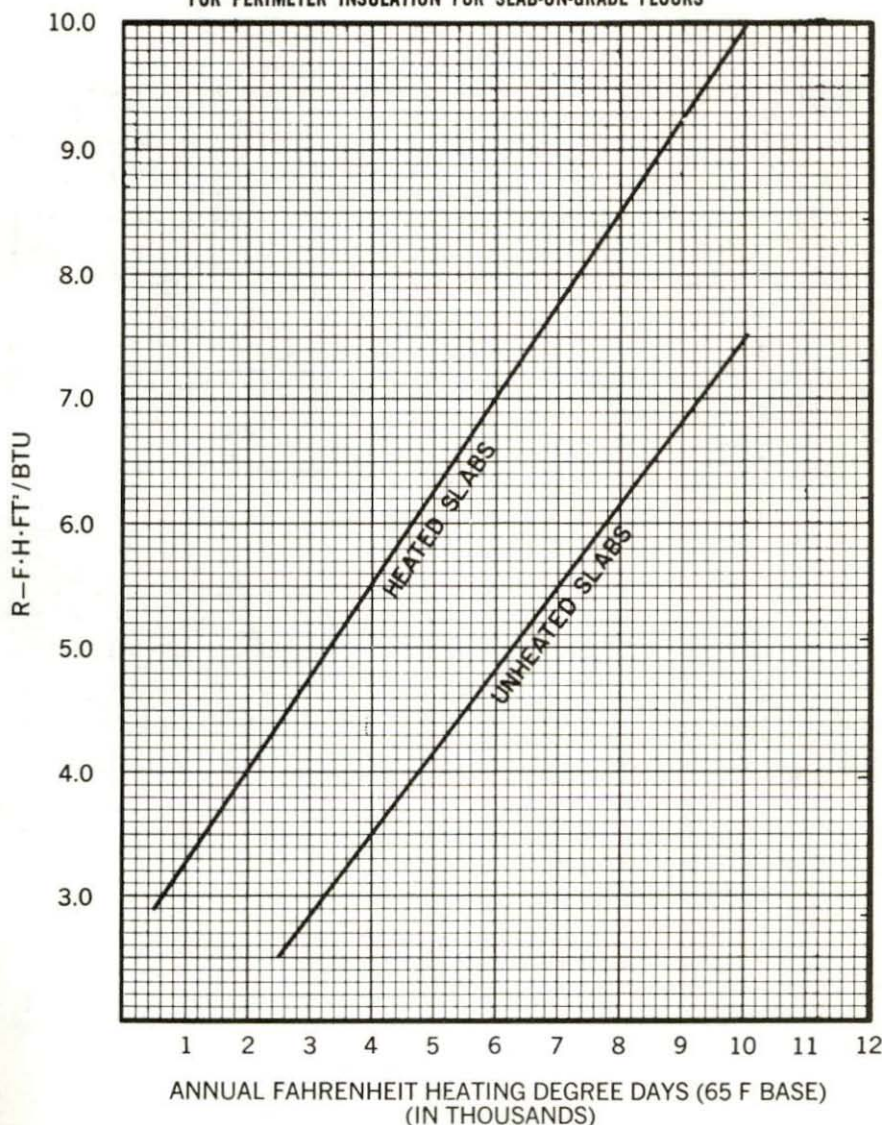
Figure 2002.2.3  
MAXIMUM ALLOWABLE  $U_o$  VALUES  
FOR FLOORS OVER UNHEATED SPACES





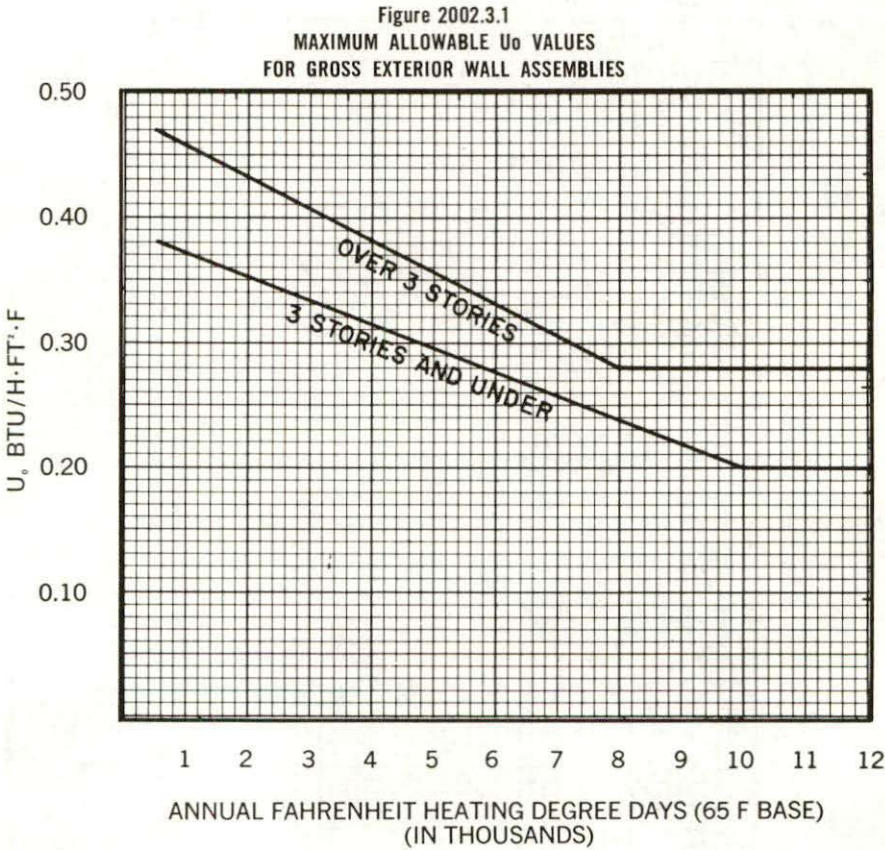
**2002.2.4 Slab-on grade floors:** For slab-on grade floors, the perimeter of the floor shall be insulated with a material having a thermal resistance value (R) not less than those specified in the following Figure 2002.2.4. The insulation shall extend downward from the top of the slab for a minimum distance of twenty-four (24) inches or downward to the bottom of the slab then horizontally beneath the slab for a minimum total distance of twenty-four (24) inches.

Figure 2002.2.4  
MINIMUM ALLOWABLE R VALUES  
FOR PERIMETER INSULATION FOR SLAB-ON-GRADE FLOORS



**2002.3 Other buildings:** The requirements herein shall govern all buildings and structures or portions thereof other than defined by Section 2002.2.

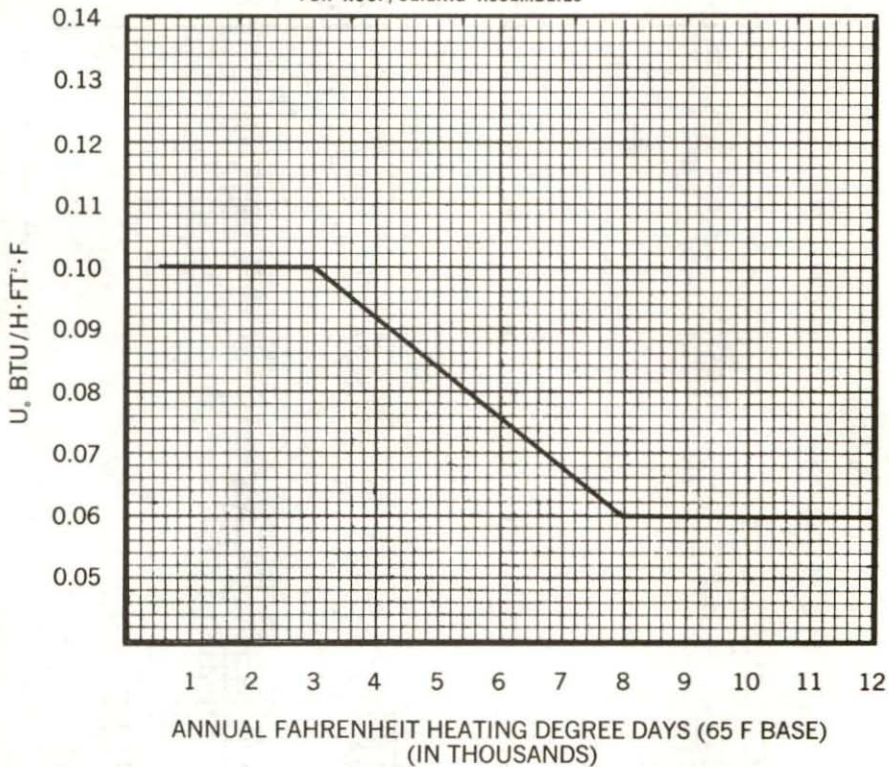
**2002.3.1 Heating criteria for walls:** All buildings and structures that are heated shall have a combined thermal transmittance value ( $U_o$ ) for the gross area of exterior walls not exceeding those specified in the following Figure 2002.3.1.





**2002.3.2 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 2002.3.2.

Figure 2002.3.2  
MAXIMUM ALLOWABLE  $U_o$  VALUES  
FOR ROOF/CEILING ASSEMBLIES

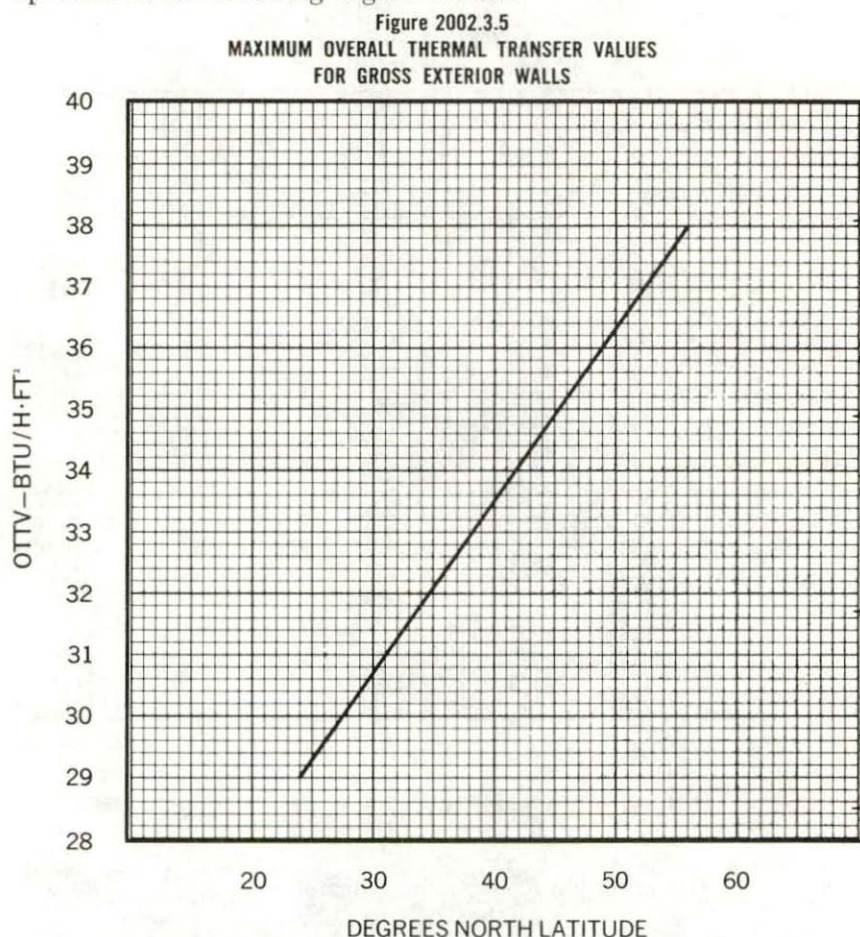


**2002.3.3 Heating criteria for floors over unheated spaces:** The floor of a heated space located over an unheated space shall have a thermal transmittance value ( $U_o$ ) not exceeding those specified in Figure 2002.2.3.

**2002.3.4 Heating criteria for 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 Figure 2002.2.4.

The insulation shall extend downward from the top of the slab for a minimum distance of twenty-four (24) inches or downward to the bottom of the slab then horizontally beneath the slab for a minimum total distance of twenty-four (24) inches.

**2002.3.5 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 2002.3.5.



**2002.3.6 Cooling criteria for roof/ceilings:** 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 2002.3.2 for heating.

**2002.4 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.



**2002.4.1 Standard:** Compliance with the criteria for air leakage shall be determined by ASTM E283, Standard Method of Test for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors, listed in Appendix E at a pressure differential of one and five-hundred sixty-seven thousandths (1.567) lb/ft<sup>2</sup> which is equivalent to the effect of a twenty-five (25) mph wind.

**2002.4.2 Acceptance criteria:** The air infiltration rate for windows shall not exceed point five (0.5) cfm per foot of sash crack.

**2002.4.2.1 Sliding doors:** The air infiltration rate for sliding glass doors in residential buildings shall not exceed point five (0.5) cfm per foot of door area.

**2002.4.2.2 Swinging doors:** The air infiltration rate for swinging doors in residential buildings shall not exceed one point twenty-five (1.25) cfm per square foot of door area.

**2002.4.2.3 Other doors:** The air infiltration rate for swinging, revolving or sliding doors in other than residential buildings shall not exceed eleven (11) cfm per lineal foot of door crack.

**2002.4.3 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 2003.0 ALTERNATIVE SYSTEMS

**2003.1 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.

**2003.1.1** When such alternative 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.

**2003.2 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 the ASHRAE Standard 90 listed in Appendix B.

## GENERAL NOTES CONCERNING STANDARDS

The standards issued by the accredited authoritative agencies listed herein are intended to serve as criteria for accepted safe practice for various materials, products, systems of construction, or specific uses as required or used under the provisions of this code. The text of the code referring to any standard indicates whether conformance with that standard is mandatory or permissive.

In the following appendices, an effort has been made to group the standards according to the principal subjects to which they apply. Some standards cover both accepted engineering practice and material specifications, or other combinations of subject matter, so that it is sometimes necessary for convenience to list them in more than one of the appendices.

Wherever possible, the standards 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 *NFPA 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*.

In addition to the standards listed, there are a number of listings of materials, devices, products and assemblies that are accepted for specified performances. Among such listings, which are generally recognized in the *Basic Building Code*, are those listed below.

1. Test reports; inspection service; lists of building materials, fire protection and extinguishing equipment and devices; and electrical equipment, issued by Underwriters' Laboratories, Inc.
2. Test investigations; reports and lists of fire protection equipment; special hazards; electrical equipment; building construction and mill fire prevention organizations, issued by Factory Mutual Laboratories.
3. *Building Materials and Structures Report on Fire-Resistance Classifications of Building Constructions (BMS92)* issued by National Bureau of Standards.



4. *Fire-Resistance Ratings of Construction Assemblies* issued by American Insurance Association.

5. *Approved Fire-Resistance Ratings of Assemblies of Construction Materials* (columns; beams, girders and trusses; walls and partitions; floor and roof assemblies) recognized in the *Basic Building Code*, issued by Building Officials and Code Administrators International, Inc.

6. *Evaluation Service Research Reports* of specific performance of trade-name products issued to the building official; and *Follow-up Inspection Service* by Building Officials and Code Administrators International, Inc.