ARTICLE 8-PART A

MATERIAL AND TESTS

SECTION 800.0 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 be subject to the approval of the State Building Code Commission and shall follow those requirements of accepted engineering practice and material and test standards as specified in the reference standards of this article as approved by the State Building Code Commission.

800.1 ACCEPTED ENGINEERING PRACTICE: The quality, use and installation of all materials and devices, and the methods of building construction shall be controlled by the standards of accepted engineering practice as approved by the State Building Code Commission and listed in the references of this article.

800.2 MATERIAL AND TESTS: All materials, devices, methods of construction, and tests shall be subject to the approval and control of the State Building Code Commission for use in the Commonwealth of Massachusetts.

800.3 USED MATERIALS: The use of all second-hand materials which meet the minimum requirements of the Basic Code for new materials shall be permitted.

800.4 CONTROL OF CONSTRUCTION MATERIALS: The use of construction materials in all structures covered by section 128.0, and all personnel and laboratories involved in the control, inspection and testing of such structures shall be subject to the rules and regulations of the State Building Code Commission administered through their provisions and under their direction by the Construction Industry Safety Board.

800.41 CONSTRUCTION INDUSTRY SAFETY BOARD: The Board will review applications for registration for licensing of individuals and laboratories responsible for inspection, control and testing of construction material, and report to the State Building Code Commission their recommendations. The Board will collect information and review cases where disciplinary action against an existing license, whether an individual, laboratory or firm, has been proposed and make recommendations to the State Building Code Commission. The Commission will issue applications, receive payment of registration and licensing fees, and maintain records for the efficient dispatch of the duties of the Board. The Board shall submit to the Commission reports from time to time as requested by the Commission, but at least annually.

800.42 TESTING AND EVALUATION GROUP: The State Building Code Commission shall establish and maintain a Testing and Evaluation Group, who will have the responsibility of administering and directing, under the supervision of the Commission, the testing and controls for evaluating individual applicants and laboratories wishing to become registered and licensed as required under section 128.9.

SECTION 801.0 DEFINITIONS

ARCHITECTURAL TERRA COTTA: plain or ornamental hard-burned plastic clay units, larger in size than brick, with glazed or unglazed ceramic finish.

ASHLAR FACING: facing of solid rectangular units larger in size than brick of burned clay or shale, natural or cast stone, with sawed, dressed and squared beds and mortar joints.

ASHLAR MASONRY: masonry composed of bonded, rectangular units, larger in size than brick, with sawed, dressed or squared beds and mortar joints.

BRICK: a solid masonry unit of clay or shale, usually formed into a rectangular prism while plastic and burned or fired in a kiln.

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

CALCIUM-SILICATE BRICK (sand lime brick): a building unit made of sand and lime.

CERAMIC SURFACE UNIT: (see tile).

CLAY MASONRY UNIT: a building unit larger in size than a brick composed of burned clay, shale, fireclay or mixtures thereof.

COLD-FORMED STEEL CONSTRUCTION: that type of construction made up entirely, or in part, of steel structural members cold-formed to shape from sheet or strip steel such as roof deck, floor and wall panels, studs, floor joists, roof joists and other structural elements.

CONCRETE: a mixture of cement, aggregates and water, of such proportions and manipulation as to meet specific requirements.

CONCRETE BRICK: a solid masonry unit having a shape approximating a rectangular prism and composed of inert aggregate particles embedded in a hardened cementitious matrix.

CONCRETE MASONRY UNIT: a building or unit or block larger in size than twelve (12) by four (4) by four (4) inches made of cement and suitable aggregates.

FLOOR FILL: the fill between the structural floor arch or slab and the finished flooring:

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

FLOOR FINISH: the finish placed on top of the floor arch, slab or other structural floor element.

HOLLOW BRICK: a masonry unit of clay or shale whose net cross-sectional area in any plane parallel to the bearing surface is not less than sixty (60) percent or more than seventy-five (75) percent of its gross cross-sectional area measured in the same plane.

HOLLOW MASONRY UNIT: a masonry unit whose net cross-sectional area in any plane parallel to the bearing surface is less than seventy-five (75) percent of its gross cross-sectional area measured in the same plane.

MASONRY: a built-up construction or combination of building units or materials of clay, shale, concrete, glass, gypsum, stone or other approved units bonded together with mortar; or monolithic concrete. Reinforced concrete is not classed as masonry.

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

NOMINAL DIMENSIONS.

-LUMBER: a dimension that may vary from actual dimensions as provided in American Lumber Standard listed in the references standards of this article.

-MASONRY: a dimension that may vary from actual masonry dimensions by the thickness of a mortar joint but not to exceed one-half (½) inch.

PRESERVATIVE TREATED WOOD: wood treated by a recognized pressure impregnation process to increase its durability.

REINFORCED CONCRETE: concrete in which reinforcement other than that provided for shrinkage or temperature changes is combined in such manner that the two materials act together in resisting forces.

RUBBLE

-COURSED RUBBLE: masonry composed of roughly shaped stones fitting approximately on level beds and well bonded.

-RANDOM RUBBLE: masonry composed of roughly-shaped stones laid without regularity of coursing but well bonded and fitted together to form well defined joints.

-ROUGH OR ORDINARY RUBBLE: masonry composed of unsquared field stones laid without regularity of coursing but well bonded.

-RUBBLE MASONRY: masonry composed of roughly shaped stones.

SOLID MASONRY: masonry consisting of solid masonry units laid contiguously with the joints between the units filled with mortar, or consisting of plain concrete.

SOLID MASONRY UNIT: a masonry unit whose net cross-sectional area in every plane parallel to the bearing surface is seventy-five (75) percent or more of its gross cross-sectional area measured in the same plane.

STEEL JOIST: any secondary steel member of a building or structure made of hot or cold-formed solid or open-web sections, or riveted or welded bar, strip or sheet steel members or slotted and expanded or otherwise deformed rolled sections.

STRUCTURAL CLAY TILE: a hollow masonry unit composed of burned clay, shale, fireclay or mixtures thereof and having parallel cells.

STRUCTURAL STEEL MEMBER: any primary or secondary member of a building or structure consisting of a rolled steel structural shape other than formed steel, light gage steel or steel joist members.

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

WALL: (see also sections 201.0 and 901.0.)

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

-COMPOSITE WALL: a wall built of a combination of two (2) or more masonry units of different materials bonded together, one forming the back-up and the other facing elements.

-FACED WALL: a wall in which the masonry facing and backing are so bonded as to exert common action under load.

-HOLLOW WALL: a wall built of masonry units so arranged as to provide an air space within the wall, and in which the facing and backing of the wall are bonded together with masonry units.

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

SECTION 802.0 BASIC CLASSIFICATION OF CONSTRUCTION MATERIALS

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 721.1 and 722.2. The design and construction shall be based on the assumptions, limitations and methods of stress determination of recognized design procedures.

SECTION 803.0 TESTS

All structural units and assemblies shall be tested as approved by the State Building Code Commission and in accordance with those approved standards listed in the references of this article.

803.1 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 the Basic Code, or to such other tests as approved by the State Building Code Commission, that simulate the loads and conditions of application that the completed structure will be subjected to in normal use.

803.11 STRENGTH TESTS FOR GLASS: The working strength of glass for any location in which it is required to withstand specific loads shall be determined as provided in the reference standards of this article.

803.2 DURABILITY AND ENDURANCE TESTS: Whenever specific conditions in a particular case warrant, and such information is otherwise unavailable, the building official may require a specific material to be subject to sustained and repetitive loading to determine its resistance to fatigue, and to tests for durability and weather resistance.

803.3 MAINTENANCE TEST: When reasonable doubt exists as to the quality of approved materials, or excessive variation exists in the quality or standards of materials, the building official may require verification of quality standards before approving further use. The building official may also submit such approved materials to the State Building Code Commission for review of approval.

803.4 PROOF TESTING: Whenever there is sufficient evidence that the stability or structural safety of a completed building or structure or part thereof will not meet approved engineering or other standards cited in this code, the building official may require a load test of the building unit or portions of the structure in question under the supervision of a qualified registered professional engineer or architect. Such existing structure or part thereof shall be subjected to a superimposed load equal to two (2) times the design live load, or to a load causing a stress equal to eighty (80) percent of the yield point in the most highly stressed element. 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 the 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) percent of the maximum deflection within twenty-four (24) hours after removal of the test load.

803.5 TESTS OF SERVICE EQUIPMENT AND DEVICES: Tests of service equipment and devices are covered in the sections appropriate to their use.

803.6 FIRE TESTS: In the determination of flash points, combustibility, flameresistance and fireresistance of construction materials and methods, all tests shall be conducted in conformity to section 903 and 904 and the applicable standards listed in appendices G and H.

803.7 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.

803.8 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 as approved by the State Building Code Commission according to the reference standards of this article. All test specimens and constructions shall be truly representative of the materials, workmanship and details to be normally applied in practice. When structural or fireresistive 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 State Building Code Commission.

803.9 CONDUCT OF LOAD TESTS: Load tests, when required, shall be performed under the supervision of a qualified registered professional engineer or architect. A thorough analysis of the conditions of loading shall be made to ensure that the results reflect an accurate evaluation of the existing stresses.

SECTION 804.0 CONDITIONS OF ACCEPTANCE

When the strength or deflection of a member or assembly cannot be accurately determined by analysis, its evaluation may be based on the results of physical tests as established in these provisions. This section shall apply only to members and assemblies which have not been incorporated into a structure. In-place construction shall be evaluated by the provisions of section 803.4.

804.1 TEST LOAD FACTOR:

a) The test specimen shall sustain for a period of twenty-four (24) hours, without visible damage other than hairline cracks, its own weight, plus a superimposed test load equal to the dead load to be added at the site plus one hundred fifty (150) percent of the design live load.

b) After completion of the test required by section 804.1.a. and removal of all superimposed loads, the recovery of deflection within twenty-four (24) hours shall be at least seventy-five (75) percent of the deflection due to the superimposed loads.

c) The test specimen shall sustain without collapse its own weight, plus a superimposed test load equal to fifty (50) percent of its weight plus one hundred fifty (150) percent of the dead load to be added at the site, plus two hundred fifty (250) percent of the design live load.

804.2 WORKING LOAD DEFLECTION: The deflection properties of the member of assembly under working loads shall conform to the applicable requirements of this Code and the reference standards, as well as to any special requirements of the job specifications. Such deflections may be predicted on the basis of short-time tests, plus a suitable allowance, approved by the building official, for the effects of shrinkage, creep, and relaxation.

804.3 WALL AND PARTITION ASSEMBLIES: Bearing wall and partition assemblies shall sustain the load test both with and without window framing.

804.4 CONCENTRATED LOAD TESTS: When not capable of design all floor constructions in the use classification groups specified in table 7-2 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 7-1;

804.5 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 805.0 APPROVALS

805.1 APPROVAL: All materials devices, methods of construction and tests shall be subject to the approval and control of the State Building Code Commission for use in the Commonwealth of Massachusetts.

805.2 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 806.0 MASONRY CONSTRUCTION UNITS

806.1 IDENTIFICATION: The materials which are recognized as being acceptable as masonry for the purposes of this Code are as follows: Brick, Structural Clay Tile, Glazed Masonry Units, Concrete Units, Gypsum Units, Structural Glass Block Units, Architectural Terra Cotta, Natural Stone, Cast Stone, Mortar for Masonry. A material designated to be used as masonry not so included by this article, shall be subject to approval and classification by the State Building Code Commission.

806.2 NOMINAL DIMENSIONS: Dimensions and thickness specified in the Basic Code are nominal dimensions; actual dimensions may vary from the prescribed minimum in accordance with accepted tolerances in the building industry.

806.3 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 807.0 BRICK UNITS

All clay, shale and sand-lime brick shall be selected of the appropriate grade specified in the reference standards of this article. The minimum grade permitted for brick in contact with the ground and subject to water, frost and freezing action shall be grade SW; when subject to frost without danger of water saturation, grade MW; and when not subject to weathering or when used as back-up in exterior walls or for interior construction, grade NW. Underburned clay brick shall not be used in isolated brick piers, nor in a bearing wall which is more than forty (40) feet in height. Brick for fire protection, fireresistive walls or fire stopping shall be of grade MW or better.

SECTION 808.0 STRUCTURAL CLAY TILE UNITS

808.1 LOAD BEARING WALL TILE: Structural clay load bearing wall tile shall be classified for physical quality as grade LBX or grade LB and shall be in conformance with the reference standards of this article.

808.2 FLOOR TILE: Structural clay floor tile shall be classified for physical quality as grade FT1 or grade FT2 and shall conform to the reference standards of this article.

808.21 ARCHES: Structural clay floor tile used in floor and roof arches shall be at least grade FT2.

808.3 FIREPROOFING AND NON-LOAD BEARING PARTITION TILE: Structural clay non-load bearing tile, used for partitions, fireproofing, and furring shall be classified as grade NB and shall conform to the reference standards of this article.

808.31 FIRERESISTANCE: Structural clay tile in fire resistive construction shall be of grade NB or better, and shall conform to the requirements of Table 2-5.

808.4 EXPOSURE: Any structural clay tile exposed to the weather shall be at least of grade LBX.

SECTION 809.0 GLAZED MASONRY UNITS

Structural clay load-bearing facing tile, facing brick, and other solid masonry units made from clay, shale, fire-clay, or mixtures thereof having a finish consisting of a ceramic glaze shall be in conformance with the reference standards of this article.

SECTION 810.0 CONCRETE UNITS

Concrete units as classified in this Code shall include concrete bricks, solid load bearing units, hollow load bearing units and hollow non-load bearing units of concrete made from Portland cement, water and suitable aggregates, such as sand gravel, crushed stone, bituminous or anthracite cinders, expanded clay or shale and blast furnace slag. The materials shall conform to the specific reference standards herein noted except that cinder aggregate for concrete blocks shall contain not more than twenty (20) percent of combustible matter.

810.1 HOLLOW LOAD BEARING UNITS: Hollow load bearing concrete units shall conform to the reference standards of this article and when used unprotected below grade or unprotected against the weather by stucco, brick or other approved facings or veneers shall be grade U; when used protected below grade or protected exterior subject to frost action, grade P or better; for interior and protected exterior use not subject to frost action, grade G or better.

810.2 HOLLOW NON-LOAD BEARING UNITS: Hollow non-load bearing concrete units shall conform to the reference standards of this article and may be used in non-load bearing interior partitions and non-load bearing exterior walls where effectively protected from the weather.

810.3 SOLID LOAD BEARING UNITS: Solid load bearing units shall conform to the reference standards of this article and when used unprotected below grade or unprotected against the weather by stucco, brick or other approved facings or veneers shall be grade U; when used protected below grade or protected exterior subject to frost action, grade P or better; for interior and protected exterior use not subject to frost action, grade G or better.

810.4 CONCRETE BRICK: Concrete brick shall conform to the reference standards of this article and when exposed to severe frost action shall be grade U; when exposed to moderate frost action shall be grade P or better; and when used in backup or interior masonry, or where effectively protected against moisture penetration, grade G or better.

810.5 CONCRETE FIREPROOFING AND FURRING UNITS: Concrete units may be used for fireproofing or furring when graded for weathering according to this section except that the exterior use of hollow non-load bearing units shall not be permitted for fireproofing purposes. All non-load bearing units shall be clearly marked to distinguish them from load bearing units.

810.6 CONCRETE FLOOR TILE

810.61 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.

810.62 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 811.0 GYPSUM UNITS

A gypsum building unit in the form of tile or block for use in non-load bearing construction in the interior of buildings and for the protection of columns, elevator shafts, etc., against fire shall conform to the reference standards of this article.

811.1 USE: Gypsum tile or block shall not be used in load bearing masonry, in masonry exposed to weather or soil, nor in masonry exposed to frequent or continuous wetting. Gypsum partition tile or block shall not be used for partitions to receive Portland cement plaster, ceramic tile, marble or structural glass wainscots unless self-furring metal lath is placed over the gypsum tile.

SECTION 812.0 STRUCTURAL GLASS BLOCK UNITS

Solid or hollow approved structural glass blocks shall not be used in fire walls, party walls or fire-division 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 813.0 ARCHITECTURAL TERRA COTTA

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, and shall conform to the reference standards of this article.

SECTION 814.0 NATURAL STONE

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 815.0 CAST STONE

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 conform to the reference standards of this article.

SECTION 816.0 MORTAR FOR MASONRY

816.1 MATERIALS: All Portland, natural and masonry cements, quicklime and hydrated lime for use in masonry mortar and concrete shall meet the minimum strength and durability requirements of the standards listed in the references of this article.

816.2 MORTAR TYPES AND PROPORTIONS: Mortar for masonry construction shall conform to one (1) of the following types 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) percent and shall conform to the reference standards of this article.

MORTAR PROPORTIONS (Parts By Volume)

Mortar Type	Portland Cement	Masonry Cement	Hydrated Lime or Lime Putty Min.	Hydrated Lime or Lime Putty Max.	Damp Loose Aggregate
M	1	-	-	¼	
	1	1	-	-	
S	1	-	¼	½	
	½	1	-	-	
N	1	-	½	1¼	not less than 2¼ and not more than 3 times the sum of the volumes of the cements and limes used.
	-	1	-	-	
O	-	1	-	-	
	1	-	1¼	2½	

816.3 TYPES OF MORTAR PERMITTED: Unit masonry shall be laid in mortar of the following 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

816.4 SPECIAL MORTARS: other special masonry mortars in place of the mortar types listed in section 816.2 may be approved 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. In no case shall the allowable unit working stresses in the masonry be more than one-fourth (¼) the average ultimate compressive strength of the assembled test samples.

816.5 GYPSUM MORTAR: Gypsum mortar shall be composed of one (1) part of unfibered 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. Gypsum shall conform to the reference standards of this article.

816.6 MORTARS FOR CERAMIC WALL AND FLOOR TILE: Mortars for installing ceramic wall and floor tile shall be of the following composition measured by volume:

Walls:	Scratch coat	1 cement: 1/3 hydrated lime: 4 sand
	Setting bed and Leveling coat	1 cement: 1/2 hydrated lime: 4 sand
Floors:	Setting bed	1 cement: 5 sand
Ceilings:	Scratch coat and setting bed	1 cement: 1/2 hydrated lime: 3 sand

or other mortars of comparable adhesive strength and durability, in accordance with the reference standards of this article.

816.61 DRY-SET PORTLAND CEMENT MORTARS: Dry-set Portland cement mortars to be used in the installation of ceramic tile shall be in accordance with standard specification for dry-set Portland cement mortar listed in the reference standards of this article.

816.7 ORGANIC ADHESIVES: Organic adhesives to be used in installing ceramic tile shall have a shear bond strength in accordance with commercial standard for adhesives for installations of clay tile listed in the reference standards of this article.

SECTION 817.0 CONCRETE AGGREGATES

817.1 AGGREGATE QUALITY: Concrete aggregates shall conform to the reference standards of this article for organic impurities, soundness, mortar strength, durability, weather resistance, fire resistance, and wearing qualities.

817.2 FIRERESISTANCE: 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 wall conducted in accordance with standard fire test specifications applicable to such test. Protective coverings of encasements of concrete for steel in fireresistive 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 2-5.

817.21 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 the Basic Code for the appropriate construction when tested in accordance with standard methods of fire tests of building construction and materials listed in the reference standards of article 9.

817.22 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 the Basic Code for the appropriate construction when tested in accordance with standard methods of fire tests of building construction and materials listed in the reference standards of article 9.

817.3 SIZE OF AGGREGATES: Fine aggregates shall conform to the reference standards of this article and shall be well-graded from fine to coarse. Coarse aggregates shall not exceed one-fifth (1/5) of the narrowest dimensions between sides of the form nor three-quarters (3/4) of the minimum clear spacing between reinforcing bars and shall conform to the reference standards of this article.

817.4 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 requirements of the approved rules and shall be classified in their respective fireresistant 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 818.0 READY-MIX CONCRETE

818.1 CONTROL: Ready-mix concrete for use in ordinary or in controlled materials procedure shall conform to section 842 for reinforced concrete and to the applicable standards listed in the reference standards of this article.

818.2 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 after the mixing of cement and water.

818.3 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 permissible slump shall be specified. The cement factor and water cement ratio shall conform to the provisions of the reference standards of this article.

SECTION 819.0 STRUCTURAL WOOD GLUES

819.1 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, shall not be attractive to vermin and shall conform to the reference standards of this article.

819.2 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 the reference standards of this article.

819.3 TYPES OF GLUE: Structural glues shall be classified as dry use and wet use in conformance with the reference standards of this article.

SECTION 820.0 INTERIOR LATHING AND PLASTERING

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 the reference standards of this article except as may otherwise be provided in this article for specific materials.

820.1 INSTALLATION

820.11 INSPECTION: The building official shall be notified not less than twenty-four (24) hours in advance of all plastering work, and no plaster shall be applied until after the lathing or other plaster base has been inspected and approved by him.

820.12 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 821.0 EXTERIOR LATHING AND STUCCO

All exterior lathing, plastering and stucco work shall be installed of Portland cement or other approved mortar, as provided in the reference standards of this article or as provided in this Code for specific materials.

821.1 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.

821.2 MINIMUM WEIGHT: Metal lath, expanded metal and wire reinforcing fabric shall weigh not less than the following:

Type of Reinforcement	Minimum U.S. Gage	Maximum Mesh inches	Minimum Weight Pounds per Square Yard
Metal lath	-	-	3.4
Expanded metal	-	-	1.8
Woven wire	18	1	1.74
Woven wire	17	1¼	1.41
Woven wire	16	2	1.47
Welded wire	18	4 sq. in.	0.67
Welded wire	17	4 sq. in.	0.82
Welded wire	16	4 sq. in.	1.10

821.3 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.

821.4 SHEATHING: Except in back-plastered construction, the studs shall be covered with approved sheathing complying with section 855; or not less than No. 18 U.S. gage 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 the reinforced stucco; or an approved paper-backed wire fabric may be used of not less than No. 14 U.S. gage 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.

821.5 BACK PLASTERED CONSTRUCTION; In back-plastered construction, when spacing of studs exceeds sixteen (16) inches, approved horizontol 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 855.

821.6 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.

821.7 PROTECTION.

821.71 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.

821.72 FROM MOISTURE: Stucco shall be kept a sufficient height above ground surfaces as provided in section 855 and all sills, coping and projecting courses shall be flashed and provided with drips as therein specified.

821.73 FROM RAPID DRYING: Stucco shall be protected from heat, sun, and wind for the first forty-eight (48) hours to prevent premature drying.

SECTION 822.0 PLASTERING MATERIALS

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 reference standards of this article.

822.1 SPECIAL CEMENTS AND PLASTERS: Approved cements used in plastering may have admixtures of approved plasticity agents added in the manufacturing process or when mixing plaster at the site in the approved proportions. All premixed special plasters, cements and aggregates shall be packaged and identified with the approved label.

822.2 LIME PLASTER: Lime and hydrated lime plasters for use in base and finish coats shall be applied in accordance with the reference standards of this article and the manufacturers' specifications.

822.3 GYPSUM PLASTER: All gypsum plaster shall comply with the reference standards of this article.

822.4 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 reference standards of this article.

SECTION 823.0 PLASTER BASES

823.1 FIBER BOARDS: Approved fiber boards used as plaster bases shall comply with section 824. 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 in the reference standards of this article.

823.2 GYPSUM LATH: Except when greater thickness is required for fireresistance under the provisions of article 9, or as herein specified, gypsum lath used for plastering shall be not less than three-eighths (3/8) inches thick and shall comply with the reference standards of this article.

823.3 PERFORATED GYPSUM LATH: Where required to provide specified time-temperature performance, perforated gypsum lath shall be not less than three-eighths (3/8) inches thick. The openings shall be equivalent to three-quarter (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 fireresistance ratings.

823.4 METAL LATH: The dimensions and sizes of expanded, ribbed and sheet metal lath shall comply with the reference standards of this article; and shall be fabricated from not less than No. 30 U.S. gage steel sheets. It shall be manufactured from copperbearing steel, coated with rust-inhibitive paint after cutting, or cut from zinc-coated steel sheets.

823.5 WIRE LATH: All types of wire lath shall comply with the reference standards of this article; and shall be fabricated from woven or welded wire of not less than No. 19 W & M gage with not more than two and one-half (2½) meshes to the inch. Woven or welded wire reinforcement shall be coated with zinc or rust-inhibitive paint.

823.6 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 823.4 and 823.5.

823.7 COMBUSTIBLE LATH: Wood lath shall be erected horizontally on walls and partitions and ceiling lath shall run in one direction only; but in neither case shall it extend through cross-partitions from room to room. Wood lath shall be not less than one (1) inch wide nor less than five-sixteenths (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 continuous break.

SECTION 824.0 FIBER BOARDS

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 and water-repellent and shall meet the strength and durability tests specified in the reference standards listed in this article.

824.1 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 the reference standards of this article.

824.2 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.

824.3 ROOF INSULATION: When used as roof insulation in all types of construction, fiber boards shall be protected with an approved type of roof covering.

824.4 WALL INSULATION: When installed and firestopped to comply with article 9, fiber boards may be used for wall insulation in all types of construction. In firewall and fire division construction, unless treated to be noncombustible, the boards shall be cemented directly to the masonry or other combustible veneer anchored to the base without intervening air spaces.

824.5 DRY WALL CONSTRUCTION: Where fireresistance ratings are required, provisions shall be made for interlocking, lapping or otherwise protecting the joints between adjacent boards to insure smoke and flame tightness.

824.6 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 825.0 PLYWOOD

825.1 QUALITY: All plywood when used structurally shall meet the performance standards and all other requirements of the reference standards of this article 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 in conformance with the reference standards of this article.

825.2 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 (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 (1½) 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.

825.3 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 identification index listed in the reference standards of this article, provided it is continuous over two (2) or more spans and laid with face grain perpendicular to the supports.

825.31 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 803.

825.32 The allowable span for plywood combination subfloor underlayment shall conform to the reference standards of this article.

SECTION 826.0 WALLBOARDS AND SHEATHING

826.1 SHEATHING: Sheathing of particleboard, gypsum, processed fiber and other approved materials shall conform to the reference standards of this article. When used in frame construction, they shall meet requirements of section 855.1 and 855.2. When required to meet fireresistance ratings, the assembled construction shall comply with table 2-5 for structural elements and article 9 for trim and finishes.

826.2 WALLBOARDS: Wall board of particleboard, gypsum, processed fiber and other approved materials shall conform to the reference standards of this article. When required to meet fireresistance ratings, the assembled construction shall comply with table 2-5 for structured elements and article 9 for trim and finishes.

SECTION 827.0 STRUCTURAL STEEL CONSTRUCTION

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 reference standards of this article.

827.1 PLANS: Design plans drawn to appropriate scale 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.

827.2 IDENTIFICATION: Structural steel that is required to have a minimum yield point greater than thirty-six thousand (36,000) pounds per square inch shall at all times in the fabricator's plant, be marked, segregated, or otherwise handled so that the separate alloys and tempers are positively identified, and after completion of fabrication, shall be marked to identify the alloy and temper. Such markings shall be affixed to completed members and assemblies or to boxed or bundled shipments of multiple units prior to shipment from the fabricator's plant.

827.3 SHOP DRAWINGS: Shop drawings, giving complete information necessary for the fabrication of the component parts of the structure, including the types of material, the location, type and size of all rivets, bolts and welds, shall be prepared in advance of the actual fabrication. They shall clearly distinguish between shop and field rivets, bolts and welds. Shop drawings shall be made in conformity with the best modern practice and with due regard to safety, speed and economy in fabrication and erection.

827.4 WELDING: All welded construction shall be designed by qualified registered professional engineers and shall be supervised by qualified registered professional engineers and qualified technicians licensed and registered by the State Building Code Commission. Welds shall be made by welders, tackers, and welding operators who are licensed and registered by the State Building Code Commission to perform the type of work required, as prescribed in the reference standards of this article.

827.5 PAINTING: All painting shall comply with the specifications for design, fabrication and erection of structural steel for buildings listed in the reference standards of this article.

SECTION 828.0 FORMED STEEL CONSTRUCTION

828.1 DESIGN: The design of all light gage and 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 conformance with the reference standards of this article.

828.2 SECONDARY STRUCTURAL SYSTEM: 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.

828.3 PROTECTION.

828.31 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.

828.32 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.

828.33 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 in no case for a height of less than eight (8) inches.

828.34 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.

828.4 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 803 and 804. 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) percent from the mean value shall cause rejection of the series.

SECTION 829.0 OPEN WEB STEEL JOISTS

Steel joists may be used as secondary members in floor and roof construction, other than around stairwells, shafts and other floor openings. The materials, design and construction methods shall conform with the reference standards of this article.

829.1 DESIGN.

829.11 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.

829.12 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.

829.2 PROTECTION: Painting of steel joists shall be in accordance with the requirements of section 828 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.

829.3 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 standards, steel joist construction of the required fireresistance may be used in all buildings within the height limits of table 2-6.

829.4 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 803 and 804.

SECTION 830.0 REINFORCING STEEL

Metal reinforcement for reinforced concrete, reinforced gypsum, concrete, reinforced brickwork and reinforced hollow block construction shall comply with the reference standards of this article.

830.1 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 (¼) inch rounds shall be securely tagged to identify the manufacturer and the grade of steel.

830.2 HIGH YIELD STEELS: When the yield point of reinforcing bar steel is fifty thousand (50,000) pounds per square inch or more, the building official shall approve tension stresses in bending and compression stresses in vertical column reinforcement not more than forty (40) percent of the minimum yield point, and in conformity with the reference standards of this article. Such stresses shall be not more than thirty-thousand (30,000) pounds per square inch except when pre-stressed reinforcement is used.

830.3 COLUMN REINFORCEMENT

830.31 STRUCTURAL STEEL SECTIONS: The allowable unit stress on structural steel column sections shall conform with the provisions of the reference standards of this article.

830.32 CAST IRON SECTIONS: All cast iron used as reinforcement in combination with concrete shall be of pit-cast water pipe grade complying with the reference standards of this article; and the allowable unit stress shall be not more than ten thousand (10,000) pounds per square inch.

830.4 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 831.0 CAST STEEL CONSTRUCTION

831.1 MATERIALS: Carbon steel casting for building construction shall be cast from open hearth or basic oxygen steel conforming to the requirements of the reference standards of this article. All castings shall be free from injurious blow holes or other defects which would impair the structural strength.

831.2 HIGHER STRENGTH CAST STEEL: Higher strength cast steel may be used when approved under controlled material procedures.

831.3 WELDING CAST STEEL: Cast steel designed for use in welding shall be of weldable grade complying with the approved rules.

SECTION 832.0 CAST IRON CONSTRUCTION

832.1 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 reference standards of this article.

832.2 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. Cast iron columns shall not be used in the primary structural frames of buildings whose height exceeds one hundred (100) feet or twice the width at the ground level. Cast iron shall not be used for columns required to have four (4) hour fireresistive protection. Cast iron columns supporting a floor shall not be longer than seventy (70) times the least radius of gyration or twenty-four (24) times the outside diameter or least side. Cast iron columns supporting roof loads only shall not be longer than ninety-six (96) times the least radius of gyration or thirty (30) times the outside diameter or least side; cast iron columns shall not be smaller than six (6) inches in outside diameter or side.

832.3 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.

832.4 THICKNESS OF METAL: The minimum thickness of cast iron shall be not less than herein specified:

832.41 COLUMNS: In columns, the metal shall be not less than one-twelfth (1/12) the smallest dimension of the cross-section and in no case less than three-quarter (3/4) inch.

832.42 BASES AND BRACKETS: In bases and flanges, the metal shall be not less than one (1) inch thick reinforced with fillets and brackets;

832.43 LINTELS: In lintels, the metal shall be not less than three-quarter (3/4) inches thick and shall be limited to use on spans of not more than six (6) feet.

832.5 INSPECTION: No cast iron column shall 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) percent shall be prohibited. Where required by the building official, three-eighth (3/8) inch round inspection holes shall be drilled in the section to expose the thickness of metal for inspection purposes.

SECTION 833.0 SPECIAL STEELS

833.1 IDENTIFICATION: Silicon, nickel and other corrosion-resistive alloy and high strength steels with minimum yield points in excess of thirty-six thousand (36,000) used in the design and construction of buildings and structures shall conform to the standards of accepted engineering practice. Every such special steel shall be marked or otherwise identified to clearly distinguish it from all other classes of steel.

833.2 DESIGN AND WORKMANSHIP: Design and fabrication methods shall conform to the requirements of the approved rules.

SECTION 834.0 LIGHT WEIGHT METAL ALLOYS

Aluminum and other approved light weight metals and alloys shall be used for structural purposes in buildings and structures in accordance with the reference standards of this article.

SECTION 835.0 MASONRY WALL CONSTRUCTION

835.1 DESIGN: All masonry construction shall comply with the provisions of this article governing quality of materials and manner of construction; and shall be of adequate strength and proportions to support all superimposed loads within working stresses prescribed in the Basic Code and the reference standards of this article.

835.2 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 (1/8) inch of water for one (1) minute is less than twenty-five thousandths (0.025) ounce per square inch of immersed area.

835.3 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. No frozen materials shall be used nor shall frozen masonry be built upon.

835.4 INCORPORATION OF COMBUSTIBLES: No lumber or other combustible materials, except nailing blocks and ornamental timber to an extent permitted by the chasing restrictions of section 838 and the provisions of section 900.2 shall be incorporated in masonry walls, except as approved for combustible aggregates or component materials after fire test.

SECTION 836.0 BONDING OF WALLS

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

836.1 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.

836.2 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.

836.3 INTERSECTION 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:

a) walls may be bonded by laying at least fifty (50) percent 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 (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.

b) where walls are carried up separately the intersection 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.

c) interior nonloadbearing 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 twenty-two (22) gage corrosion-resistant corrugated metal ties seven-eights (7/8) inch in width, or other equivalent approved method of anchorage.

836.4 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. No wall shall 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 837.0 LATERAL BRACING OF WALLS

All masonry walls shall be laterally supported by horizontal bracing of floor and roof framing or vertical bracing of columns, buttresses or crosswalls at vertical or horizontal intervals. All masonry walls shall be subject to the provisions of the reference standards of this article. Where applicable, masonry walls shall be subject to control as specified in Section 128.0. All such structures shall ensure that provision is made to transfer wind pressures and other lateral forces to the foundation.

SECTION 838.0 CHASES AND RECESSES IN BEARING WALLS

838.1 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. Vertical chases adjacent to bearings of beams or lintels, vertical chases wider than twelve (12) inches and all horizontal chases shall be proportioned on the basis of stress analysis and such calculations shall be submitted by a qualified registered professional engineer or architect.

838.2 MAXIMUM SIZE: The maximum permitted depth of a chase in any wall shall be not more than one-third (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 838.5; 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 (1/4) of the area of the face of the wall in any one story.

838.3 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 divisions, fire partitions or required fire-protective covering of structural members.

838.4 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.

838.5 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 839.0 CORBELED AND PROJECTED MASONRY

839.1 LIMITATIONS: No wall less than twelve (12) inches thick shall 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 871. The maximum total horizontal projection of corbels shall be not more than one-half (1/2) the thickness of the wall. The maximum projection of one (1) unit shall neither exceed one-half (½) the depth of the unit nor one-third (1/3) its width at right angles to the face which is offset.

839.2 HOLLOW WALLS: Corbeling of hollow masonry or masonry built of hollow units shall be supported on at least one full course of solid masonry.

839.3 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.

840.0 BEARING ON HOLLOW UNIT WALLS

840.1 BEARING DETAILS: Concentrated loads shall be supported upon a solid construction of solid masonry, concrete, or masonry of hollow units with cells filled with mortar, grout, or concrete and of sufficient height to distribute safely the loads to the wall, pilaster, or column, or other adequate provisions shall be made to distribute the loads.

840.11 JOIST BEARING: Solid construction for support under joists shall be at least two and one-quarter (2¼) inches in height, and joists supported on such construction shall extend into the masonry at least three (3) inches.

840.12 BEAM BEARING: Solid construction for support under beams, girders, or other concentrated loads shall be at least four (4) inches in height and the bearing of beams shall extend into the masonry at least three (3) inches.

840.2 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 841.0 PLAIN CONCRETE

Plain concrete is concrete cast in place and not required to be reinforced for structural purposes except with respect to shrinkage and temperature. Such concrete shall be subject to the reference standards of this article and, where applicable, subject to control by section 128.0.

841.1 LIMITATIONS: Plain concrete in loadbearing masonry or where exposed to soil or where used for fireresistive purposes, shall be of such proportions as to have a strength of at least fifteen hundred (1500) pounds per square inch and where exposed to wetting or freezing at least two thousand (2,000) pounds per square inch.

SECTION 842.0 REINFORCED CONCRETE

842.1 Concrete materials, design, construction, inspection and testing involved in structures and parts thereof included in the categories of section 128.1 shall be subject to the control provisions of section 128.0 and shall conform to the reference standards of this article. In addition, any other structures or parts thereof, required by the building official to be subject to section 128.0 shall be subject to the same control as outlined in that section.

842.2 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 914.3. 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 of the construction undiminished.

SECTION 843.0 STRUCTURAL CINDER CONCRETE

843.1 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) percent of unburned carbon and not more than one and one-half (1½) percent of sulphur nor more than a total of five (5) percent of volatile materials.

843.2 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 measures separately with a compressive strength of not less than eight hundred (800) pounds per square inch at twenty-eight (28) days' age.

SECTION 844.0 SHORT SPAN FLOOR FILLING

For spans not exceeding ten (10) feet between steel flanges, the safe supporting capacity of concrete floor and roof slabs built as fireproof floor filling between steel beams shall be determined by the provisions of the reference standards of this article or in accordance with the approved rules for stone and light weight aggregate concrete and other approved fireresistive floor filling.

SECTION 845.0 CONCRETE-FILLED PIPE COLUMNS

Concrete-filled pipe columns shall be manufactured from standard extra strong, or double extra strong steel pipe and tubing, filled with concrete.

845.1 DESIGN: The safe supporting capacity of concrete-filled pipe columns shall be computed in accordance with good engineering practice or determined by test. Where computed, the calculations and design shall be submitted by a qualified registered professional engineer or architect with his seal and signature. Where determined by test, such testing shall be done by an approved licensed registered facility.

845.11 CONCRETE: The concrete shall be designed in accordance with the reference standards of this article and shall be placed to ensure complete filling without voids.

845.2 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.

845.3 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 in the section, but not nearer than one (1) inch to the exterior steel shell. All strucutral shapes used as reinforcement shall be milled to insure bearing on cap and base plates.

845.4 FIRERESISTIVE PROTECTION; Pipe columns shall be of such size or so protected as to develop the required fireresistance ratings specified in table 2-5. 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.

SECTION 846.0 PNEUMATIC CONCRETE

Construction methods for mortar or concrete deposited pneumatically (shotcrete) shall conform to the reference standards of this article. Such 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 U.S. gage in diameter, spaced not less than two (2) nor more than four (4) inches either way, with a gross area of not less than two-tenths (0.2) percent of the cross-sectional area of the mortar layer.

846.1 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 the Basic Code for reinforced concrete.

846.11 PROPORTIONS: The proportion of cement to aggregate, in loose dry volume, shall not be less than one (1) to four and one-half (4½).

846.12 WATER: The water content at the time of discharge, including moisture in the aggregate, shall not exceed three and one-half (3½) gallons per sack of cement.

846.13 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) percent moisture.

846.2 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) percent of the total aggregate in any batch.

846.3 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 addtional material adjacent to previously applied work, these sloping edges shall be cleaned and wetted.

846.4 DAMAGE: Any pneumatically placed concrete which subsides after placement shall be removed.

SECTION 847.0 MINIMUM CONCRETE DIMENSIONS

The protection of reinforced concrete structural elements in buildings of fireproof (types 1-A and 1-B) construction shall be adequate to meet the fire and strength tests of the Basic Code; but in no case 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, unless calculations submitted by a registered professional engineer or architect are submitted to justify incorporation of the floor finish as part of the structural element.

SECTION 848.0 REINFORCED GYPSUM CONCRETE

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 the reference standards of this article.

848.1 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 849.0 REINFORCED BRICKWORK

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 the reference standards of this article. Reinforced brickwork shall be used only when design specifications are submitted by a registered professional engineer or architect and, where applicable, shall be subject to the control of section 128.0.

849.1 DESIGN: The formulae and assumptions used in the design or reinforced masonry shall be those contained in the reference standards of this article.

SECTION 850.0 REINFORCED HOLLOW BLOCK CONSTRUCTION

Walls constructed of hollow block or other hollow unit masonry and reinforced with steel rods grouted solidly into the cells shall be designed and constructed in accordance with reference standards of this article; and plans and specifications shall be submitted by a registered professional engineer or architect. When applicable, the control of section 128.0 shall apply.

SECTION 851.0 LUMBER AND TIMBER CONSTRUCTION

851.1 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 the reference standards of this article. All lumber used for load supporting purposes shall be

identified by the grade mark of a lumber grading inspection agency approved by the State Building Code Commission. Grading practices and the identification shall be in accordance with rules published by an agency approved by the Commission. In lieu of a grade mark on the material, a certificate of inspection as to species and grade issued by an approved lumber grading or inspection agency may be accepted by the building official for precut, remanufactured, or rough sawn lumber; also for sizes larger than three (3) inches nominal thickness.

851.2 MINIMUM DIMENSIONS.

851.21 SIZES OF STRUCTURAL MEMBERS: All lumber sizes specified in the Basic 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).

851.22 STRUCTURAL POSTS: All isolated structural posts shall have a minimum dimension of four (4) inches.

851.3 FABRICATION.

851.31 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 the reference standards of this article.

851.32 CAMBERING: Trusses and long span girders shall be designed with sufficient camber or other provision shall be made to compensate for excessive deflection.

851.33 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 (1/6) the depth of the member and shall not be located in the middle one-third (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 (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 (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 (1/3) the depth of the stud. When the stud is cut or bored in excess of one-third (1/3) its depth it shall be reinforced to be equal in load carrying capacity to a stud notched not more than one-third (1/3) its depth.

851.4 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.

851.5 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.

851.6 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 852.0 HEAVY TIMBER TYPE CONSTRUCTION

852.1 WOOD: All structural wood members sawn or glued laminated used in heavy timber type construction shall be stress-grade timbers identified as to grade strength by approved manufacturing, testing, or inspection agencies or bureaus. All structural timber members shall have the minimum dimensions specified in section 217.1 for type 3-A construction.

852.2 OTHER STRUCTURAL MATERIALS: Structural steel or reinforced concrete members may be substitued for timber in any part of the structural frame, protected to develop the required fireresistance specified in table 2-5, but not less than three-quarter (3/4) hour fireresistance. Structural members supporting walls shall be protected to afford the same fireresistance rating as the wall supported.

852.3 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 be timber splice plates affixed to the columns by means of metal connectors housed within the contact faces, or by other approved methods. Girder or trusses supporting columns shall have at least three-quarter (3/4) hour fireresistance.

852.4 FLOORS: The planks shall be laid so that no continuous line of joints will occur except at points of support and so that they are not spiked to supporting girders. Flooring shall not extend closer than one-half (½) inch to walls to provide an expansion joint, but the joint shall be covered at top or bottom to avoid flue action.

852.5 BEAMS AND GIRDERS.

852.51 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 (½) 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 fireresistance 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.

852.52 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 853.0 WOOD FRAME CONSTRUCTION

The exterior walls, interior partitions, floors and roofs of wood frame construction shall be designed, braced and constructed to develop adequate strength and rigidity to resist all vertical and lateral forces due to both dead and live loads without exceeding the stresses allowed in this section for the various grades and species of wood. Standard balloon, braced, platform, and post and beam types of construction shall be acceptable framing methods. Sizes of wood members stated in this section are nominal sizes, materials, design, and construction methods shall meet the requirements in those applicable sections of the reference standards of this article.

853.1 WOOD-STUD FRAME.

853.11 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 804.3.

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

853.13 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 853.2 is applied vertically in panels of not less than four (4) feet by eight (8) feet in area with approved nailing complying with the reference standards of this article. Ledger or ribbon boards used in support joists shall be not less than one (1) by four (4) inches in size, cut into and securely nailed to each stud.

853.14 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.

853.15 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 U.S. gage steel sheets for two (2) inch framing members and not less than No. 18 U.S. gage for three (3) inch structural members. For four (4) inch and larger members, column splices and beam and girder supports shall comply with section 854.

853.16 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.

853.2 WALL SHEATHING: Except as provided in section 853.3 for weather boarding or when stucco construction complying with section 821.5 is used, all enclosed buildings shall be sheathed with one 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	5/8 inch
Particleboard	3/8 inch
Plywood	5/16 inch
Gypsum sheathing	1/2 inch
Fiber boards	1/2 inch

853.21 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 821.4 with a one (1) inch intermediate space which shall be mortar filled as each course of veneering is applied.

853.3 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 roof, 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	1/4 to 1 inch
Stucco or exterior plaster	3/4 inch
Precast stone facing	5/8 inch
Wood siding (without sheathing)	1/2 inch
Wood siding (with sheathing)	3/8 inch
Protected fiber board siding	1/2 inch
Wood shingles	3/8 inch
Exterior plywood (without sheathing)	See sec. 825.2
Exterior plywood (with sheathing)	5/16 inch
Asbestos shingles	5/32 inch
Aluminum Cement boards	1/8 inch
Aluminum clapboard siding	.024 inch
Formed steel siding	29 gage
Hardboard siding	1/4 inch

853.31 MASONRY VENEERS: See section 860.0.

853.32 METAL VENEERS: See section 860.0.

853.33 HEIGHT OF VENEERS: See section 860.0.

853.34 NAILING: All weatherboarding and wall and roof coverings shall be securely nailed with aluminum, copper, zinc, zinc-coated or other approved corrosion-resistive nails in accordance with the nailing schedule in the reference standards of this article, 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 (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. Wood shingles or shakes and asbestos shingles or siding may be nailed directly to nail base fiberboard sheathing not less than one-half (½) inch nominal thickness with approved corrosion-resistive annular grooved nails when the installation is in accordance with the approved manufacturer's standards.

853.4 FOUNDATION ANCHORAGE: When required to resist wind uplift, walls sills shall be anchored to the foundation walls or piers at corners and at intermediate intervals of not more than eight (8) feet with one-half (½) inch bolts. The bolts shall be imbedded in the masonry foundation to a depth of not less than eight (8) inches in placed concrete, and not less than fifteen (15) inches in unit masonry. Sill plates shall be at least equivalent to a two (2) by six (6) inch member.

853.5 AT-GRADE PROTECTION.

853.51 WOOD FRAMING: All exterior wood framework of buildings whether structural or non load-bearing shall be supported on approved foundation walls at least eight (8) inches above the finished grade.

853.52 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.

853.6 FLOORS.

853.61 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 (1) by three (3) inch lumber, double-nailed at each end, or of equivalent metal bracing of equal rigidity. A line of bridging shall also be required at supports where adequate lateral support is not otherwise provided.

Midspan bridging is not required for floor, attic or roof framing in one- and two-family dwellings (use group L-3) and multi-family dwellings (use group L-2) except when the joist depth exceeds twelve (12) inches nominal and/or when the minimum uniformly distributed live load exceeds forty (40) pounds per square foot.

853.62 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.

853.7 ROOFS.

853.71 TYPES OF DECKING AND SHEATHING: Roof deck sheathing shall consist of not less than one (1) inch boards or plywood of the thickness specified in section 825.3, 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 (1) by four (4) inch roofers spaced not more than six (6) inches on centers or material of equivalent strength and rigidity.

853.72 WOOD SHINGLES: Wood shingles and handsplit shakes complying with the reference standards of this article may be used for roof covering where permitted in section 928.3, and may be installed on tight decking or on spaced roof boards.

853.8 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. When veneers of 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.

853.9 INTERIOR FINISH: In all habitable spaces, interior wall and partition surfaces shall be finished with materials which do not exceed the combustible limitations of section 904.0 and are of adequate strength to resist a horizontal force of not less than five (5) pounds per square foot.

SECTION 854.0 STRESS SKIN PANELS

854.1 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 the reference standards of this article or meeting the test requirements of sections 803, 804, and 805.

854.2 SPLICES: Splices and connections between panels shall be weathertight and of sufficient strength to resist two and one-half (2½) 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.

854.3 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 803 and 804.

SECTION 855.0 STRUCTURAL GLUED LAMINATED TIMBER AND BUILT-UP WOOD CONSTRUCTION

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

855.1 STRUCTURAL GLUED LAMINATED TIMBER: Structural glued laminated timber elements shall be manufactured in conformity with the provisions of the reference standards of this article.

855.2 GLUED LUMBER MEMBERS: Built-up beam and column sections consisting of one or more webs with glued lumber flanges and stiffeners, shall be designed in accordance with approved engineering analysis.

855.21 GLUING SURFACES: In glued lumber constructions, the surfaces to be glued shall be clean, plane and sound to provide a controlled glue line. The surfaces shall be free of wax, grease, oil or any other release agents to ensure full strength bonding.

BUILDING ENCLOSURES, WALLS AND
WALL THICKNESS

SECTION 856.0 ENCLOSURE WALLS: 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 specified in table 2-5 and as required in the Basic Code for location, use and type of construction.

856.1 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.

856.2 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 906.1.

856.3 GLASS PANELS.

856.31 CONDITIONS OF USE: Glass, where used in exterior walls and for doors shall be subject to the provisions of this section. Glass subject to the requirements of human impact shall be identified by a permanent marking on each piece of glass so used.

856.32 SUPPORT FOR GLASS PANELS: Glass shall be firmly held in place, and the supports designed to resist any wind or impact load to which it may be subject. Where unusual conditions of support exist, they shall be designed and specified by a registered professional engineer or architect.

856.33 GLASS REQUIREMENTS: Unless otherwise stated herein, glass shall meet the requirements of the reference standards of this article for the applicable type, size, thickness and quality.

856.34 THICKNESS OF GLASS: Thicknesses of glass panels shall be chosen as provided in section 803.11.

856.35 DEFLECTION OF SUPPORT: The deflection of members supporting glass panels under the design wind load shall not exceed L/175 where L is the span of the supporting member. In no case shall such deflection exceed three-quarters (3/4) inch.

856.36 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 not be more than forty-eight (48) inches; glass edges shall be smooth. Other types of glass may be used subject to the approval of the building official.

856.37 PANELS SUBJECT TO HUMAN IMPACT LOADS: Glass in prime and storm doors, interior doors, fixed glass panels that may be mistaken for means of egress or ingress, or in similar locations wherein one or more of the following criteria apply, shall meet the requirements set forth in table 8-1, or by comparative tests, shall be proven to produce equivalent performance:

a) Openings are located in regularly occupied spaces.
b) Lowest point of panel is less than eighteen (18) inches above finished floor.
c) Minimum dimension of panel is larger than eighteen (18) inches.

SECTION 857.0 PROTECTION OF WALL OPENINGS

857.1 FIRE-PROTECTED OPENINGS: Openings in exterior walls when required to be fire-protected shall comply with the provisions of article 9.

TABLE 8-1
REQUIREMENTS FOR GLASS PANELS SUBJECT TO IMPACT LOADS

Glass Type	Individual Opening Area	Requirements
Regular plate, sheet or rolled (annealed)	Over 6 square feet	Not less than 3/16 inch thick. Must be protected by a push-bar or protective grille firmly attached on each exposed side, if not divided by a muntin.
Regular plate, sheet or rolled (annealed) surface sandblasted, etched, or otherwise depreciated	Over 6 square feet	Not less than 7/32 inch thick. Must be protected by a push-bar or protective grille attached on each exposed side.
Regular plate, sheet or rolled (annealed) obscure	Over 6 square feet	Not less than 3/16 inch thick. Must be protected by a push-bar or grille firmly attached on each exposed side.
Laminated	Over 6 square feet	Not less than 1/4 inch thick. Shall pass impact test requirements of reference standard RS 8-75.
Full-tempered	Over 6 square feet	Shall pass impact test requirements of reference standard RS 8-75.
Wired	Over 6 square feet	Not less than 7/32 inch thick. Shall pass impact test requirements of reference standard RS 8-75.
All unframed glass doors (swinging)		Shall be fully-tempered glass and pass impact test requirements of reference standard RS 8-75.

NOTES:

1) Glass less than single strength (SS) in thickness shall not be used.
2) If short dimension is larger than twenty-four (24) inches, glass must be double strength (DS) or thicker.

857.2 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.

857.3 STRUCTURAL STRENGTH.

857.31 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 factored wind load.

857.32 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 858.0 FIRE ACCESS PANELS

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. Access panels shall be not less than thirty-two (32) inches by forty-eight (48) inches in size.

858.1 MULTI-STORY BUILDINGS: In all exterior walls of the building required to have thirty (30) foot wide open space adjacent thereto (see sections 307.1 and 308.1), each floor below a height of seventy (70) feet shall be provided with access panels spaced not more than fifty (50) feet apart in each story.

858.2 SINGLE-STORY BUILDINGS: In one (1) story buildings not more than seventy (70) feet in height:

a) roof vents shall be provided, spaced not more than one hundred twenty-five (125) feet apart; and

b) 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

858.3 CONSTRUCTION OF ACCESS PANELS: Construction access panels

a) shall have a sill height of not more than thirty-six (36) inches; and

b) shall be readily identifiable from the outside; and

c) shall be readily openable from the outside or shall be glazed with plain flat glass.

858.4 LOCATION: Wherever practicable, one access opening in each story shall provide access to a stairway, or where there is no stairway at the exterior wall, one access opening in each story shall be located as close as practicable to a stairway.

858.5 EXEMPTIONS: The provisions of this article shall not apply to any story that is completely protected by an automatic sprinkler system conforming to the construction requirements of article 12.

SECTION 859.0 STRUCTURAL GLASS BLOCK WALLS

859.1 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.

859.2 JOINT MATERIALS: Glass blocks shall be laid up in type S or N mortar with approved galvanized or other noncorrosive metal wall ties in the horizontal mortar joints of exterior panels. The sills of glass block panels shall be coated with approved asphaltic emulsion, or other elastic waterproofing material previous to laying the first mortar course and the perimeter of the panels shall be caulked to a depth of not less than one-half (½) inch with nonhardening caulking compound on both faces; or other approved expansion joints shall be provided. When laid up in joint materials other than mortars herein defined, no single panel shall be more than one hundred (100) square feet in area nor more than ten (10) feet in either length or height.

859.3 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 713.0 and 719.0.

859.4 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 fireresistive.

859.5 FIRERESISTANCE RATING: Nothing herein contained shall be construed to prohibit the use of glass blocks in an opening protective assembly or nonbearing partition or wall when required to afford a specific fireresistance, provided approval of the building official is secured after satisfactory time-temperature performance under the prescribed test procedure of article 9.

859.6 ACCESS PANELS: Access panels shall be provided in exterior glass block walls for the fire department use to comply with section 858.0

SECTION 860.0 WALL FACINGS AND VENEERS

860.1 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 no wood backing surfaces shall 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 the Basic Code for the specific material.

860.2 VENEER THICKNESS: No materials used for nonbearing veneers on masonry walls shall have less than the following thickness:

Ceramic veneer (architectural terra cotta - anchored type)	1 inch
Brick	2 inches
Stone (natural)	2 inches
Stone (cast artificial)	1-1/2 inches
Clay tile (structural)	1-3/4 inches
Clay tile (flat slab)	1/4 to 1 inch
Marble slabs	1 inch
Precast stone facing	5/8 inch
Structural glass	11/32 inch
Aluminum clapboard siding	.024 inch
Metal (approved corrosion-resistive)	28 U.S. Gage

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.

860.3 MASONRY VENEERS: Veneers of unit masonry shall be attached to the wood frame with at least twenty-two (22) gage corrosion-resistive, corrugated metal ties not less than seven-eighths (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.

860.4 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 gage in thickness mounted on wood or metal furring strips or approved sheathing on the frame construction.

860.5 HEIGHT OF VENEERS: The height and length of veneer areas shall be unlimited, except as required to control expansion and contraction. When attached to wood frame structures as provided in section 860.3, the veneer shall be supported on footings or foundation walls.

860.6 VENEER OR MASONRY: Veneer attached to masonry or concrete backing shall not be limited in height other than by compressive stresses. Veneer shall be securely attached to the masonry or concrete in an approved manner.

SECTION 861.0 STRUCTURAL GLASS VENEERS

861.1 DIMENSIONS: The minimum thickness of glass veneer shall be eleven thirty-seconds (11/32) 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 (3/16) inch.

861.2 CONSTRUCTION.

861.21 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.

861.22 SUPPORT OF VENEER: The base course of glass units shall be supported on a corrosion-resistive metal frame anchored to the backing and caulked with a waterproof compound at grade.

861.3 REINFORCEMENT: Metal reinforcing of cold formed corrosion-resistive angles of not less than No. 16 U.S. gage or other approved reinforcement shall be provided in all horizontal joints anchored into the masonry wall with expansion or toggle bolts.

861.4 EXPANSION JOINTS: Expansion joints shall be provided at ends and intermediate sections caulked with an approved waterproofing compound as required by the approved rules. Where necessary for watertightness, exposed edges shall be protected with corrosion-resistive metal or other approved noncombustible flashing.

861.5 OTHER LOADS: No signs, awning brackets or other loads shall 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 glass.

SECTION 862.0 THIN STONE AND TILE VENEERS

862.1 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) percent in area.

862.2 CONSTRUCTION: One (1) inch thick marble, granite, terra cotta, and similar materials; or ceramic tile facing one-quarter (¼) to one (1) inch in thickness shall be set in accordance with the applicable standards listed in the reference section of this article.

SECTION 863.0 METAL VENEERS

863.1 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.

863.2 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.

863.3 WATERPROOFING: All joints and edges exposed to the weather shall be caulked with approved durable waterproofing material or by other approved means to prevent penetration of moisture.

863.4 GROUNDING METAL VENEERS: Grounding of metal veneers on all buildings shall comply with the requirements of the Massachusetts State Electrical Code.

SECTION 864.0 PLASTIC VENEERS

Veneers of approved weather-resisting non-combustible plastics shall be erected and anchored on a foundation coat, waterproofed or otherwise protected from moisture adsorption and sealed with a coat of mastic or other approved waterproof coating in accordance with the approved rules.

SECTION 865.0 THICKNESS OF SOLID MASONRY WALLS

All masonry walls shall be of a thickness conforming to the reference standards of this article and subject to the maximum stresses, combined or direct as provided in this Code or in the reference standards.

SECTION 866.0 THICKNESS OF PANEL WALLS

866.1 SOLID PANEL WALLS: Panel, apron or spandrel walls as defined in the Basic Code supported at vertical intervals not exceeding thirteen (13) feet in height, shall not be limited in thickness, provided they meet the fireresistive requirements of article 9 and table 2-5, and are constructed of approved noncombustible weather-resisting materials of adequate strength to resist the wind loads specified in sections 713 and 714.

866.2 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 2-5 for exposure on both faces.

866.3 WEATHER RESISTANCE: When the construction as tested and approved for fireresistance 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.

866.4 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 867.0 THICKNESS OF PARAPET WALLS

All masonry exterior walls shall be constructed with parapet walls extending not less than two (2) feet above the roof, except in one- and two-family dwellings and structures where the roof overhangs the wall, or in places where such walls are capped with cornices or gutters; and except as required for fire walls in section 907 or as herein specifically provided.

867.1 MINIMUM THICKNESS AND HEIGHT: Parapet walls shall be of the same thickness as the wall below; but in no case shall the required thickness exceed twelve (12) inches, nor shall the height be more than four (4) times the thickness unless laterally supported by non-combustible bracing or buttresses.

867.2 PARTY WALLS WITH FLAT ROOFS: Parapet walls erected between two (2) structures in residential use groups, with flat roofs not more than forty (40) feet in height, need not extend more than six (6) inches above the roof.

867.3 PARTY WALLS WITH PITCHED ROOFS: Party walls in buildings and structures in residential use groups, the roofs of which slope at an angle of thirty (30) degrees or more from the horizontal, may stop at the level of the top of the roof boards, provided no combustible material passes through the wall, and the junction of roof and walls is completely weatherproofed and firestopped.

867.4 COPING: The top of all parapet walls exposed to the weather shall be coped with approved noncombustible and weather-resisting materials.

SECTION 868.0 FOUNDATION WALLS

868.1 DESIGN: Foundation walls shall be designed to resist frost action and to support safely all vertical and lateral loads as provided in article 7 and shall extend to a minimum depth of four (4) feet below grade. The maximum stresses due to combined load shall be within the

868.1 DESIGN: Foundation walls shall be designed to resist frost action and to support safely all vertical and lateral loads as provided in article 7 and shall extend to a minimum depth of four (4) feet below grade. 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.

868.2 MINIMUM THICKNESS: The thickness of foundation wall 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 wall supported including gables is not more than twenty (20) feet;

868.21 REINFORCED CONCRETE: When reinforced concrete is required to resist all stresses, foundation walls shall be not more than eight (8) inches thick;

868.22 HOLLOW AND SOLID MASONRY AND MASS CONCRETE: The thickness of masonry foundation walls shall not be less than shown in the following table for the type of foundation and superstructure construction used. The combined height of eight (8) inch foundation wall and the wall supported shall not exceed thirty-five (35) feet.

THICKNESS OF FOUNDATION WALLS

Foundation Wall Construction		Maximum Depth Below Grade (feet) Note 1.2		
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 those shown in parentheses where such increase is warranted by soil conditions and local experience and is required 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 869.1.

868.23 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;

868.24 RUBBLE STONE: Foundation walls of rough or random rubble stone shall be not less than sixteen (16) inches thick;

868.25 BONDING: All foundation walls shall be bonded as required for superstructure walls in section 836.

868.3 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.

868.4 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 (½) the depth of the unit nor one-third (1/3) its width at right angles to the face which is offset.

868.5 LATERAL STABILITY: Foundation walls of buildings and structures which serve as retaining walls shall conform to the applicable requirements of section 869 or shall be strengthened with buttresses or additional wall thickness to resist lateral soil and hydrostatic pressure when subjected thereto.

SECTION 869.0 RETAINING WALLS

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 piling or other approved materials within the allowable stresses of accepted engineering practice.

869.1 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. Retaining walls meeting the requirements of section 128.1 shall be subject to control as provided in section 128.0.

869.2 HYDROSTATIC PRESSURE: Unless drainage is provided, the hydrostatic head of water pressure shall be assumed equal to the height of the wall.

869.3 COPING: All masonry retaining walls other than reinforced concrete walls shall be protected with an approved coping.

SECTION 870.0 ISOLATED PIERS

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 871.0 WATERPROOFING

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

871.1 STEEL FRAME: Exterior steel columns and girders before embedment in masonry of the required fireresistance specified in table 2-5 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.

871.2 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.

871.3 FOUNDATIONS: Exterior wall below grade and the cellar floors of all buildings for institutional and residential uses (use groups H and I) 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 710 and 869. 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 one-coat application of approved waterproofing paint, or a one-half (½) inch parging coat of Portland cement mortar or other approved dampproof covering.

871.4 TYPES OF WATERPROOFING: The processes and methods used to render building, structures or parts thereof watertight as herein required shall comply with accepted engineering practice covering types of waterproofing.

SECTION 872.0 RATPROOFING

All buildings and strucutres 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.

872.1 GRADE PROTECTION.

872.11 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 noncombustible, water-resisting and rat-proofing material of required strength, shall be installed around the entire perimeter of the building.

872.12 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 727. 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.

872.2 GRADE FLOORS: Where continuous concrete grade floor slabs are provided, no open spaces shall be left between slab and walls, and all openings in the slab shall be protected.

872.3 OPENING PROTECTION.

872.31 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 U.S. gage perforated steel sheets, or No. 20 B & S gage aluminum or No. 16 U.S. gage expanded metal or wire mesh screens, with no more than one-half (½) inch mesh openings.

872.32 SLAB OPENINGS: Access opening in grade floor slabs shall be protected with concrete, masonry, metal or other corrosion-resistive noncombustible covers of adequate strength to support the floor loads.

872.33 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 873.0 PROTECTION AGAINST DECAY AND TERMITES

The expression "approval" as used in the following statements means approval in accordance with the procedure established by the Basic Code.

873.1 WHERE CONDITIONS ARE FAVORABLE TO DECAY.

873.11 WOOD IN CONTACT WITH THE GROUND: All wood in contact with the ground and supporting permanent structures shall be approved treated wood.

873.12 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.

873.2 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 508.0.

873.3 SILLS: All sills which rest on concrete or masonry exterior walls and are less than six (6) inches from exposed earth shall be of approved durable or treated wood.

873.31 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.

873.32 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.

873.33 WALL POCKETS: Ends of wood girders entering masonry or concrete walls shall be provided with a one-half (½) inch air space on top, sides and end unless approved durable or treated wood is used.

873.34 CLEARANCE BETWEEN WOOD SIDING: Clearance between wood siding and earth on the exterior of a building shall be not less than six (6) inches.

873.4 WOOD USED IN A RETAINING WALL: Wood used in a retaining wall shall be approved durable or treated wood except as follows:

a) when the wall is not more than two (2) feet in height and is located on the property line.
b) 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.
c) 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.

873.5 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.

873.6 PRESSURE TREATMENT: Where pressure treatment of wood members is required by the Basic Code, preservatives and methods of treatment shall conform to the standards for pressure treatment and preserving of lumber listed in the reference standards of this article.

SECTION 874.0 FIRE PROTECTION AND FIRESTOPPING

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.

874.1 BEAM SEPARATION IN ORDINARY CONSTRUCTION (types 3-B and 3-C): 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.

874.2 GIRDER SEPARATION IN HEAVY TIMBER CONSTRUCTION (type 3-A): Wood girders framing into walls shall have at least (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.

874.3 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.

874.4 FIREPLACES: Hearths of noncombustible construction and fireboards, mantels and other combustible trim shall comply with section 1012 governing fireplace construction.

874.5 CONCEALED ROOF SPACES: Concealed roof spaces enclosed by combustible ceiling and roof construction shall be subdivided into areas of not more than three thousand (3000) square feet as provided in section 316.

874.6 EXTERIOR CORNICES: Exterior cornices where permitted of combustible construction in section 926, or when erected with combustible frames shall be firestopped at maximum intervals of twenty (20) feet. If noncontinuous, they shall have closed ends, with at least four (4) inches separation between adjoining sections.

874.7 WALL FURRING: In masonry wall construction (types 3-A, 3-B, and 3-C) and in frame construction (types 4-A and 4-B) where walls are furred, the space between the inside of the furring and the face of the wall for the full depth of the combustible floor or roof joists shall be firestopped.

874.8 COMBUSTIBLE TRIM AND FINISH: The space behind combustible trim and finish where permitted under the Basic Code and all other hollow spaces where permitted in fireresistive construction shall be back-filled with noncombustible materials or firestopped as required in section 921.0.

874.9 FIRESTOPPING: Firestopping meeting the requirements of section 921 shall be provided in stud walls and partitions at each floor level and between the ceiling of the top story and roof space; in all furred spaces of frame walls and studded off spaces of masonry walls at maximum intervals of eight (8) feet; 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 noncombusitble means; and in all other locations that would permit the free travel of flame.

SECTION 875.0 THERMAL INSULATING MATERIALS

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.

875.1 INSTALLATION IN TYPE 1 AND TYPE 2 CONSTRUCTION: Such materials when exposed as installed in building of fireproof or noncombustible (types 1 or 2) construction shall qualify as noncombustible materials when tested in accordance with section 904.

875.2 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 or 4) construction may be of noncombustible or approved combustible material when tested in accordance with section 904.

875.3 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 unexpected surface of ceiling or sidewall interior finish, or when installed in completely enclosed wall, ceiling joist or rafter spaces, fire-stopped as required in section 874.0 are not required to have a flameresistance rating.

ACI	318	1971	Building Code Requirements for Reinforced Concrete
AITC	103-65	1965	Standard for Structural Glued-Laminated Timber
ANSI	A 42.1	1964	Specifications for Gypsum Plastering
ANSI	A 42.2	1971	Specifications for Portland Cement Stucco
ANSI	A 42.3	1971	Specifications for Portland Cement Plastering
ANSI	A 42.4	1967	Specifications for Interior Lathing and Furring
ANSI	A 42.5	1960	Standard Specifications for Lime-Cement Stucco
ANSI	A 97.1	1965	Specifcations for Gypsum Wallboard Finishes
ANSI	A 108.5	1967	Tile, Ceramic, Installed in Dry-Set Portland Cement Mortar
ANSI	A 118.1	1972	Standard Specifications for Dry-Set Portland Cement Mortar
ANSI	A 118.3	1969	Standard Specifications for Epoxy, Chemical Resistant, Water Cleanable Tile-Setting and Grouting
ANSI	Z 97.1	1972	United States Standard Performance Specifications and Methods of Test for Transparent Safety Glazing Material Used in Buildings
ASTM	C 5	1968	Specifications for Quicklime for Structural Purposes
ASTM	C 6	1968	Specifications for Normal Finishing Hydrated Lime
ASTM	C 10	1970a	Specifications for Natural Cement
ASTM	C 22	1950	Specifications for Gypsum
ASTM	C 28	1968	Specifications for Gypsum Plasters
ASTM	C 33	1971a	Specifications for Concrete Aggregates
ASTM	C 34	1970	Specifications for Structural Clay Load Bearing Wall Tiles
ASTM	C 35	1970	Specifications for Inorganic Aggregates for Use in Gypsum Plaster

ASTM	C 36	1970,1973	Specifications for Gypsum Wallboard
ASTM	C 37	1969	Specifications for Gypsum Lath
ASTM	C 52	1972	Specifications for Gypsum Partition Tile or Block
ASTM	C 55	1971	Specifications for Concrete Building Brick
ASTM	C 56	1971	Specifications for Structural Clay Non-Load Bearing Tile
ASTM	C 57	1957	Specifications for Structural Clay Floor Tile
ASTM	C 61	1964	Specifications for Keene's Cement
ASTM	C 62	1969	Specifications for Building Brick (Solid Masonry Units Made From Clay or Shale)
ASTM	C 73	1972	Specifications for Sand-lime Building Brick
ASTM	C 79	1967	Specifications for Gypsum Sheathing Board
ASTM	C 90	1970	Specifications for Hollow Load Bearing Concrete Masonry Units
ASTM	C 91	1971	Specifications for Masonry Cement
ASTM	C 94	1971,1972	Specifications for Ready-Mixed Concrete
ASTM	C 126	1971	Specifications for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units
ASTM	C 129	1971	Specifications for Hollow Non-Load Bearing Concrete Masonry Units
ASTM	C 144	1970	Specifications for Aggregate for Masonry Mortar
ASTM	C 145	1971	Specifications for Solid Load Bearing Concrete Masonry Units
ASTM	C 150	1972	Specifications for Portland Cement
ASTM	C 206	1968	Specifications for Special Finishing Hydrated Lime
ASTM	C 207	1968	Specifications for Hydrated Lime for Masonry Purposes

Reference Standards - Article 8 Part A

ASTM	C 208	1966	Specifications for Structural Insulating Board Made From Vegetable Fibers
ASTM	C 216	1971	Specifications for Brick, Facing (Solid Masonry Units Made From Clay of Shale)
ASTM	C 270	1971	Specifications for Mortar for Unit Masonry (Tentative)
ASTM	C 330	1969	Specifications for Lightweight Aggregates for Structural Concrete (Tentative)
ASTM	C 331	1969	Specifications for Lightweight Aggregates for Concrete Masonry Units (Tentative)
ASTM	C 332	1966	Specifications for Lightweight Aggregates for Insulating Concrete
ASTM	C 476	1971	Specifications for Mortar and Grout for Reinforced Masonry
ASTM	C 595	1968	Specifications for Blended Hydraulic Cements
ASTM	C 652	1970	Specifications for Hollow Brick (Solid Masonry Units Made from Clay or Shale)
Federal Specification	DD-G-00451b D.F. 2.5		Glass Thickness Specifications
USDC	CS 181	1952	Adhesive-Water Resistant Organic, for Installation of Clay Tile
U.S. Product Standard	PS-1		Specifications for Plywood
Vermiculite Institute		1963	Standard Specifications for Vermiculite Plastering

1.0 GLASS DESIGN CRITERIA - The required nominal thickness of glass shall be determined from the chart within this reference standard. The modified design wind load to be used for entering the chart shall be determined by dividing the appropriate general design wind load of section 713.0 by the relative resistance value for the glass type involved. For this purpose, the relative resistances to wind load for equal thicknesses of glass shall be assumed as follows:

2.0 GLASS TYPE	RELATIVE RESISTANCE
Regular Plate or Sheet	1.0
Laminated	0.6
Wired Glass	0.5
Heat Strengthened	2.0
Fully-Tempered	4.0
Rough-Rolled Plate	1.0
Sandblasted	0.4
Factory Fabricated Double Glazing (Use only the thickness of the thinner of the two lights)	1.5

Reference Standards - Article 8 Part B

ACI	318	1971	Building Code Requirements for Reinforced Concrete
ACI	506	1966	Recommended Practice for Shotcreting
ACI	525	1963	Minimum Requirements for Thin-Section Precast Concrete Construction
AISC		1969	Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings
AISI		1968	Specification for the Design of Cold-Formed Steel Structural Members
AITC	PS 56-73	1973	Structural Glued-Laminated Lumber
AITC	200-73	1973	Inspection Manual
AA		1969	Aluminum Construction Manual
APA		1967	Design and Fabrication of Flat Plywood Stressed Skin Panels
ASTM	A 27	1971	Specifications for Mild-To-Medium Strength Carbon-Steel Castings for General Application
ASTM	A 48	1971	Specifications for Gray Iron Castings
ASTM	A 148	1971	Specifications for High-Strength Steel Castings for Structural Purposes
ASTM	A 377	1966	Specifications for Cast Iron Pressure Pipe
ASTM	C 31	1966	Making and Curing Concrete Compression and Flexure Test Specimens in the Field
ASTM	C 143	1966	Test for Slump of Portland Cement Concrete
ASTM	C 172	1968	Sampling Fresh Concrete
ASTM	D 2277	1972	Specifications for Fiberboard Nail-Base Sheathing (Tentative)
AWS	D1.0-69	1969	Code for Welding in Building Construction
NCMA		1971	Specification for the Design and Construction of Load Bearing Concrete Masonry. Where conflict arises between this reference standard and the Basic Code, the more stringent requirements of the two shall apply.

Reference Standards - Article 8 Part B

NFoPA		1970	Maximum Spans for Joists and Rafters in Residential Construction
NFoPA		1970	Wood Structural Design Data
NFoPA		1973	National Design Specification for Stress-Grade Lumber and its Fastenings.
BIA		1969	Structural Clay Products Institute Recommended Building Code Requirements for Engineered Brick Masonry. Where conflict arises between this reference standard and the Basic Code, the more stringent requirements of the two shall apply.
SJI-AISC		1972	Standard Specifications and Load Tables for Open Web Steel Joists, J-Series and H-Series
SJI-AISC		1972	Standard Specifications and Load Tables for Long-Span Steel Joists, LJ-Series and LH-Series
ANSI	A59.1	1954	Specifications for Reinforced Gypsum Concrete
USDC	CS 31	1952	Wood Shingles (Red Cedar, Tidewater, Red Cypress and California Redwood)

ACI	525	1963	Minimum Requirements for Thin-Section Precast Concrete Construction
AWPA	C 1	1972	Standard for the Preservative Treatment of all Timber Products by Pressure Processes
AWPA	C 2	1972	Standard for the Preservative Treatment of Lumber, Timbers, Bridge Ties and Mine Ties by Pressure Processes
AWPA	C 3	1972	Standard for the Preservative Treatment of Piles by Pressure Processes
AWPA	C 4	1972	Standard for Preservative Treatment of Poles by Pressure Processes
AWPA	C 9	1972	Standard for the Preservative Treatment of Plywood by Pressure Processes
AWPA	M 2	1962	Standard Instructions for the Inspection of Preservative Treatment of Wood
AWPA	M 4	1962	Standard for the Case of Pressure-Treated Wood Products
ANSI	A 94.1	1961	Specifications for Interior Marble
ANSI	A 94.2	1961	Specifications for Thin Exterior Marble Veneer (Two Inches and Less in Thickness)
ANSI	A 94.3	1961	Specifications for Thin Exterior Marble in Curtain or Panel Walls
ANSI	A 108.1	1967	Specifications for (Including Requirements of Related Divisions) Installation of Glazed Ceramic Wall Tile in Cement Mortars
ANSI	A 108.2	1967	Specifications for (Including Requirements of Related Divisions) Installation of Ceramic Mosaic Tile in Cement Mortars
ANSI	A 108.3	1967	Specifications (Including Requirements of Related Divisions) for Installation of Quarry Tile and Pavers in Cement Mortars
ANSI	A 108.5	1967	Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar

Recommended Nailing Schedule

Building Element	Nail Size and type	Number and location
Stud to sole plate	8d common	4 Toe-nail
Stud to cap plate	16d common	2 Toe-nail
Double studs	10d common	12"o.c. Direct
Corner studs	16d common	24"o.c. Direct
Sole plate to joist or blocking	16d common	16"o.c.
Double cap plate	16d common	16"o.c. Direct
Cap plate laps	16d common	2 Direct
Ribbon strip - 6" or less ...	10d common	2 each Direct bearing
Ribbon strip - 6" or more ...	10d common	3 each Direct bearing
Roof rafter to plate	8d common	3 Toe-nail
Roof rafter to ridge	16d common	2 Toe-nail
Jack rafter to hip	10d common	3 Toe-nail
Floor joists to studs	10d common	5 Direct or
(No ceiling joists)	10d common	3 Direct
Floor joists to studs ..... (With ceiling joists)	10d common	2 Direct
Floor joists to sill or girder	8d common	3 Toe-nail
Ledger strip	16d common	3 each Direct joist
Ceiling joists to plate	16d common	3 Toe-nail
Ceiling joists to parallel rafters	16d common	3 Direct
Ceiling joists (laps over partition)	16d common	3 Direct
Collar beam	10d common	3 Direct
Bridging to joists	8d common	2 each Direct end
Diagonal brace (to stud and plate)	8d common	2 each Direct bearing
Tail beams to headers	20d common	1 each End
(When nailing permitted)		4 sq. ft. floor area
Header beams to trimmers	20d common	1 each End
(When nailing permitted)		8 sq. ft. floor area
1" roof decking ..... (6" or less in width)	8d common	2 each Direct rafter
1" roof decking ..... (over 6" in width)	8d common	3 each Direct rafter
1" sub-flooring (6" or less)..	8d common	2 each Direct joist
1" sub-flooring (8" or more)..	8d common	3 each Direct joist
2" sub-flooring	16d common	2 each Direct joist
1" wall sheathing (8" or less in width)	8d common	2 each Direct stud
Plywood roof and wall sheathing ..... (1/2 or less	6d common	6"o.c. Direct edges and 12"o.c. intermediate
(5/8" or greater)	8d common	6"o.c. Direct edges and 12"o.c. intermediate

Recommended Nailing Schedule

Building Element	Nail Size and type	Number and location
(5/16", 3/8" or 1/2")...	16 ga. galvanized wire staples, 3/8" minimum crown; length of 1" plus plywood thickness	4"o.c. edges and 8"o.c. intermediate
(5/8")	Same as immediately above	2-1/2"o.c. edges and 5"o.c. intermediate
Plywood subflooring:		
(1/2")	6d common or 6d annular or spiral thread	6"o.c. Direct edges and 10"o.c. intermediate
(5/8", 3/4")	8d common or 6d annular or spiral thread	6"o.c. Direct edges and 10"o.c. intermediate
(1", 1-1/8")	10d common or 8d ring shank or 8d annular or spiral thread	6"o.c. Direct edges and 6"o.c. intermediate
(1/2")	16 ga. galvanized wire staples	4"o.c. edges and 7"o.c. intermediate
(5/8")	3/8" minimum crown, 1-5/8" length	2-1/2"o.c. edges and 4"o.c. intermediate
Built up girders and beams ..	20d common	32"o.c. Direct
Continuous header to stud ...	8d common	4 Toenail
Continuous header-two pieces.	16d common	16"o.c. Direct
1/2" Fiberboard sheathing ...	1-1/2" galvanized roofing nail or 6d common nail or 16 gage staple, 1-1/8" long with minimum crown of 7/16"	3"o.c. exterior edge 6"o.c. intermediate
25/32" Fiberboard sheathing..	1-3/4" galvanized roofing nail or 8d common nail or 16 gage staple, 1-1/2" long with minimum crown of 7/16"	3"o.c. exterior edge, 6"o.c. intermediate
Gypsum sheathing	12 gage 1-1/4" large head corrosion-resistive	4"o.c. on edge, 8"o.c. intermediate
Shingles-wood	No. 14 B&S corrosion-resistive	2 each bearing
Weather boarding	8d corrosion-	2 each bearing

PLYWOOD ROOF SHEATHING
DOUGLAS FIR, WESTERN LARCH, SOUTHERN PINE
AND
GROUP 1 SHEATHING GRADES WESTERN SOFTWOOD PLYWOOD

Panel Identification Index (2) (roof span "/floor span")	Roof				Floor
	Maximum Span (Inches)		Load (psf)		
	Edges Blocked(3)	Edges Unblocked	Total Load	Live Load	Maximum Span(5) (Inches)
12/0	12	12	130	100	0
16/0	16	16	75	55	0
20/0	20	20	55	45	0
24/0	24(6)	24	60	45	0
30/12	30	26	55	40	12(7)
32/16	32	28	50(4)	40	16(8)
36/16	36	30	50(4)	35(4)	16(8)
42/20	42	32	45(4)	35(4)	20(8)
48/24	48	36	40(4)	40	24

1. These values apply for Structural I and II, Standard Sheathing and C-C grades only. Spans shall be limited to values shown because of possible effect of concentrated loads.

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

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

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

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 (1/360) of span is one hundred (100) psf.

6. 1/2 inch Structural I, when continuous over one (1) support, may be laid with face grain parallel to supports provided all panel edges are blocked or other approved type edge support is provided, the spacing of the supports does not exceed twenty-four (24) inches on center, and the live load does not exceed thirty (30) pounds per square foot. For other grades, a thickness of five-eighths (5/8) is required.

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

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.

PLYWOOD COMBINATION SUBFLOOR-UNDERLAYMENT

ALLOWABLE SPAN FOR PLYWOOD COMBINATION SUBFLOOR-UNDERLAYMENT (1)

Plywood Continuous over Two (2) or More Spans and Face Grain Perpendicular to Supports

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

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 1/360 of span is 100 psf. 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. 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.

ARTICLE 9

FIRERESISTIVE CONSTRUCTION REQUIREMENTS

SECTION 900.0 SCOPE

The provisions of this article shall govern the use and assembly of all materials of construction with respect to fireresistance, flame spread resistance, and smoke and toxic fume limitation. The provisions shall also control the location and function of integral structural and fire protective elements of building, and provide for the installation of safeguards against the spread of fire within buildings and between buildings.

900.1 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 the Basic Code in respect to structural safety.

900.2 USE OF COMBUSTIBLES: All materials and forms of construction that develop the fireresistance 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 to type 3 and type 4 construction as follows:

900.21 COMBUSTIBLE COMPONENTS: Combustible aggregates may be incorporated in concrete mixtures approved for fireresistive construction as provided in section 811 and 848 for gypsum concrete, in section 843 for cinder concrete and any other approved component material or admixture may be used in assemblies that meet the fireresistive test requirements of the Basic 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.

900.22 FILLER UNITS: When not included in strength calculations, filler units that contain component combustible materials may be used in all fireresistive floor construction provided the complete assembly meets the required fire test performance.

900.3 REINFORCED CONCRETE: All reinforced concrete mixtures which meet the requirements of section 817 for concrete aggregates and the provisions of this article for time-temperature performance shall be accepted in fireresistive construction and shall be classified in accordance with the degree of fireresistance required in article 2 and in tables 2-5 and 2-6.

SECTION 901.0 DEFINITIONS

AUTOMATIC FIRE DOOR: a fire door or other opening protective so constructed and arranged so that if open, it shall close when subjected to:

a) a predetermined temperature, or
b) a predetermined rate of temperature rise, or
c) smoke or other products of combustion.

COMBUSTIBLE FIRE DAMPER: a damper arranged to seal off air flow automatically through part of an air duct system, so as to restrict the passage of heat. The fire damper may also be used as a smoke damper if the location lends itself to the dual purpose.

COMBUSTIBLE (MATERIAL): a combustible (material) is a material which cannot be classified as noncombustible in accordance with that definition.

CONFLAGRATION HAZARD: the fire risk involved in the spread of fire by exterior exposure to and from adjoining buildings and structures.

FIRE DAMPER: a damper arranged to seal off air flow automatically through part of an air duct system, so as to restrict the passage of heat. The fire damper may also be used as a smoke damper if location lends itself to the dual purpose.

FIRE DIVISION: the interior means of separation of one part of a floor area from another part together with fireresistive floor construction to form a complete barrier between adjoining or superimposed floor areas in the same building or structure.

FIRE DOOR: a door and its assembly, so constructed and assembled in place as to give protection against the passage of fire.

FIRE DOOR ASSEMBLY: the assembly of a fire door and its accessories, including all hardware and closing devices and their anchors; and the door frame, when required, and its anchors.

FIRE GRADING: the posted fire hazard classification of a building or structure in hours or fractions of an hour as established for its use group and occupancy in table 9-1.

FIRE HAZARD: the potential degree of fire severity existing in the use and occupancy of a building and classified as high, moderate or low;

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

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

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

FIRE PARTITION: a partition which subdivides a story of a building to provide an area of refuge or to restrict the spread of fire.

FIRE PREVENTION: the preventive measures which provide for the safe conduct and operation of hazardous processes, storage of highly combustible and flammable materials, conduct of fire drills, and the maintenance of fire detecting and fire-extinguishing service equipment and good housekeeping conditions.

FIRE PROTECTION: the provision of safeguards in construction and of exit facilities; and the installation of fire alarm, fire-detecting and fire-extinguishing service equipment to reduce the fire risk and the conflagration hazard.

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

FIRERESISTANCE RATING: the time in hours or fractions thereof that materials or their assemblies will resist fire exposure as determined by fire tests conducted in compliance with recognized standards.

FIRERESISTIVE PARTITION: a partition other than a fire partition which is required to subdivide the floor area of a fireresistive building for the purpose of restricting the spread of fire.

FIRERETARDANT CONSTRUCTION: fabricated units or assemblies of units of construction which have a fireresistance rating of not less than one-third (1/3) hour.

FIRERETARDANT LUMBER: wood so treated by a recognized impregnation process as to reduce its combustibility.

FIRE SAFETY: the measure of protection of a building or structure against interior and exposure fire hazards through fireresistive construction and the provision of safe exitways and fire-detecting and extinguishing equipment.

FIRE SEPARATION (EXTERIOR FIRE EXPOSURE): the distance in feet measured from any other building on the site, or from an interior lot line, or from the opposite side of a street or other public space to the building.

FIRE WALL: a wall having adequate fireresistance and structural stability under fire conditions to accomplish the purpose of completely subdividing a building or of completely separating adjoining buildings to resist the spread of fire.

FIRE WINDOW: a window constructed and glazed to give protection against the passage of fire.

FLAMERESISTANCE: the property of materials or combinations of component materials which resists the spread of flame as determined by the flameresistance tests specified in the Basic Code.

FLAME SPREAD: the propagation of flame over a surface.

FLAME SPREAD RATING: the measurement of flame spread on the surface of materials or their assemblies as determined by tests conducted in compliance with recognized standards.

NONCOMBUSTIBLE: (INCOMBUSTIBLE) This is a general, relative term. Its precise meaning is defined in the Basic Code for specific applications.

PARTY WALL: a fire wall, used or adapted for joint service between two buildings, which may fall on an interior lot line or which may be used to separate adjoining one and/or two-family dwellings on the same lot.

SELF-CLOSING: a fire door or other opening protective which is normally closed and equipped with an approved device to insure closing after having been opened for use.

SHAFT: a vertical opening or passage through two or more floors of a building or through floors and roof.

-COVERED: an interior enclosed space extending through one (1) or more stories of a building, connecting a series of two (2) or more openings in successive floors, or floors and roof, and covered at the top.

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

STANDARD FIRE TEST: the standard controlled furnace test formulated under the procedure of the American Society for Testing Materials and designated ASTM E119 as listed in the reference standards of this article.

SECTION 902.0 FIRE HAZARD CLASSIFICATION

The degree of fire hazard of buildings and structures for each specific use group as defined by the fire grading in Table 9-1 shall determine the requirements for fire walls, fire divisions and the segregation of mixed uses as prescribed in section 213 and all structural members supporting such elements, unless otherwise provided in this Code.

902.1 UNCLASSIFIED USES: The building official shall determine the fire hazard classification of a building or structure designed for a use not specifically provided in table 9-1 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.

SECTION 903.0 FIRERESISTANCE TESTS

All fire tests of building materials and construction shall be conducted in accordance with the standard fire test procedure; except that the hosestream test therein prescribed for one (1) hour construction shall be required for all assemblies and constructions approved for a fireresistance rating of three-quarter (3/4) hours.

TABLE 9-1 - FIRE GRADING OF USE GROUPS

Class	Use Group	Fire grading in hours
A	High hazard	4
B-1	Storage - Moderate hazard	3
B-2	Storage - Low hazard	2
C	Mercantile	3
D	Industrial	3
E	Business	2
F-1	Assembly - Theatres	3
F-2	Assembly - Night Clubs	3
F-3	Assembly - Recreation centers, lecture halls, terminals, restaurants	2
F-4	Assembly - Churches, schools	1½
H-1	Institutional - Restrained occupants	3
H-2	Institutional - Incapacitated occupants	2
L-1	Residential - Hotels	2
L-2	Residential - Multi-family dwellings	1½
L-3	Residential - 1 and 2 family dwellings	3/4

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 2-5. All floor and ceiling assemblies shall extend to and be tight against the exterior wall. Approved firestopping providing equivalent fireresistance shall be used to close off any separation between the floor and exterior wall.

903.2 COLUMN, BEAM AND GIRDER PROTECTION: 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.

903.3 ROOF COVERINGS.

903.31 SIZE OF SPECIMEN: Roof coverings shall be tested in a complete assembly of roof deck and roof covering constructed and applied as in practice with a panel area of not less than twelve (12) square feet and no dimension less than thirty-two (32) inches.

903.32 TEST PROCEDURE: The tests shall be conducted to determine ability to resist ignition, duration of flaming and susceptibility to fire spread.

903.4 CLASSIFICATION OF ROOF COVERINGS: Roof coverings shall be classified as A, B or C on the basis of their resistance to exterior fire exposure as listed or tested in accordance with reference standard of this article.

903.41 CLASS A ROOFINGS shall be effective against severe fire exposure and shall be permitted for use on fireproof (type 1), noncombustible (type 2) and heavy timber mill (type 3-A) buildings and structures;

903.42 CLASS B ROOFINGS shall be effective against moderate fire exposure and shall be permitted as the minimum for use on fireproof (type 1) buildings and structures;

904.43 CLASS C ROOFINGS shall be effective against light fire exposure and shall be permitted as the minimum for use on noncombustible (type 2), masonry enclosed (type 3) and protected frame (type 4-A) buildings and structures;

903.44 NON-RATED ROOFINGS shall be limited to use in areas outside of the fire limits where the exterior fire exposure hazard is reduced by required fire separations as provided in section 928.3 and on frame (type 4-B) construction.

903.5 OPENING PROTECTIVES.

903.51 STRUCTURAL INTEGRITY: Opening protectives, including frames, self-closing devices, and hardware, shall be classfied as to fire-protection rating and shall be installed, maintained and operated in accordance with the provisions of the reference standards of this article. All opening protectives shall bear the identification of an approved testing laboratory or agency certifying to the performance rating thereof.

903.52 SMOKE AND FLAME BARRIER: Tests of door and window assemblies shall be considered unsuccessful unless the assembly prevents the passage of smoke or flames in considerable volume and remains securely in the opening during the fire exposure and following the hose stream test.

903.53 LABELED FIRE DOORS: Opening protective assemblies including the frames, hardware and operation which comply with the standards and accepted practice, including shop inspection, of approved testing authorities shall be deemed to meet the requirements of the Basic Code for their recommended and approved locations and use as listed in section 917.

903.54 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.

903.55 LABELED FIRE WINDOWS AND SHUTTERS: Fire window assemblies and shutters which comply with Section 918 and the standards and accepted practice of approved testing agencies shall be deemed to meet the requirements for their recommended and required locations under the Basic Code.

903.56 LABELED FIRE DAMPERS: Only fire dampers which have been tested, listed and labeled by an approved testing agency shall be deemed to meet the requirement of this Code for the recommended locations and use as listed in section 1810.1.

903.6 COMBUSTIBILITY TESTS: Where the behavior of materials under exposure to fire is specified in the Basic Code the characteristics of materials shall be determined by the following tests and criteria:

903.61 NONCOMBUSTIBLE MATERIALS: A noncombustible material is one which, in the form in which it is used, meets any of the following requirements:

a) materials which pass the test procedure for defining noncombustibility of elementary materials listed in the reference standards of this article 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 temperature rise of the surface or interior thermocouples in excess of 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.

b) materials having a structural base of noncombustible material as defined in paragraph 1, with a surfacing not more than one-eighth (1/8) inch thick which has a flamespread rating not greater than fifty (50) when tested in accordance with the method of test for surface burning characteristics of building materials listed in the reference standards of this article.

c) materials other than defined in paragraphs 1 and 2, having a flamespread rating not greater than twenty-five (25) without evidence of continued progressive combustion, and of such composition that surfaces that would be exposed by cutting

through the material in any way would not have a flamespread rating greater than twenty-five (25) when tested in accordance with the method of test for surface burning characteristics of building materials listed in the reference standards of this article.

903.62 FIRE-RETARDANT TREATED WOOD 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 the reference standards of this article, 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, with no evidence of significant progressive combustion. The material shall bear the identification of an accredited authoritative testing agency showing the performance rating thereof.

903.7 FIRERETARDANT TREATED WOOD: Wood that has been pressure-treated with fireretardant chemicals in accordance with the reference standards of this article may be used in type 1 and 2 constructions for nonbearing partitions, structural elements, roof framing and sheathing as indicated by note (h) of table 2-5 provided that the assembly in which such material is used shall produce the required fireresistance when tested in accordance with the reference standards of this article.

903.71 LIMITATIONS: Fireretardant treated wood may not be used where exposed to the weather or in interior spaces where the relative humidity is normally eighty (80) percent or more. There shall be no fabrication of the material after treatment, such as cutting, shaping or grooving for splines or ring connectors so as to expose untreated surfaces, except that the material may be cut to length, shaped, or grooved if the exposed surfaces or edges are tightly butted against other material that is noncombustible or that is fireretardant treated, so that no untreated wood is left exposed to danger of ignition. Holes may be bored or cut for plumbing or heating pipes and for electric outlets only if the openings are covered with tightly fitted noncombustible escutcheons or cover plates. The allowable working stresses of the material shall be ninety (90) percent of the allowable stresses for untreated lumber of like classification.

SECTION 904.0 FLAMERESISTANCE TESTS

All materials which are required to restrict the spread of flame or to be flameresistant under the provisions of the Basic Code, including but not limited to interior finish materials, fireretardant 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 the reference standards of this article.

904.1 INTERIOR FINISH MATERIALS: All materials used for interior finish shall be classified within the classifications listed in table 9-2. Interior finish materials shall be tested in accordance with

one of the methods of test for surface burning characteristics of building materials in the reference standards of this article. For class D material, the flame from the test specimen shall not reach the angle frame at any point in five (5) minutes or less when tested under the federal specification.

TABLE 9-2 - FLAME-SPREAD RATING

Class of material	Federal specification test	Surface Burning Characteristics Test (Tunnel test)
I	A	0 to 25
II	B or C	26 to 75
III	D (5 min. limit)	76 to 200
IV	Note a	201 to 500

904.2 INTERIOR HANGINGS AND DECORATIONS: Refer to Chapter 148 of the General Laws of the Commonwealth of Massachusetts for buildings subject to those regulations.

904.21 ACCEPTANCE CRITERIA: Where required to be flameresistive under the provisions of the Basic 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 fireretardant materials; or if treated to be flame-resistant shall not generate smoke or gases more than those given off by untreated wood or paper burning under comparable conditions when tested in the vertical flame test listed in the reference standards of this article.

SECTION 905.0 SPECIAL FIRERESISTIVE REQUIREMENTS

In buildings or parts thereof of the occupancies and types of construction herein specified, the general fireresistive requirements of table 2-5 and the height and area limitations of table 2-6 shall be subject to the following exceptions and modifications, and to Massachusetts Department of Public Safety, Board of Fire Prevention Regulations FPR-4.

905.1 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 3-A) 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 three-quarter (3/4) hours; except that existing roof trusses shall be exempt from all fireproofing requirements.

905.2 OPEN PARKING STRUCTURES.

905.21 HEIGHTS AND AREAS: Heights and areas of open parking structures shall not exceed the limits in the following table:

HEIGHT AND AREA LIMITATION FOR OPEN PARKING STRUCTURES

Type of Construction	Height	Area in Square Feet
1-A and 2-B	Unlimited	Unlimited
2-A	12 Stories-120 feet	Unlimited
2-B	10 Stories-100 feet	50,000
2-C	8 Stories- 85 feet	30,000
2-B and 2-C	2 Stories- 25 feet	Unlimited

The areas of structures wherein more than twenty-five (25) per cent of the perimeter has frontage on street or other open space leading to a street each of which is not less than thirty (30) feet wide may be installed in accordance with section 308.1 in types 2-B and 2-C construction, the area may be unlimited. The above limits of height permit parking on the roof.

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 (5000) 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 2-6. Not more than one motor vehicle may be stored in such buildings unless separately enclosed with a fire division of two (2) hours fireresistance.

905.4 PACKING AND SHIPPING ROOMS: Every packing or shipping room located on or below a floor occupied for mercantile uses shall be separated therefrom by fire divisions of not less than the fireresistance of the type of construction of the building but in no case less than three-quarter (3/4) hours fireresistance.

905.5 TRUCK LOADING AND SHIPPING AREAS: Truck loading and shipping areas shall be permitted within any business building provided such areas are enclosed in construction of not less than the fireresistance of the type of construction of the building but in no case less than three-quarter (3/4) hours; and direct access is provided therefrom to the street. Where applicable, conformance with Department of Public Safety, Board of Fire Prevention Regulations FPR-4 and 11 is required.

905.6 RESIDENTIAL BUILDINGS.

905.61 PROTECTED ORDINARY CONSTRUCTION: Multi-family dwellings (use group L-2) of protected ordinary (type 3-B) construction may be increased to six (6) stories or seventy-five (75) feet in height when the first floor above the basement or cellar is constructed of not less than three (3) hour fireresistive construction, the floor area is subdivided by two (2) hour fire walls into fire areas of not more than three thousand (3000) square feet, and the common exitway, public hallways and exitways are enclosed in two (2) hour fireresistive construction.

905.62 PROTECTED NONCOMBUSTIBLE CONSTRUCTION: When of three-quarter (3/4) hour protected noncombustible (type 2-B) construction, multi-family dwellings (use group L-2) may be increased to nine (9) stories or one hundred (100) feet in height when separated 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 continuous fire wall of two (2) hour fireresistance and the first floor is not less than one and one half (1½) hours fireresistive construction.

905.63 RETAIL BUSINESS USE: The first floor of buildings of unprotected noncombustible (type 2-C), masonry wall (type 3-C) or frame (type 4-B) construction may be occupied for retail store use, provided the ceilings and enclosure walls are protected to afford three-quarter (3/4) hour fireresistance and the exitways from the residence floors are separately enclosed in accordance with the requirements of section 909.5 and article 6.

905.7 GRADE FLOOR PROTECTION.

905.71 NON-FIREPROOF CONSTRUCTION: In all buildings other than one- and two-family dwellings (use group L-3) and other than fireproof (types 1-A and 1-B) construction with habitable or occupiable stories or basements below grade, the ceilings, partitions and supports below the grade floor shall be protected with noncombustible materials or assemblies of component materials having a fireresistance rating of not less than three-quarter (3/4) hours or shall be of heavy mill (type 3-A) construction, or shall be equipped with automatic sprinklers; but in no case less than the required fireresistance of the use group and type of construction required by tables 2-5 and 2-6.

905.72 PROTECTED NONCOMBUSTIBLE CONSTRUCTION: In all buildings of one and one-half (1½) hour protected noncombustible (type 2-A) construction, more than four (4) stories or fifty (50) feet in height, in other than residential use groups, the floor above the basement or cellar shall be constructed with a fireresistance of not less than two (2) hours.

905.73 ONE- AND TWO-FAMILY DWELLINGS: One- and two-family dwellings (use group L-3), not more than two (2) stories and attic or thirty-five (35) feet in height, shall be exempt from the requirements of this section.

905.74 BASEMENT ASSEMBLY USES: No dance hall, skating rink or similar places of public assembly for amusement, entertainment, instruction, or service of food or refreshment shall be located in stories or rooms below grade unless the floor construction above and below is of not less than one and one-half (1½) hour fireresistance.

SECTION 906.0 ENCLOSURE WALLS

All exterior masonry and other enclosure walls shall comply with the structural provisions of articles 7 and 8 and with the fireresistance requirements of table 2-5 as regulated by the location and type of construction.

906.1 EXCEPTIONS: The provisions of the Basic Code shall not be deemed to prohibit the omission of enclosure 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 required in table 2-5; and except as otherwise specifically permitted in the Basic Code, the piers, columns and other structural supports within the open portion shall be constructed with the fireresistance required for exterior bearing walls in table 2-5.

906.2 FIRE CANOPIES: All fire canopies required by section 918.51 shall be constructed of noncombustible materials extending out at least two (2) feet horizontally from the wall and at least as long as the width of the lower opening and constructed to provide a fireresistance rating required for the exterior wall.

906.3 PARAPETS. - Parapets shall be provided on all exterior walls of buildings of construction types 3A, 3B, 3C that have roof construction of combustible materials, shall be at least two (2) feet high, shall be of materials and assembly having at least the fireresistance rating of the wall below and shall otherwise conform to the requirements of section 867.0. Exceptions where parapets need not be provided on the exterior walls shall be made for the following buildings:

906.31 One (1) story buildings less than twenty-two (22) feet high; or

906.32 A building whose roof has a pitch of more than twenty (20) degrees to the horizontal and whose overhang, fascia, cornice or gutter is of noncombustible construction, or if of combustible construction, is separated from the roof and ceiling construction by construction having the fireresistance rating required for the exterior wall of the building. Combustible members, including roof sheathing, shall not extend through this construction, but shall have at least four (4) inches of solid noncombustible material below, at the sides, and at the ends of such members; or

906.33 A building is provided with a fire canopy, or not more than two (2) feet below the roof level, continuous around that portion of the wall that is without a parapet, constructed as required by section 906.3; or

906.34 A building whose roof has a class A roof covering, and any overhangs, cornices, or gutters are constructed as required by section 906.32 above.

SECTION 907.0 FIRE WALLS AND PARTY WALLS

Fire walls, party walls and other fire division walls shall be constructed of noncombustible materials or form of construction of the required strength and fireresistance rating specified in table 2-5 for the type of construction but not less than the fire grading of the use group in table 9-1. The construction shall comply with all the structural provisions for bearing and non-bearing walls of this Code.

907.1 SOLID BRICK: In other than frame buildings, when constructed of solid brick masonry, the wall thickness shall conform to the requirements of section 867.0; except that in all buildings more than twenty-five (25) feet in height used for moderate hazard storage (use group B-1) and all high hazard uses (use group A), no part of an unplastered masonry fire wall shall be less than twelve (12) inches thick.

907.2 REINFORCED CONCRETE: When constructed of reinforced concrete, the wall thickness shall be not less than six (6) inches for the uppermost twenty-five (25) feet or portion thereof measured down from the top of the wall; except that in buildings more than twenty-five (25) feet in height used for storage of moderate fire hazard (use group B-1) and high hazard (use group A), no part of an unplastered reinforced concrete fire wall shall be less than eight (8) inches thick.

907.3 FRAME DWELLINGS: In one- and two-family dwellings (use group L-3), of frame (type 4) construction, party walls shall be not less than three-quarter (3/4) hour fireresistive construction and shall extend through intersecting walls of frame construction to the outside of all combustible wall and roof sheathing.

907.4 OTHER FRAME BUILDINGS: In frame buildings, in use groups other than one- and two-family dwellings, all party and fire walls shall be not less than two (2) hour fireresistive construction, but in no case less than the equivalent fire grading of the use group as specified in table 9-1.

907.5 CUTTING FIRE WALLS: Chases or recesses shall not be cut into fire divisions so as to reduce their thickness below that required for all fireresistance rating, except that no chases, recesses or pockets for insertion of structural members subsequent to erection shall be cut in walls of eight (8) inches or less in thickness.

907.6 HOLLOW FIRE WALLS: When combustible members frame into hollow fire walls or fire walls of hollow units, all hollow spaces shall be solidly filled for the full thickness of the wall and for a distance of not less than four (4) inches above, below and between the structural members, with noncombustible materials approved for firestopping in section 921.

907.7 COMBUSTIBLE INSULATION: The building official may permit the application of cork or fiber board or other combustible insulation if laid up without intervening air spaces and cemented or attached directly to the face of the fire wall and protected on the exposed surface as provided in section 824.

907.8 CONTINUITY OF FIRE WALLS AND FIRE DIVISIONS: Fire walls and other vertical fire divisions shall be continuous between foundation, roof, or horizontal fire divisions and through any concealed space in floor or roof construction. Horizontal fire divisions shall be continuous between exterior walls and/or vertical fire divisions.

907.81 When roof construction is combustible on both sides of a vertical fire division, the division shall extend through the roof construction to a height of at least four (4) inches above the high point at the roof framing. Decking shall tightly butt the fire division. Above the decking of roofs that are flatter than twenty (20) degrees to the horizontal blocking shall be constructed to form cants on both sides of the fire division with slopes not steeper than 1:4. Combustible decking shall not extend over the top of the fire division.

907.82 Except as required in 907.83 below, when roof construction is noncombustible on one (1) or both sides of a vertical fire division, the vertical fire division may terminate at the underside of the noncombustible roof construction provided the junction of the wall and roof construction is made smoke tight.

907.83 When a vertical fire division is required by table 9-1 to have a fireresistance rating of three (3) hours or greater, and the roof construction has a fireresistance rating of less than two (2) hours, the fire division shall extend above the roof construction to form a parapet at least three (3) feet high.

907.84 Fire walls and fire divisions shall be so constructed that the removal or collapse of construction on one side will not endanger the support of construction on the other side.

907.85 Fire walls and fire divisions shall be made smoke-tight at their junction with exterior walls.

907.9 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.

907.10 ONE AND TWO-FAMILY DWELLINGS: The requirements for the means of separation of single-family dwellings or two-family dwellings are as follows:

a) TWO-FAMILY DWELLING: Superimposed dwelling units - when one dwelling unit of a two-family dwelling is located wholly or partly above the other dwelling unit, the two dwelling units shall be completely separated by fire division walls and floor-ceiling assemblies of not less than three-quarter (3/4) hour fireresistive construction.

b) 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 division wall having a minimum of three-quarter (3/4) hour fireresistance rating that shall serve to completely separate the dwelling units.

c) MULTIPLE, SINGLE-FAMILY DWELLINGS: Side by side - when multiple, single-family dwellings (use group L-3) are attached by a common wall, said wall shall be a party wall, having a minimum three-quarter (3/4) 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.

d) MULTIPLE, TWO-FAMILY DWELLINGS: Side by side - when multiple, two-family dwellings (use group L-3) are attached by a common wall, said wall shall be a party wall, having a minimum three-quarter (3/4) 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.

SECTION 908.0 FIRE WALL OPENINGS

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, 904 and 917.

908.1 SIZE OF OPENING: Except in sprinklered buildings, no opening through a fire wall shall 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) percent of the length of the wall.

908.2 FIRST STORY EXCEPTIONS: In buildings of all types of construction, when the entire areas on both sides of a fire wall are protected with an approved automatic sprinkler system complying with 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 fire resistance 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.

Heat-actuated hold-open devices used on an automatic fire assembly providing three (3) hour fireresistance rating shall be installed, one 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-quarter (3/4) hour fireresistance shall be protected in a similar manner or by a single fusible link incorporated in the closing device.

SECTION 909.0 FIRE PARTITIONS

909.1 CONSTRUCTION: Fire partitions required for the enclosure of exitways and areas of refuge shall be constructed of approved masonry, reinforced concrete or other approved noncombustible materials having the minimum fireresistance prescribed by table 2-5; except that partitions constructed of combustible materials to provide the required fireresistance may be accepted for use in exitways of building of types 3 and 4 construction as regulated by table 2-5 and the provisions of section 618.9.

909.2 BEARING PARTITIONS: When fire partitions are used as bearing walls, they shall comply with all the structural provisions of article 8, governing height and thickness.

909.3 CONTINUITY: When fire partitions around vertical shafts are not continuous from floor to floor, the offset in the floor construction shall be of construction with a fireresistance rating not less than that of the partition construction, nor less than that of the fire grading defined in table 9-1 for the specific use group.

909.4 OPENINGS.

909.41 SIZE: No other openings shall be permitted in fire partitions except exitway doors, and the aggregate permissible width of such doorways shall not exceed twenty-five (25) percent of the length of the wall, nor shall the maximum area of any individual opening exceed forty-eight (48) square feet.

909.42 PROTECTIVES: All opening protectives in fire partitions in other than one- and two-family dwellings shall comply with the provisions of sections 903 and 918 for construction, except as provided in table 6-6 for buildings not more than three (3) stories in height.

909.5 COMBUSTIBLE STAIR ENCLOSURES.

909.51 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 floors, ceilings and fire doors, separating the exitways from the unprotected areas of the building. Such enclosures shall be firestopped to comply with sections 874.9 and 921.

909.52 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 story of not more than seven hundred and twenty (720) square inches. Such light panels shall comply with the provisions of section 919 and shall be contained in stationary sash and frames of steel or other approved noncombustible materials.

SECTION 910.0 FIRERESISTIVE PARTITIONS

910.1 CONSTRUCTION: All permanent partitions designated as fireresistive for subdividing purposes other than providing required areas of refuge shall be constructed of noncombustible materials when designed for use in buildings and structures of fireproof or noncombustible (types 1 and 2) construction, except as provided in section 910.4.

910.2 SUPPORTS: All fireresistive partitions shall extend from the top of the fireresistive floor below to the fireresistive ceiling above, and shall be securely attached thereto. They shall be supported on fireproofed steel or reinforced concrete construction; except that the supporting beams and girders of fireresistive partitions constructed of combustible materials shall be protected with component materials or assemblies to afford the required fireresistance of the partitions supported. All hollow vertical spaces shall be firestopped at every floor level as required in sections 874.0 and 921.

910.3 OPENINGS: Door openings shall not exceed one hundred and twenty (120) square feet in area and where required to be fire protected, they shall comply with the provisions of sections 903.0 and 917.

910.4 EXCEPTIONS.

910.41 NONFIREPROOF CONSTRUCTION: In buildings and structures of masonry enclosed (type 3) and frame (type 4) construction, protected wood studs or other combustible assemblies constructed with component materials to afford the required fireresistance specified in table 2-5 shall be approved for enclosures of exitways where permitted in table 6-6 and for all nonbearing partitions.

910.43 FIREPROOF CONSTRUCTION: In all buildings and structures or other than institutional (use group H) and residential (use groups L-1 and L-2) of fireproof (type 1) or of protected noncombustible (type 2) 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 common corridor serving an occupant load of fifty (50) or more in areas occupied by a single tenant and not exceeding five thousand (5,000) square feet between fireresistive or fire partitions, fire walls, and fireresistive floors. Larger areas may be subdivided with fireretardant wood or with materials of similar combustible characteristics when complying with section 903.62 but not to exceed fifty (50) percent increase in area.

SECTION 911.0 VERTICAL SHAFTS AND HOISTWAYS

The provisions of this section shall apply to all vertical shaft enclosures, except as provided for stairway enclosures in section 618, flue enclosures in section 1009, incinerator chutes in sections 1014 and 1015 duct shafts in sections 1016 and 1017, and pipe shafts in section 1115.

911.1 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 specified in table 2-5.

911.2 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 911.3.

911.3 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 three-quarter (3/4) hours, and shall extend not less than three (3) feet above the roof with a ventilating skylight of noncombustible construction as specified in section 928.

911.4 TOP ENCLOSURE.

911.41 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 as the floors of the building or structure in which it occurs, but in no case 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 gasses in the event of fire, with an area not less than ten (10) percent of the shaft area.

911.42 EXTENDING TO ROOF: All shafts that extend to the roof of the building shall be covered at the top with a thermostatically controlled skylight of not less than twenty-five (25) percent of the area of the shaftway, constructed in accordance with the requirements of section 928. 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.

911.43 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 and 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.

911.5 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 as the lowest floor through which it passes, but in no case with a fireresistance rating less than that of the shaft enclosure.

911.6 EXISTING SHAFTWAYS: In all existing shaftways of buildings of assembly (use groups F-1, F-2, F-3 and F-4), institutional (use groups H-1 and H-2) and residential (use groups L-1 and L-2) classifications, 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,

911.7 SHAFT OPENING: No openings other than necessary for the purpose of the shaftway shall be constructed in shaft enclosures; and all openings shall be protected with approved fire doors or fire shutters complying with the provisions of sections 917, 918, 919.

SECTION 912.0 WALL LINTELS

912.1 FIRE PROTECTION. Lintels over openings wider than four (4) feet in masonry walls, other than in walls of masonry veneer on wood frame structures, shall be fire protected as required by section 913 for structural members, when the full load over the opening is not relieved by a masonry arch of required strength. The members of an assembled metal lintel that support only outer face masonry that is securely bonded or anchored to backing, need not be fire protected as required for structural members supporting masonry.

912.2 STONE LINTELS: Except when otherwise approved by the building official in controlled material procedure, the use of stone lintels on spans exceeding four (4) feet shall be prohibited unless supplemented by fireproofed structural members or masonry arches of the required strength to support the superimposed wall load.

SECTION 913.0 BEAMS AND GIRDERS

All beams and girders shall be protected with noncombustible materials or assemblies of component materials to afford the fire-resistance specified in table 2-5 and as herein modified.

913.1 PROTECTION OF BEAMS AND GIRDERS: Beams and girders that are required to be fire protected, and that support only one (1) floor or a roof, and/or a nonbearing wall not more than one (1) story high, shall be individually encased on all sides with materials having the required fireresistance rating; or shall be protected by a ceiling as specified in section 913.2 having the required fireresistance rating; or shall be protected by a combination of both a ceiling and individual encasement which, together, provide the required fireresistance rating. Beams and girders that are required to be fire protected, and that support more than one (1) floor or a nonbearing wall, more than one (1) story high, or a bearing wall, shall be individually encased on all sides for their entire length or height with materials having the required fireresistance rating. Similar individual encasement shall be provided for all structural elements supporting stairway enclosures.

913.11 Ceilings that contribute to the required fireresistance rating of a floor or roof assembly shall be continuous between exterior walls, vertical fire divisions, or vertical partitions having at least the same fireresistance rating as the ceiling.

913.2 CEILING FIXTURES: Ceilings required to have a fireresistance rating may be pierced to accommodate noncombustible electric outlet boxes or recessed lighting fixtures, if the aggregate area of such openings does not exceed sixteen (16) square inches in each ninety (90) square feet of ceiling area and the electrical outlet boxes or recessed lighting fixtures are constructed of steel at least .022 inches thick and sealed tightly at the ceiling. Noncombustible pipes, ducts, and additional or larger electrical or other service facilities may pierce ceilings that are required to have a fireresistance rating only when the type of ceiling to be used has been tested with such types of facilities installed in place and the proportionate area of openings for such facilities to be installed in the ceiling does not exceed the proportionate area of such openings in the assembly tested, and provided no opening is larger than that in the assembly tested. Protection for such openings shall be the same as provided in the test. Duct openings installed in accordance with the foregoing shall be protected by fire dampers complying with the requirements of article 18.

913.3 FIRESTOPPING OF CEILING SPACES: Floor or roof assemblies required to have a firesistance rating shall have any concealed spaces therein firestopped as outlined below:

913.31 FIRESTOPPING OF NON-COMBUSTIBLE CONSTRUCTION: The concealed space above fireresistive ceilings shall be firestopped into areas not exceeding three thousand (3,000) square feet with materials listed in section 921.0 for the full height of the concealed space. Access to each such concealed space may be through one (1) or more openings not exceeding nine (9) square feet and protected by self-enclosing protectives having the fire protection rating required by table 2-5. Firestopping shall not be required where the structural members within the concealed space are individually protected with materials having the required fireresistance rating, or where the ceiling is not an essential part of the fireresistance assembly. Firestopping shall not be required where a concealed space is sprinklered in accordance with the construction requirements of article 12. Concealed spaces over boiler rooms and under roofs may be ventialated to the outer air.

913.4 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 (1000) square feet with materials meeting the requirements of section 921.

913.5 WALL SUPPORTS: Structural members which support walls shall be protected in conformance with section 913.1 to afford not less than the required fireresistance of the wall construction supported thereon.

913.6 EXTERIOR EXPOSED BEAMS AND GIRDERS: Beams and girders exposed to the outdoors on building that do not exceed two (2) stories or thirty (30) feet in height, which are required by table 2-5 to have a fireresistance rating not exceeding one (1) hour need not be protected on any face of the member that has an exterior separation of thirty (30) feet or more, provided the outdoor area within the thirty (30) foot separation distance is not used for storage of materials, or for motor vehicle parking.

913.7 BEAMS AND GIRDERS IN CAVITY WALLS: Where beams and girders occur within exterior cavity walls, portions of such structural members facing the exterior need not be individually fire protected if the outer wythe of the cavity wall provides the required fireresistance rating and is located not more than two and one-half (2½) inches from such structural members, and if all surfaces of the structural members are fire protected from the interior of the building by materials having the required fireresistance rating.

913.8 EMBEDMENTS AND ENCLOSURES: Pipes, wires, conduits, ducts, or other service facilities shall not be embedded in the required fire protection of a structural member that is required to be individually encased; except that pipes, wires, and conduits may be

installed in the space between the required fire protection and the structural member protected, provided that where such facilities pierce the required fire protection, the area of the penetrations does not exceed two (2) percent of the area of the fire protection, on any one (1) face, the penetrations are closed off with close-fitting metal escutheons or plates and the concealed space shall be fire-stopped at each story in accordance with the provisions of section 913.3.

9.3.9 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. Where applicable, such protection shall be designed in accordance with the requirements of section 710.

SECTION 914.0 COLUMNS

All steel, iron and other approved metal columns and reinforcement in concrete columns shall be protected with noncombustible materials or assemblies of component materials to afford the fireresistance specified in table 2-5 and as herein modified. Columns that are required to be fire protected, and that support only one floor or a roof, and/or a non-bearing wall not more than one (1) story high, shall be individually encased on all sides with materials having the required fireresistance rating; or shall be protected by a ceiling as specified in section 913.2 having the required fireresistance rating; or shall be protected by a combination of both a ceiling and individual encasement which, together, provide the required fireresistance rating. Columns that are required to be fire protected, and that support more than one (1) floor or support a bearing wall or non-bearing wall more than one (1) story high, shall be individually encased on all sides for their entire length or height with materials having the required fireresistance rating; (or shall be protected by a combination of both a ceiling and individual encasement which, together, provide the required fireresistance rating.)

914.1 EXTERIOR COLUMNS: Columns located in exterior walls or along the outer lines of a building or structure shall be fireprotected as required by this section and shall be protected agains corrosion by cement parging, waterproofing, or other approved methods complying with section 871.

914.2 COLUMNS IN CAVITY WALLS: Where columns occur within exterior cavity walls, portions of such structural members facing the exterior need not be individually fire protected if the outer wythe of the cavity wall provides the required fireresistance rating and is located not more than two and one half (2½) inches from such structural members, and if all surfaces of the structural members are fire protected from the interior of the building by materials having the required fireresistance rating.

914.3 EMBEDDED MECHANICAL FACILITIES: Plumbing and heating pipes and vent ducts and similar service equipment shall be installed outside of the required protective column covering; except that plumbing pipes, wires, conduits and cables may be embedded in the required fireproof protection when they occupy not more than one-quarter (¼) of the fireproofed surface of a rectangular column face nor more than one-quarter (¼) of the perimeter of a round column.

914.4 MECHANICAL 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. Where applicable, such protection shall be designed in accordance with the requirements of section 710.

914.5 EXTERIOR EXPOSED COLUMNS: Columns exposed to the outdoors on buildings that do not exceed two (2) stories or thirty (30) feet in height, which are required by table 2-5 to have a fireresistance rating not exceeding one (1) hour need not be protected on any face of the member that has an exterior separation of thirty (30) feet or more, provided the outdoor area within the thirty (30) foot separation distance is not used for storage of materials, or for motor vehicle parking. The interior faces of exterior columns shall be protected and insulated as otherwise required.

914.6 ANCHORS, BANDS AND TIES.

914.61 CONCRETE REINFORCEMENT: Concrete fire protection on structural metal columns shall be reinforced and anchored by wire mesh, metal caging, metal clips or spirally wound wire of approved types. Wire fabric shall be not less than No. 12 U.S. gage, four (4) by four (4) inch mesh or its equivalent; spirally wound wire shall be not less than No. 10 U.S. gage with not over four (4) inch pitch or equivalent heavier wire at a maximum pitch of eight (8) inches.

914.62 GYPSUM CONCRETE REINFORCEMENT: Poured-in-place gypsum fire protection shall be reinforced and anchored by wire fabric of not less than No. 16 U.S. gage, two (2) by two (2) inch mesh or No. 14 U.S. gage, four (4) by four (4) inch mesh.

914.63 MASONRY UNIT TIES: Block and tile fireproofing units shall be securely anchored or bounded by wall ties, metal mesh or metal u-clips in the horizontal joints, or by outside tie wires not less than No. 16 U.S. gage with at least one (1) tie around every block course; or shall consist of special masonry units designed to furnish positive anchorage to the strucural member and to each other.

914.64 EXPOSED TIES: When outside tie wires are used, they shall be protected by not less than one-half (½) inch of cement mortar, or gypsum plaster or the equivalent fireresistive covering.

914.7 REINFORCED CONCRETE COLUMNS: The thickness of protection required outside of reinforcing steel in concrete columns shall be proportioned by test to meet the fireresistive requirements of table 2-5 base on the fireresistive classification of concrete aggregates.

SECTION 915.0 TRUSSES

All trusses shall be protected with noncombustible materials or assemblies of component materials to afford the fireresistance specified in Table 2-5 and as herein modified.

915.1 PROTECTION OF TRUSSES: Trusses that are required to be fire protected, and that support only one floor or a roof, and/or a nonbearing wall not more than one (1) story high, shall be individually encased on all sides with materials having the required fireresistance rating; or shall be protected by a ceiling as specified in section 913.2 having the required fireresistance rating; or shall be protected by a combination of both a ceiling and individual encasement which, together, provide the required fireresistance rating. Trusses that are required to be fire protected, and that support more than one story high, shall be individually encased on all sides for their entire length or height with materials having the required fireresistance rating. With the use of a continuous ceiling of the specified fireresistance rating, the enclosed truss space shall have an access doorway with maximum dimensions of three (3) by three (3) feet, equipped with an opening protective of the same fireresistance rating as the required truss protection. When the trusses or the roof decking are permitted to be constructed of combustible materials, the space above the required fireresistive ceiling shall be subdivided into maximum areas of three thousand (3,000) square feet as required for attic spaces in section 316.

915.2 ONE STORY BUILDING: In all one (1) story buildings required to be of fireresistive construction, no protection shall be required for the members of roof trusses, purlins or roof beams when the height to the lowest chord is twenty (20) feet or more from the floor.

915.3 ROOFS LESS THAN 20 FEET HIGH: In multi-story buildings of types of construction in which fire protected coverings of the structural framework are required by table 2-5 and the provisions of the Basic Code, the fire protection of individual members of the roof truss may be omitted when the clear height of the lower chord of the truss is more than fifteen (15) and less than twenty (20) feet above the floor, gallery or balcony immediately below and a three-quarter (3/4) hour continuous ceiling is installed.

915.4 ROOFS 20 FEET OR HIGHER: When every part of the structural framework 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 roof beams and purlins.

915.5 ROOF SLABS AND ARCHES: Where the omission of fire protection from roof trusses and purlins is permitted, the horizontal or sloping roofs in fireproof (type 1) and noncombustible (type 2) constructions, immediately above such trusses, 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.

SECTION 916.0 EXTERIOR OPENING PROTECTIVES

Where specified herein, the exterior openings of all buildings and structures more than three (3) stories or forty (40) feet in height, other than churches (use group F-4), residential buildings (use groups L-2 and L-3) and buildings of frame (type 4) construction, shall have approved fire windows, shutters, curtains, doors or other approved opening protectives meeting the requirements of the Basic Code and the provisions of article 4 for special uses and occupancies.

916.1 HORIZONTAL EXPOSURE: Approved protectives shall be provided in every opening facing a street thirty (30) feet or less in width, or within thirty (30) feet horizontally in a direct line not in the same plane of any unprotected noncombustible (type 2-C), unprotected frame (type 4-B) structure, or within thirty (30) feet horizontally of any opening in another building of any type of construction.

916.2 VERTICAL EXPOSURE: Approved protectives shall be provided in every opening which is less than fifty (50) feet vertically above the roof of an adjoining structure within a horizontal distance of thirty (30) feet of the wall in which the opening is located, unless such roof construction affords a fireresistance of not less than one and one-half (1½) hours.

916.3 INTERIOR LOT LINE EXPOSURE: Opening protectives shall be provided in every permissible wall opening in buildings of high hazard (use group A) within eleven (11) feet of an interior lot line; in buildings of moderate hazard (use group B-1) within six (6) feet of such lot lines; and in wall openings of frame buildings which are erected within six (6) feet of interior lot lines, except for store fronts and window and door openings in dwellings of use group L-2 and L-3.

916.4 FIRST STORY OPENINGS: The required fireresistive 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.

916.5 NON-AUTOMATIC PROTECTIVES: Required protective assemblies in exterior openings, unless self-closing or provided with approved automatic closing devices, operative from either side, shall be closed at the end of business hours and at all times when not required for light and ventilation under the provisions of article 5.

916.6 COMBUSTIBLE MATERIALS: Exterior windows and doors, including their frames and glazing, that are not required by this Code to have a fire-protection rating, may be of combustible materials.

SECTION 917.0 FIRE DOORS

917.1 FIRE DOOR ASSEMBLIES: Approved fire door assemblies as defined in this Code shall be constructed of any material or assembly of component materials which meet the test requirements of section 903 and 904 and the fireresistance rating herein required.

Location	FIRERESISTANCE Rating in Hours
Fire walls and fire divisions of 3 or more hour construction	3
Fire walls and fire divisions of 2 hour construction	1-1/2
Shaft enclosures and elevator hoistways of 2 hour construction	1-1/2
Stairway and exitway enclosures of 1 hour or less except fire towers and grade passageways	3/4

Doors in exitways of residential and business use building not more than three (3) stories for forty (40) feet in height with an occupancy load of not more than forty (40) below or seventy (70) above grade and doors from hotel rooms (occupancy group L-1 and from hospital rooms (occupancy group H-2), to corridors providing access to an exitway may be of noncombustible construction or of one and three-quarter (1-3/4) inch bonded solid-core wood doors.

917.2 LABELED PROTECTIVE ASSEMBLIES: Labeled protective assemblies meeting the requirements of section 903.53 and 903.55, and the reference standards of this article, including shop inspection, shall be approved for use in the following typical and special situations:

917.21 TYPICAL SITUATIONS:

- CLASS A DOORS: fire wall openings in accordance with section 908.

- CLASS B DOORS: vertical shafts and openings in fire partitions in accordance with sections 909. and 911.

- CLASS C DOORS: openings in corridor, room and fireresistive partitions in accordance with section 910.

- CLASS D DOORS AND WINDOWS: openings in exterior walls in exposing and exposed buildings of high hazard use (use group A) in accordance with article 4 and along exterior stairways in accordance with section 621.

- CLASS E DOORS AND WINDOWS: openings in exterior walls and along fire escapes except where class D protectives are required in accordance with section 624.

917.22 SPECIAL SITUATIONS: Approved labeled opening protective assemblies shall be accepted as complying with the required time-temperature performance ratings specified in the Basic Code including the following special situations:

- CLASS A DOORS: high pressure boiler room walls in accordance with sections 618 and 1113.
  Volatile flammables, film, pyroxylin products and fur storage vaults in accordance with sections 403, 406, and 407.
  Grinding and grain processing rooms in accordance with section 409.

  Paint and flammable storage rooms in accordance with section 410.

  Dry cleaning rooms of high and moderate hazard in accordance with section 411.
  Proscenium walls of theatres in accordance with section 416.
  Transformer room walls in accordance with Massachusetts Electrical Code.

- CLASS B DOORS: motion picture studios in accordance with section 407.

  Dressing rooms in accordance with section 416.
  Show rooms in public garages in accordance with section 413.
  Theatre exits and property rooms in accordance with section 416.
  Fire and smokeproof towers in accordance with section 620.
  Horizontal exits in accordance with sections 616 and 908.

- CLASS C DOORS: projection and trial exhibition rooms in accordance with section 407.
  Paint spray rooms in accordance with section 410.
  Service stations and repair shops in accordance with sections 414 and 415.
  Kitchen and service pantries in places of assembly in accordance with section 417.
  Corridor rooms and all fireresistive partitions in accordance with section 910.

- CLASS D DOORS: attached garages in accordance with sections 412 and 917. Switchboard rooms where required in the Basic Code.

917.3 MULTIPLE DOORS.

917.31 FIRE WALLS: Two (2) doors of one and one-half (1½) hour fireresistance each, installed on opposite sides of the same opening, shall be deemed equivalent in fireresistance to one three (3) hour door.

917.32 FIRE PARTITIONS: Two (2) doors of three-quarter (3/4) hour fireresistance each, installed on opposite sides of same opening shall be deemed equivalent in fireresistance to a one and one-half (1½) hour fire door.

917.4 GLASS PANELS: Wire glass panels shall be permitted in fire doors within the limitations of section 919.

917.5 ALTERNATE CLOSING DEVICES: Except as may be otherwise provided for openings in fire and fire division walls, all fire doors shall be self-closing and shall be closed during occupancy of the building or part thereof; except that 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 918.0 FIRE WINDOWS AND SHUTTERS

918.1 FIRERESISTANCE RATING: Approved assemblies of fire window and fire shutters shall meet the test requirements of sections 903 and 904, or shall be approved labeled assemblies meeting the requirements of section 903.55.

Steel window frame assemblies of one-eights (1/8) inch minimum solid section or of not less than No. 18 U.S. gage formed sheet steel members fabricated by pressing, mitering, riveting, interlocking or welding and having provision for glazing with one-quarter (1/4) inch wired glass as required in section 919.0, when securely installed in the building construction and glazed with one-quarter (1/4) inch wired glass, shall be deemed to meet the requirements for a three-quarter (3/4) hour fire window assembly.

918.2 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 as required for the wall construction in which the protective is located.

918.3 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.

918.4 ROLLING FIRE SHUTTERS: When fire shutters of the rolling type are used, they shall be of approved counterbalanced construction that can be readily opened from the outside.

918.5 VERTICAL SEPARATION OF WINDOWS.

918.51 WHERE REQUIRED: In all buildings and structures designed for storage, mercantile, industrial and business uses (use groups A, B, C, D and E), 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 three-quarter (3/4) hours 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.

918.52 FIRERESISTANCE RATING: The apron or spandrel walls shall be constructed with the same fireresistance required for the exterior wall in which located as specified in table 2-5, except that when such required rating exceeds three-quarter (3/4) hours, approved wired glass construction in fixed noncombustible sash and frames not exceeding one-third (1/3) of the area of such apron or spandrel may be located therein, and except further that in exterior nonbearing enclosure walls which are not required to be of more than three-quarter (3/4) hour fireresistance, the provisions of this section in respect to apron or spandrel walls shall not apply.

SECTION 919.0 WIRED GLASS

Wired glass in approved opening protective assemblies shall be not less than one-quarter (1/4) inch thick and shall be limited in area and location as herein required.

919.1 FIRE WALL PROTECTIVES: Wired 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 with no dimension exceeding twelve (12) inches.

919.2 FIRE PARTITION PROTECTIVES: Wired glass vision panels may be used in fire doors of one and one-half (1½) hour fireresistance rating intended for use in fire partitions; but in no case shall the glass panels be more than one hundred (100) square inches in area with no dimension exceeding twelve (12) inches.

919.3 FIRERESISTIVE PARTITION PROTECTIVES: Wired glass panels in three-quarter (3/4) hour fire doors shall not exceed a total exposed area of one thousand two hundred and ninety-six (1296) square inches; except as provided in section 917.32.

919.4 WIRED GLASS IN LABELED DOORS AND WINDOWS: One-quarter (1/4) inch wired glass may be used in approved labeled opening protectives with the following maximum sizes:

LIMITING SIZE OF WIRED GLASS PANELS

	Area in square inches	Height in inches	Width in inches
Class A door per opening.....	0	0	0
Class B door per opening.....	100	12	12
Class C door per light.....	1296	....	....
Class D door per light.....	0	0	0
Class E door per light.....	720	54	44
Class E window per light.....	720	54	54
Class F window per light.....	2916	54	54

919.5 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 vision panels which shall be so located as to furnish clear vision of the passageway or appraoch to the elevator or stairway. Such vision panels shall not exceed the size limitations specified for class B doors.

SECTION 920.0 FIRERESISTIVE REQUIREMENTS FOR PLASTER

920.1 THICKNESS OF PLASTER: The required thickness of fireresistive plaster protection shall be determined by the prescribed fire tests for the specified use and type of construction and in accordance with the provisions of section 820 for interior plastering and section 821 for exterior plastering. The thickness in all cases shall be measured from the face of the plaster base when applied to fiber board, wood, or gypsum lath and from the back of metal lath.

920.2 PLASTER EQUIVALENTS: For fireresistive purposes, one-half (½) inch of unsanded gypsum plaster shall be deemed equivalent to three-quarter (3/4) inches of one (1) to three (3) sanded gypsum or one (1) inch Portland cement plaster.

920.3 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.

920.4 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 (3/4) inch from the outer surface and fixed securely in place.

920.5 PLASTER ALTERNATES FOR CONCRETE: In reinforced concrete construction, gypsum or Portland cement plaster may be substituted for one-half (½) inch of the required poured concrete protection, except that a minimum thickness of three-eighth (3/8) inches 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 821.6.

SECTION 921.0 FIRESTOPPING

921.1 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 316.0, for combustible wall, partition and floor framing in section 874.0 for ceiling spaces in section 913; for open spaces behind acoustical and

other finishes in section 923; for floor sleeper spaces in section 924; for pipe, duct and flue openings in section 1117 and for fire dampers and curtains in section 1810.

921.2 FIRESTOPPING MATERIALS: All firestopping shall consist of noncombustible materials including asbestos, brick, terra cotta, concrete, fibrous glass, gypsum, mineral wool, rock wool, steel, iron, metal lath and cement or gypsum plaster, formed steel of not less than No. 20 U.S. gage, or other approved noncombustible materials, securely fastened in place; except that firestops of two (2) thicknesses of one (1) inch lumber with broken lap joints or of two (2) inch lumber installed with tight joints shall be permitted in open spaces of wood framing.

921.3 INSPECTION OF FIRESTOPPING: No firestopping shall be concealed or covered from view until inspected and approved by the building official.

SECTION 922.0 INTERIOR FINISH AND TRIM

922.1 FLOORS AND FLOOR COVERINGS: Finish floors and floor coverings shall be exempt from the requirements of this section provided, however, that in any case where the building official finds a floor surface of unusual hazard the floor surface shall be considered a part of the interior finish for the purpose of this code.

TABLE 9-3 - INTERIOR FINISH REQUIREMENTS

	Use Groups	Required Vertical Exitways and Passageways	Corridors Providing Exitway Access	Rooms or Enclosed Spaces (a)
A	High Hazard	I	II	III
B-1	Storage-Moderate Hazard	I	II	III
B-2	Storage-Low Hazard	I	II	III
C	Mercantile Walls			
	Ceilings	I	II	II(e)
D	Industrial	I	II	III
E	Business	I	II	III
F-1	Assembly-Theatres	I	I	II(b)
F-2	Assembly-Night Clubs	I	I	II(b)
F-3	Assembly-Halls, Terminals, Restaurants	I	I, I(e)	II(b)
F-4	Assembly-Churches, Schools	I	I	II(b)
H-1	Institutional-Restrained	I	I	I(c)
H-2	Institutional-Incapacitated	I	II	I(c)
L-1	Residential-Hotels	I	II	III
L-2	Residential-Multi-family Dwellings	I	II	III
L-3	Residential-1 and 2-Family Dwellings	IV(f)	IV(f)	IV

NOTE a. - Requirements for rooms or enclosed spaces are based upon spaces enclosed in partitions of the building or structure, and where fireresistance 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 not 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 approved full sprinkler protection 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, except in exitways.

NOTE b. - Class III interior finish materials may be used in places of assembly with a capacity of 300 persons or less except for use group F-6.

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 4 persons capacity. Provisions in Note "a" allowing a change in interior finish classes when sprinkler protection shall not apply.

NOTE d. - Class III interior finish materials may be used for wainscoting of paneling for not more than one thousand (1000) square feet of applied surface area in the grade lobby when applied directly to a noncombustible base or over furring strips applied to a noncombustible base and fire-stopped as required by section 923.

NOTE e. - Class III interior finish materials may be used in mercantile occupancies of 3,000 square feet or less gross area, used for sales purposes on the street floor only. (balcony permitted).

NOTE f. - Class IV finish having a flame spread rating not greater than five hundred (500) is permitted in one- and two-family dwellings, except that material of no greater flame spread than class III finish shall be used in exitways from the upper story of a two-family dwelling.

922.2 CLASSIFICATION OF MATERIALS:

a) The classification of interior finish materials specified in section 922.2 (b) shall be that of the basic material used, without regard to subsequently applied paint or wallpaper. However, the building official shall revise the classification of the basic material when such finishes, in his opinion are of such characteristics or thickness or so applied as to affect materially the flame spread characteristics. This revised classification shall be that corresponding to the rating of the combination of the basic material together with the applied finish.

b) Interior finish materials shall be grouped in classes according to their flame spread and related characteristics as given in table 9-2.

c) Smoke: Notwithstanding the flame spread classification of sections 922.2 (a) and 922.2 (b), any material shown by test to have a life hazard greater than that indicated by the flame spread classification owing to the amount of character of smoke generated, shall be included in the group appropriate to this actual hazard as determined by the enforcing authority.

d) Fire Retardant Paints: (1) In existing buildings, the required flame spread classification of interior surfaces may be secured by applying approved fire retardant paints of solutions to existing interior surfaces having a higher flame spread rating than permitted. "Approved" shall mean a paint or solution tested by Underwriters' Laboratories in accordance with ASTM E-84-61 (NFPA No. 255 dated May, 1961) and rated with flame spread classifications in accordance with the requirements set forth, and applied in accordance with manufacturer's specifications to achieve these ratings. (2) Fire retardant paints or solutions shall be renewed at such intervals as necessary to maintain the necessary fire retardant properties. Durability and serviceability of paint shall meet the washability and leeching standards established by Federal Specification (D.O.D.) TT-P-0026b dated August 24, 1961.

e) Trim and Other Incidental Finish: Interior finish not in excess of ten (10) percent of the aggregate wall and ceiling areas of any room or space may be Class III materials in occupancies where interior finish of lower flame spread rating is required.

f) In mill type construction, heavy timber structural members shall be exempt and no treatment of such heavy timbers members will be permitted that would increase the flame rating of the natural untreated timber.

g) Interior Finish and Trim Requirements by Use Occupancy: Interior finish material shall be used in accordance with requirements for individual classes of occupancy specified in sections 202 thru 213. Wherever the use of any class of interior finish is specified, the use of a higher class shall be permitted; e.g. where Class II is specified, Class I may be used.

h) Automatic Sprinklers: Where a complete standard system of automatic sprinklers is installed, interior finish with flame spread rating one class lower than that specified in table 9-2 may be used; e.g. where Class II is normally specified, an interior finish with flame spread rating not over Class III may be used.

prescribed for the various occupancy groups listed in Table 9-3 when tested in accordance with the requirements of Section 904.

922.4 INTERIOR TRIM: Baseboards, chair rails, mouldings, trim around openings and other interior trim not more than twelve (12) inches in width, may be of Class I, II or III materials except trim around fire windows and fire doors shall comply with the requirements of section 917 and section 918 and except that only Class I or II materials shall be used for interior trim where interior finish is restricted to Class I material.

Class IV trim having a flamespread rating not greater than five hundred (500) shall be allowed for trim only where Class IV material is permitted for interior finish.

SECTION 923.0 APPLICATION OF INTERIOR FINISH

Where interior finish is regulated by the requirements of the Basic 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.

923.1 APPLICATION TO STRUCTURAL ELEMENTS: Interior finish materials applied to walls, ceilings or structural elements of a building or structure which are required to be fireresistive 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.

923.2 FURRED CONSTRUCTION: Where walls, ceilings or other structural elements are required to be fireresistive or to be constructed of noncombustible component materials and interior finish is set out or dropped distances greater than one and three-quarter (1 3/4) 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 automatic sprinklers (see note (a) to Table 9-3) or is attached to a noncombustible backing complying with section 923.5 or to furring strips applied directly to such backing as provided in section 923.1.

923.3 HEAVY TIMBER CONSTRUCTION: Interior finish materials may be applied directly to the wood members and decking of heavy timber (type 3A) construction, where permitted, or to furring strips applied to such members or wood decking as provided in section 923.1.

923.4 CLASS II AND III MATERIAL: Interior finish materials, other than Class I material, which are less than one-quarter (1/4) inch in thickness shall be applied directly against a noncombustible backing unless the tests under which such material has been

classified were made with the materials suspended from the noncombustible backing.

923.5 NONCOMBUSTIBLE BACKING: Noncombustible 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 the Basic Code for noncombustible classification of material under section 903.61 or of fire-retardant treated wood. When the noncombustible 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 923.1, 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 the Basic 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 913.4 may be increased to three thousand (3,000) square feet.

SECTION 924.0 COMBUSTIBLE MATERIALS PERMITTED IN FLOOR CONSTRUCTION OF TYPE 1 AND TYPE 2 BUILDINGS

Except as provided in section 618.0 for stairs and section for theatres and similar places of public assembly (Use Groups F-1 and F-2), the use of combustible materials in or on floors of type 1 and type 2 buildings shall be herein specified.

924.1 SLEEPERS, BUCKS AND GROUNDS: Floor sleepers, bucks, nailing blocks and ground may be constructed of combustible materials, provided the space between the fireresistive floor construction and the flooring is solidly filled with noncombustible materials; or the space under the flooring shall be firestopped in areas of not more than one hundred (100) square feet, provided no such open spaces shall extend under or through permanent partitions or walls.

924.2 FLOORING ON SLEEPERS: Wood finish floorings may be attached directly to the embedded or firestopped wood sleepers.

924.3 FLOORING ON FIRERESISTIVE ARCHES: Wood finish flooring, and wearing surfaces of other approved materials including cork, rubber composition, linoleum, asphalt and composition tile and other materials of similar combustible characteristics one-half (1/2) inch or less thick shall be permitted when cemented directly to the top surface of approved fireresistive construction or cemented directly to a subfloor of wood backed up solidly with noncombustible materials. Combustible insulating boards not more than one-half (1/2) inch thick may be used for sound deadening or heat insulating when attached directly to a noncombustible floor assembly or to wood subflooring which is backed up solidly with fireresistive construction and covered with approved finish flooring.

SECTION 925.0 DECORATIVE MATERIAL RESTRICTIONS

In places of public assembly, all draperies, hangings and other decorative materials suspended from walls or ceilings shall be noncombustible or flameresistant meeting the requirements of section 904 as herein specified:

925.1 NONCOMBUSTIBLE: The permissible amount of noncombustible decorative hangings shall not be limited.

925.2 FLAMERESISTANT: The permissible amount of flameresistant decorative hangings shall not exceed ten (10) percent of the total wall and ceiling area.

SECTION 926.0 EXTERIOR TRIM RESTRICTIONS

926.1 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.

926.2 ARCHITECTURAL TRIM.

926.21 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 frame construction when the building does not exceed three (3) stories or forty (40) feet in height. Such trim may be of frame construction on all buildings of types 3 and 4 construction.

926.22 LOCATION: When architectural trim, as described in section 926.21, is located along the top of exterior walls, it must be completely backed up by the exterior wall and shall not extend over the top of exterior walls.

926.23 FIRESTOPPING: Continuous exterior architectural trim constructed of combustible materials shall be firestopped as required in section 874.

926.3 COMBUSTIBLE HALF TIMBERING: In buildings of masonry enclosed (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.

926.4 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 type 3 and 4 construction may be of unproteced noncombustible materials or frame construction. Balconies of frame construction shall afford the fireresistance rating required by table 2-5 for floor construction and the aggregate length shall not exceed fifty (50) percent of the building perimeter on each floor.

926.5 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 303.

926.6 EXISTING COMBUSTIBLE CONSTRUCTION: Any existing cornices or other exterior architectural element constructed of wood or similar combustible materials may be repaired with the same material to the extend of fifty (50) percent of its area in any one year if the public safety is not thereby endangered.

926.7 WOOD VENEERS: Inside the fire limits wood veneers are permitted in accordance with section 303.10.

SECTION 927.0 ROOF STRUCTURES

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.

927.1 SCUTTLES.

927.11 SIZE: Unless provided with other approved means of access to the roof, every building and structure more than three (3) stories or 40 feet in height, except dwellings with peak roofs and all other buildings having roofs with a pitch greater than twenty (20) degrees, shall have an access trap door not less than two (2) by three (3) feet in area, securely attached or anchored to the roof framing, with ladder leading thereto from the top story.

927.12 CONSTRUCTION: The trap door or scuttle shall be of fireresistive construction in fireproof (types 1-A and 1-B), and noncombustible (types 2-A, 2-B and 2-C) buildings; and of approved noncombustible materials, or of wood covered on top and edges with sheet metal in masonry enclosed (type 3) and protected frame (type-4) buildings.

927.2 SKYLIGHTS.

927.21 SASH AND FRAMES: Skylights which are inclined more than thirty (30) degrees from the vertical hereafter constructed on all buildings and structures except frame (type 4-B) buildings and all skylights on fireproof and noncombustible (types 1 and 2) buildings shall have the sash and frames thereof constructed of metal 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.

927.22 GLASS -- WIRED OR PLAIN: Skylights shall be glazed with wired glass or of approved glass block construction conforming to sections 812 and 859, 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 (1/8) inch thick. No single panel of wired glass in skylights shall exceed seven hundred and twenty (720) square inches in area or forty-eight (48) inches in any dimension. Light transmitting plastic may be used as specified in section 2006.0.

927.23 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 (3/4) by three-quarter (3/4) inches nor larger than one (1) by one (1) inches, constructed of not lighter than No. 12B and S gage 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.

927.3 PENTHOUSE.

927.31 ADDITIONAL STORY: Penthouses occupying more than one-third (1/3) of the roof area 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 2-5 and article 8.

927.32 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 which is required to have a greater fireresistance, it may be constructed with a fireresistance rating of not less than one and one-half (1½) hours, covered on the outside with noncombustible, waterproof material and supported on protected steel or reinforced concrete construction.

927.33 DOORS, FRAMES AND SASH: Doors, frames and window sash except where otherwise specifically required to be fireproof or fireresistive under the Basic Code, shall be constructed the same as other similar elements in the building or structure.

927.4 OTHER ROOF STRUCTURES: Roof structures other than penthouses as defined in article 2 shall comply with the following provisions:

927.41 NONCOMBUSTIBLE MATERIALS: Unless constructed of masonry or reinforced concrete in accordance with article 8, roof structures erected on buildings and structures of fireproof and noncombustible (types 1 and 2) construction shall be enclosed in walls of noncombustible materials having a fireresistance rating of not less than three-quarter (3/4) hours protected with weather-resistive roof and wall coverings complying with section 928.0.

927.42 COMBUSTIBLE MATERIALS: Roof structures erected on the roof of masonry enclosed buildings (type 3) and protected frame (type 4-A) may be constructed of combustible materials protected to afford a three-quarter (3/4) hour fireresistance rating covered on the outside with approved roofing materials.

927.5 MANSARDS AND SLOPING ROOFS: Steep roofs having a slope of more than sixty (60) degrees to the horizontal shall be constructed of material having the same fireresistance rating as required for an exterior nonbearing wall of the building of which it is a part. When the slope is sixty (60) degrees or less to the horizontal, the sloping roof shall be constructed as required for the roof of the building. Where the back of a false mansard is exposed to the outdoors, the back shall be covered with noncombustible material or with roof coverings as required for the roof of the building.

927.6 DORMER WINDOWS: Roofs of dormers shall be of the same type of construction and have roof covering of the same class as required for the roof of the building on which they are located. The walls of dormers shall be constructed of materials having the same fireresistance rating as required for nonbearing exterior walls of the building on which they are located; except that in buildings of construction types 3A, 3B, 3C and 4A, the walls may be constructed of combustible framing provided that the outside face of the framing is protected with noncombustible sheathing and the aggregate area of all such dormer walls, including openings therein, does not exceed twenty (20) percent of the roof area.

927.7 WATER TANKS.

927.71 SUPPORTS: Water tanks having a capacity of more than five hundred (500) gallons placed in or on a building for the storage of potable water supplies and for use in the building services including air conditioning and fire prevention purposes, shall be supported on masonry, reinforced concrete, steel or other approved noncombustible framing or on timber conforming to heavy timber mill construction (type 3-A); provided that when such supports are located within the building, they shall be fire-protected as required for fireproof (type 1-A) construction.

927.72 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 Massachusetts State Plumbing Code.

927.73 LOCATION: No tank shall be located over or near a stairway or elevator shaft unless a solid roof or floor deck of the necessary strength is constructed underneath the tank.

927.74 TANK COVER: All unenclosed roof tanks exposed to the weather shall have approved covers sloping toward the outer edges.

927.75 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.

927.8 COOLING TOWERS:

927.81 LOCATED IN FIRE DISTRICTS: Within Fire District Nos. 1 and 2, cooling towers erected on the roofs of buildings shall be constructed of noncombustible materials, except that drip bars may be of wood.

927.82 LOCATED OUTSIDE FIRE DISTRICTS: 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.

927.9 MISCELLANEOUS ROOF STRUCTURES: Except as herein specifically provided, all towers, spires, dormers or cupolas shall be erected of the type of construction and fireresistance rating required for the building to which they are accessory as regulated by tables 2-5 and 2-6; 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 is used for any purpose other than as a belfry or architectural embellishment, the structure and its supports shall be of fireproof (type 1) construction or noncombustible (type 2) construction. Radio and television towers and antennae shall be constructed to comply with section 421.0.

SECTION 928.0 ROOF COVERINGS

All approved roof coverings shall be classified as A, B, or C on the basis of their resistance to fire exposure as listed in the reference standards of this article.

928.1 EXISTING ROOFS: The repair of existing roofs shall comply with the provisions of section 106 but in no case shall more than twenty-five (25) per cent of the roof covering of any building be replaced in a

period of twelve (12) months unless the entire roof covering is made to conform to the requirements for new roofing.

928.2 WITHIN THE FIRE LIMITS: Within the limits of Fire District Nos. 1 and 2, all roof coverings shall be of asbestos, brick, concrete, metal, slate, tile, prepared asphalt felt or laminated felt roofing finished with asphalt, slag, gravel or similar noncombustible, moisture-resistant materials or approved combinations of materials, complying with the requirements of section 903.4 for class A, B, or C roof coverings or their approved equivalent.

928.3 OUTSIDE FIRE LIMITS: Roof coverings which are classfied as non-rated roofing under section 903.4 and the approved rules including wood shingles and handsplit shakes as specified in section 853.72 shall be deemed to meet the requirements for use on all one- and two-family dwellings of frame (type 4-B) construction, not exceeding two (2) stories or thirty-five (35) feet in height and four thousand (4000) square feet in area when the distance of the building from any other building is not less than twelve (12) feet; and on private garages or airplane hangars and structures for similar accessory uses outside the fire limits and in Fire District No. 2, located on the same lot with a dwelling, not exceeding one (1) story or twenty-five (25) feet in height and twenty-five hundred (2500) square feet in area and with a fire separation of not less than twelve (12) feet; and on storage buildings of moderate or low fire hazard (use groups B-1 and B-2) not exceeding one (1) story or twenty-five (25) feet in height and six thousand (6000) square feet in area when separated not less than twenty (20) feet from any other building.

928.4 ROOF DECKING AND SHEATHING.

928.41 COMBUSTIBLE DECKING: Unless attached directly to noncombustible framework, all roof coverings shall be applied to a closely fitted deck; except as provided in section 853.72 for wood shingles and handsplit shakes.

928.42 FIRE AND PARTY WALL RESTRICTIONS: No wood planking, sheathing, or other combustible decking when used in roof construction shall extend through or over any party wall or fire wall or across any lot line.

928.5 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.

928.6 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 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 have no greater electrical system within the building.

928.61 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 prescribed herein, and further provided that such desired method is first submitted to and approved by the building official.

AIA		1968	Fireresistance Ratings
ASTM	E 84	1970	Standard Method of Test for Surface Burning Characteristics of Building Materials
ASTM	E 108	1970	Standard Methods of Fire Tests of Roof Coverings
ASTM	E 119	1973	Standard Methods of Fire Tests of Building Construction and Materials
ASTM	E 136	1965	Method of Test for Determining Noncombustibility of Elementary Materials
ASTM	E 152	1972	Standard Methods of Fire Tests of Door Assemblies
ASTM	E 163	1965	Standard Methods of Fire Tests of Window Assemblies
AWPA	C 20	1970	Structural Lumber - Fireretardant Treatment by Pressure Processes
AWPA	C 27	1970	Plywood - Fireretardant Treatment by Pressure Processes
NFPA	No. 80	1973	Installation of Fire Doors and Windows
NFPA	No. 701	1969	Standard Methods of Fire Tests for Flameresistant Textiles and Films
U.S. Federal Test Method Standard	No. 191	1968	Method 5190 Textile Test - Burning Rate of Cloth; 30 degree angle
ULI	Standard Test Method, Subject 723	1960	Test Method for Fire Hazard Classification of Building Materials
ULI	Standard Subject 10 (a)	1965	Tin-Clad Fire Doors and Shutters
ULI	Standard 555	1970	Fire Dampers
Federal Specification	SSA 00118 C	1960	Flameresistance Tests - Acoustical Units, Prefabricated
NFPA	703	1971	Fireretardant Treatment of Building Materials
FMED			Prevention and Spread of Fire Approved Fire Protection Equipment and Building Materials

ARTICLE 10

CHIMNEYS, FLUES AND VENT PIPES

SECTION 1000.0 SCOPE

The provisions of this article shall control the design and constructions of all chimneys and vents hereafter erected or altered in all buildings and structures.

1000.1 OTHER STANDARDS: Unless otherwise specifically provided herein, conformity to the applicable standards for chimney construction and gas vents shall be deemed to meet the requirements of this Code.

1000.11 COMMONWEALTH OF MASSACHUSETTS REQUIREMENTS: Gas vents required for appliances or equipment using fuel gases of any kind such as natural gas, manufactured gas, undiluted liquified petroleum gases, liquified petroleum gas-air mixtures, or mixtures of any of these gases shall comply with the requirements of the Massachusetts Code for Installation of Gas Appliances and Gas Piping, established under Chapter 737, Acts of 1960.

1000.2 MINOR REPAIRS: Minor repairs for the purpose of maintenance and upkeep which do not increase the capacity of heating apparatus or appliances or which do not involve structural changes in the permanent chimney and gas vents of a building may be made without a permit.

SECTION 1001.0 DEFINITIONS

CHIMNEY: A primarily vertical enclosure containing one or more passageways. (see section 1005.0).

-FACTORY-BUILT CHIMNEYS: a chimney that is factory-made, listed by an accredited authoritative testing agency, for venting gas appliances, gas incinerators, and solid or liquid fuel burning appliances.

-MASONRY CHIMNEY: a field constructed chimney built in accordance with nationally recognized codes or standards.

-METAL CHIMNEY: a chimney made of metal of adequate thickness, (see section 1009.0) galvanized or painted unless suitably corrosion-resistant, properly welded or riveted and built in accordance with nationally recognized codes or standards.

-CHIMNEY CONNECTOR: a pipe or breaching which connects the heating appliance to the chimney.

DRAFT HOOD: a device placed in and made part of the vent connector from an appliance, or in the appliance itself, which is designed to (1) insure the ready escape of the products of combustion in the event of no draft, back-draft or stoppage beyond the draft hood; (2) prevent a back-draft from entering the appliances; (3) neutralize the effect of stack action of the chimney flue upon the operations of the appliance.

DRAFT REGULATOR: a device which functions to maintain a desired draft in the appliance by automatically reducing the draft to the desired value.

DUCT: a tube, pipe conduit or continuous enclosed passageway used for conveying of air, gases or vapors.

FLEXIBLE TUBING: a gas conduit other than that formed by a continuous one-piece metal tube.

FORCED AND INDUCED DRAFT FUEL BURNING APPLIANCES: fuel burning appliances listed as exhausting low temperature fuel gases and listed for use with type L venting systems.

GAS VENTS: type B. Listed factory-made gas vents for venting listed or approved appliances, equipped to burn only gas, except those specifically listed for use with chimneys only.

GAS VENTS: type B-W. Listed factory-made gas vents for venting listed or approved gasfired vented recessed heaters.

GAS VENTS: type C. Vents constructed of sheet copper not less than No. 24 U.S. standard gage or galvanized steel of not less than No. 20 U.S. standard gage, or other approved noncombustible corrosion-resistant materials.

GAS VENTS: type L. Low-Temperature, Venting Systems. A venting system consisting of listed factory made piping and fittings for use with fuel burning appliances listed as exhausting low temperature flue gases and approved for use with a type L venting system.

HOOD: a canopy or similar device connected to a duct for the removal of heat, fumes or gases.

METAL CHIMNEY (smokestack) (see chimney)

VENT: a passageway, vertical or nearly so, for removing vent gases to the outer air.

VENT CONNECTOR: (vent connector pipe.) that portion of the vent system which connects the gas appliance to the gas vent or chimney.

VENT SYSTEM: the gas vent or chimney and vent connector, if used, assembled to form a continuous unobstructed passageway from the gas appliance to the outside atmosphere for the purpose of removing vent gases.

SECTION 1002.0 PLANS AND SPECIFICATIONS

The structural plans and specifications shall describe in sufficient detail, the location, size and construction of all chimneys, gas vents and ducts and their connections to boilers, furnaces 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.

1002.1 METHODS OF VENTING: Chimney or gas vent systems shall be so engineered and constructed as to develop a positive flow adequate to remove all flue gases to the outside atmosphere.

1002.2 ENGINEERED VENT SYSTEM: The requirements specified in the following sections: 1003.0 through 1012.0 shall not necessarily govern where standard engineering methods have been used to design the chimney or vent system.

SECTION 1003.0 PERFORMANCE TEST AND ACCEPTANCE CRITERIA

The building official may require a test or tests of any chimney or gas vent to insure fire safety and the removal of smoke products of combustion.

1003.1 ACCEPTANCE CRITERIA: The system shall be accepted if the following three (3) conditions are fulfilled:

1) there shall be no continuous spillage at the draft hood when any one or combination of appliances connected to the system is in operation;

2) temperature on adjacent combustible surfaces shall not be raised more than the limits acceptable to approved testing agency; and

3) condensation shall not be developed in a way that would cause deterioration of the vent or drip from joints or bottom end of vent.

1003.11 APPROVED INSTALLATIONS: Factory-built chimneys and gas vents which have been tested and approved by an approved testing agency shall be accepted as complying with the requirements of item 2 of section 1003.1 when installed in accordance with their specified clearances.

SECTION 1004.0 KINDS OF CHIMNEYS

CHIMNEYS AS USED IN THIS ARTICLE SHALL BE CLASSIFIED AS:

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

SECTION 1005.0 APPLIANCES REQUIRING CHIMNEYS

All heating appliances shall be connected to chimneys which conform to the provisions of this article. Chimneys shall be used for venting the following types of appliances:

1) incinerators, except as noted in section 1005.1;
2) appliances which may be converted readily to use solid or liquid fuels;
3) combination gas-oil burning appliances;
4) appliances listed for use with chimneys only;
5) oil-fired appliances and equipment except as exempted in section 1011.

1005.1 EXCEPTION: Metal pipe not less than No. 20 U.S. standard gage galvanized steel or other equivalent noncombustible corrosion-resistant material may be used for venting incinerators installed in locations such as open sheds, breezeways, or carports, provided the metal pipe is exposed and readily examinable for its full length and suitable clearances are maintained.

SECTION 1006.0 EXISTING BUILDINGS

1006.1 RAISING EXISTING CHIMNEYS: Whenever a building is hereafter erected, enlarged or increased in height so that a wall along an exterior lot line, or within three (3) feet thereof, extends above the top of an existing chimney or gas 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 liquid or solid fuel burning appliances. Gas 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.

1006.2 SIZE OF EXTENDED CHIMNEYS: The construction of an extended chimney shall conform to the requirements of this article for new chimneys, but in no case shall the internal area of such extension be less than that of the existing chimney.

1006.3 NOTICE OF 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.

1006.4 EXISTING CHIMNEYS: No existing chimney, except one which does not endanger the fire safety of a building or structure and is acceptable to the building official, shall be continued in use unless it conforms to all requirements of this article for new chimneys.

1006.5 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 1007.0 FACTORY-BUILT CHIMNEYS

1007.1 FACTORY-BUILT CHIMNEYS: Factory-built chimneys that have been tested and certified by an approved agency shall be installed in accordance with the clearance and details of their approval and the manufacturer's instructions.

SECTION 1008.0 MASONRY CHIMNEY

1008.1 CLASSIFICATION: For the purpose of determining the requirements for the construction of a masonry chimney, chimneys shall be classified according to the following subsections.

1008.11 LOW TEMPERATURE: Chimneys constructed to safely remove products of combustion having a temperature not more than one thousand (1000) degrees F., and for use only with residential heating appliances, low temperature heat producing appliances and low-heat industrial appliances, shall be classified as low temperature chimneys.

1008.12 MEDIUM TEMPERATURE: Chimneys constructed to safely remove products of combustion having a temperature not more than two thousand (2000) degrees F., and for use with medium-heat or low-heat industrial appliances, shall be classified as medium temperature chimneys.

1008.13 HIGH TEMPERATURE: Chimneys constructed to safely remove products of combustion having temperatures over two thousand (2000) degrees F., and for use with high-heat, or other industrial appliances, shall be classified as high temperature chimneys.

1008.2 MASONRY CHIMNEY CONSTRUCTION.

1008.21 MASONRY CHIMNEYS: Masonry chimneys for solid and liquid fuel-fired equipment and appliances shall be constructed of masonry, reinforced concrete, or other approved noncombustible materials; and may be erected as free standing or as constituting an integral part of a wall, or may be enclosed within a structure without constituting a component part thereof. In every case a chimney shall be wholly supported on fireresistive construction or on approved foundations complying with article 7 and shall not be designed to support any direct load other than its own weight.

1008.3 LOW TEMPERATURE CHIMNEYS.

1008.31 SOLID MASONRY: When constructed of solid masonry, the walls shall be not less than eight (8) inches thick, except as herein provided in dwellings and small business buildings.

1008.32 REINFORCED CONCRETE: When constructed of reinforced concrete the walls shall be not less than six (6) inches thick, except as provided for dwellings.

1008.33 DWELLINGS: In residential buildings (use groups L-2 and L-3), the walls of a chimney in which the area of the flue is not more than two hundred (200) square inches may be of solid masonry or reinforced concrete not less than four (4) inches thick when provided with a fire clay lining.

1008.34 LINING: Low temperature masonry chimneys with less than eight (8) inch walls shall be lined with an approved flue lining that conforms to the requirements of this section and the outside face of interior walls shall be smoothly parged or stuccoed so as to be gas tight, or the flue walls within the building shall be eight (8) inches thick.

1008.35 FLUE LINING MATERIALS: Flue linings shall be made of fire clay or other approved refractory materials other than shale, capable of withstanding the action of flue gases and of resisting the temperatures to which they are subjected but not less than two thousand (2000) degrees F. without softening or cracking. The thickness of the shell of flue linings shall be not less than five-eighth (5/8) inches.

1008.36 FLUE LINING CONSTRUCTION: Flue linings shall be constructed in advance of the chimney and shall start from a point less than eighteen (18) inches below the inlet of the smokepipe or throat of a fireplace. The lining shall be constructed as nearly vertical as possible and shall extend not less than four (4) inches above the top or cap of the flue.

1008.4 MEDIUM TEMPERATURE CHIMNEYS.

1008.41 SOLID MASONRY: When constructed of solid masonry, the walls shall be not less than eight (8) inches thick and shall be lined as provided in this section.

1008.42 REINFORCED CONCRETE: When constructed of reinforced concrete the walls shall be not less than six (6) inches thick with approved lining.

1008.43 LINING: Medium temperature masonry chimneys shall be lined with not less than four and one-half (4½) inches of fire brick laid up in fire clay mortar from at least two (2) feet below to not less than twenty-five (25) feet above inlet opening to the chimney; or the walls shall be of double-wall construction with an intervening air space of not less than two (2) inches.

1008.5 HIGH TEMPERATURE CHIMNEYS: All high temperature masonry chimneys shall be built with double masonry or double reinforced concrete walls, each of the same thickness required for medium temperature chimneys, with an intervening air space of not less than two (2) inches; or of a single wall with an interior wall of double-wall construction shall be of fire brick at least four and one-half (4½) inches thick laid in fire clay or approved high temperature cement mortar; and the interior metal chimney shall be lined as specified in section 1009.5

1008.6 GENERAL REQUIREMENTS.

1008.61 CHIMNEY HEIGHT: All chimneys shall extend at least three (3) feet above the adjacent roof, and at least two (2) feet above any roof ridge within ten (10) feet thereof. If the height above the roof is more than four (4) times the minimum dimension, the chimney shall be braced and anchored to the roof framing.

1008.62 CHIMNEY CAPS: All masonry chimneys shall be capped with concrete, terra cotta tile or other approved noncombustible weatherproof material; or a sloped wash shall be provided from the outside of the chimney to the projecting lining specified in section 1008.36.

1008.63 CHIMNEY SUPPORTS: All masonry chimneys shall rest on a foundation located on permanently undisturbed soil or shall be supported on fireresistive construction; and no such chimney shall rest on or be hung or otherwise supported from combustible floor or wall construction except as provided in section 1007.0 No masonry chimney shall be corbeled from hollow or cavity wall construction, nor from a wall built to hollow masonry units; and the corbeling of chimneys shall conform to the requirements of section 839.1. Masonry chimneys erected outside of frame dwellings shall be anchored to the stud walls at each floor level or at vertical intervals of not more than ten (10) feet.

1008.64 CLEARANCES: Combustible framing shall be trimmed away from all flues and chimneys, and no combustible material shall be placed within two (2) inches of any chimney, nor within six (6) inches of any inlet opening to such chimney. Finished flooring shall have not less than one-half (½) inch clearance from the chimney walls.

1008.65 SIZE: The passageway within the chimney shall be ascertained to be open to the exterior and shall be of adequate size to remove all the products of combustion of the appliances attached thereto.

1008.66 THICKNESS AND SHAPE: For chimneys larger than one hundred and twenty (120) square inches, except as specified in section 1008.33, the walls shall be not less than eight (8) inches thick in any case. No change in the size or shape of a chimney shall be made within six (6) inches of the roof framing through which it passes.

SECTION 1009.0 METAL CHIMNEYS

1009.1 THICKNESS OF METAL.

1009.11 EXTERIOR METAL CHIMNEYS: Exterior metal chimneys shall be of adequate thickness to resist all wind stresses specified in article 7 but shall be not less than one-eighth (1/8) inch thick for diameters up to three (3) feet, three-sixteenths (3/16) inch thick for diameters up to four (4) feet and not less than one-quarter (¼) inch thick for larger diameters.

1009.12 INTERIOR METAL CHIMNEYS: Interior metal chimneys shall be constructed of metal not less than No. 16 U.S. gage for areas not more than one hundred and fifty-five (155) square inches; No. 14 U.S. gage for

areas not more than two hundred (200) square inches; No. 12 U.S. gage for areas not more than two hundred and fifty-five (255) square inches; and not less than No. 10 U.S. gage for greater areas.

1009.2 CONSTRUCTION: All metal chimneys shall be riveted or welded construction and all exterior metal chimneys shall be securely guyed, braced, anchored and supported. They shall be galvanized, painted with an approved paint, or constructed of approved corrosion-resistive alloys.

1009.3 OPENING: A cleanout shall be provided at the base of every metal chimney.

1009.4 METAL CHIMNEY FOUNDATION: A metal chimney erected on the exterior of a building or structure shall be supported on an independent substantial masonry or reinforced concrete foundation. Interior metal chimneys may be supported on fireproof (type 1-A) construction at intermediate levels.

1009.5 HIGH TEMPERATURE LINING: When metal or masonry chimneys are used to remove high temperature combustion gases they shall be lined with four and one-half (4½) inches of fire brick laid in fire clay mortar. Such lining shall extend at least twenty-five (25) feet above the smokepipe entrance.

1009.6 HEIGHT OF METAL CHIMNEY: All metal chimneys shall extend to a height of not less than four (4) feet above any roof within twenty-five (25) feet, or any roof ridge within ten (10) feet horizontally thereof, except as provided in section 1014 for high temperature chimneys.

1009.7 METAL CHIMNEY CLEARANCES: Every metal chimney or part thereof erected on the exterior of a building, shall have a clearance from a wall of frame or combustible construction of not less than twenty-four (24) inches and of not less than four (4) inches if the wall is of noncombustible construction. No such stack shall be located less than twenty-four (24) inches in any direction from a wall opening or required exitway, or fire escape.

1009.8 INTERIOR METAL CHIMNEY ENCLOSURES: Every interior metal chimney or part thereof, erected within a multi-story building shall be enclosed with walls of not less than three (3) hours fireresistance in all stories above that in which the appliance served thereby is located. Where the metal chimney passes through a combustible roof, it shall be guarded by a galvanized metal or other approved noncombustible, ventilating thimble that extends at least nine (9) inches below and above the roof construction. The thimbles shall be of a size to provide clearance on all sides of the metal chimney of not less than six (6) inches for low heat appliance and not less than eighteen (18) inches for medium and high heat appliances as defined in article 11, unless the metal chimney is insulated and protected to prevent a temperature of more than two hundred and fifty (250) degrees F. on the exterior surface.

1009.9 PROHIBITED LOCATION: No interior metal chimney shall be carried up inside a ventilating duct unless such ducts are constructed as required by this article for metal chimneys; and only when such duct is used solely for venting the room or space in which the appliance served by the metal chimney is located. Metal chimneys shall not be installed in air supply ducts.

SECTION 1010.0 CHIMNEY CONNECTOR (SMOKEPIPES)

The chimney connector from every heating appliance, except for vent connectors from gas-fired appliances, shall connect to a chimney conforming to the provision of article 10.

1010.1 CHIMNEY CONNECTORS: Chimney connectors shall be constructed of galvanized iron, or other approved noncombustible, corrosion-resistive materials having a melt point of not less than two thousand (2000) degrees F. No other pipe shall be used as a chimney connector.

1010.2 THICKNESS OF METAL: The minimum thickness of metal for chimney connectors shall comply with the requirements of section 1017 for vent construction.

1010.3 LENGTH OF CHIMNEY CONNECTOR: All chimney connectors shall be as short and as straight as possible consistent with their use and the required draft conditions. No chimney connector shall pass through a floor or ceiling construction.

1010.4 CHIMNEY CONNECTION: In entering a passageway in a masonry or metal chimney, the chimney connector shall be installed above the extreme bottom to avoid stoppage. Means shall be employed which will prevent the chimney connector from entering so far as to restrict the space between its end and the opposite wall of the chimney. The chimney connector shall be firmly attached or inserted into a thimble or slip joint to prevent it from falling out. All connections shall fit tightly. Chimney connections to any one passageway shall be limited to one floor, except as provided in section 1002.2.

1010.5 NUMBER OF CHIMNEY CONNECTORS: Two (2) or more chimney connectors may be joined to a single connection provided that the chimney connectors are on one floor level and the passageway is of sufficient size to serve all of the appliances thus connected.

1010.6 CHIMNEY CONNECTOR CLEARANCES.

1010.61 FROM COMBUSTIBLE CONSTRUCTION: Unless a chimney connector is covered on the exterior with at least one (1) inch of approved insulating noncombustible material, the following clearances shall be maintained from all combustible material or construction:

Diameter Inches	Clearance Inches
0-12	12
12-36	20
More than 36	36

1010.62 REDUCED CLEARANCES: The clearances specified herein may be reduced one-half (½) when an approved metal or other approved noncombustible enclosing shell is installed so as to provide a continuous one (1) inch ventilated air space around the chimney connector with access openings for inspecting purposes; or the exposed combustible construction shall be protected with metal or other noncombustible materials as provided in section 1112. In no case shall the chimney connector of a medium or high heat appliance pass through any wall or partition of combustible construction.

1010.7 LOW HEAT CHIMNEY CONNECTOR CLEARANCE: Chimney connectors from a low heat appliance may pass through combustible walls or partitions when protected at the point of passage by approved thimbles, fire-stopped with noncombustible material; or when such partition is constructed to afford a fireresistance of not less than three-quarter (3/4) hours for a distance corresponding to the required clearance in section 1010.6 with noncombustible materials.

1010.8 CONNECTIONS TO INCINERATOR CHIMNEY: The chimney connector of a heating appliance shall not be connected to the flue of an incinerator which has a rubbish chute identical with the flue.

SECTION 1011.0 VENT SYSTEMS

For the purpose of determining vent requirements, oil-fired appliances shall be classified as "listed" or "unlisted". A listed appliance is one that is shown in a list published by an approved 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 no applicable standard has 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.

1011.1 APPLIANCES REQUIRED TO BE VENTED: Appliances of the following types shall be connected to a listed venting system or provided with other means for exhausting the flue gases to the outside atmosphere:

a) central heating appliances, including steam and hot water boilers, warm air furnaces, floor furnaces, and vented recessed heaters;
b) duct furnaces and self-contained unit heaters;
c) all water heaters;
d) room heaters listed for vented use only as required in section 1011.2;

e) appliances equipped with gas conversion burners;
f) appliances which have draft hoods supplied by the appliance manufacturer;
g) unlisted appliances.

1011.2 EXEMPTION: Connections to vent systems shall not be required for electric, gas and industrial 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:

a) listed gas ranges;
b) built-in domestic cooking units listed and marked as unvented units;
c) listed hot plates and listed laundry stoves;
d) listed domestic clothes dryers;
e) listed gas refrigerators;
f) counter appliances;
g) other appliances listed for unvented use and not provided with flue collars;
h) specialized equipment of limited input such as laboratory burners or gas lights.

When any or all of the appliances listed in items 5, 6, 7, and 8 above are installed so that the aggregate input rating exceeds thirty (30) B.T.U. per hour per cubic foot of room or space in which they are installed, one or more of them shall be vent-connected or provided with approved means for exhausting the vent gases to the outside atmosphere so that the aggregate input rating of the remaining unvented appliances does not exceed thirty (30) B.T.U. 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.

1011.3 TYPES OF VENTS.

1011.31 TYPE L LOW-TEMPERATURE VENTING SYSTEMS: Type L low-temperature venting systems shall be used only with fuel burning appliances listed as exhausting low-temperature flue gases and listed for use with Type L low-temperature venting systems. Type L low-temperature venting systems shall be installed in accordance with the terms of their listing and manufacturer's instructions.

1011.32 VENTILATING HOODS: Ventilating hoods and exhaust systems may be used to vent commercial appliances.

1011.33 CHIMNEYS: Chimneys shall be constructed in accordance with the requirement of article 10.

1011.34 EXISTING CHIMNEYS: Where an existing masonry chimney is unlined and where local experience indicates that vent gas condensate will be a problem , an approved liner or another vent shall be installed.

Where inspection reveals that an existing chimney is not safe for the intended application it shall be rebuilt to conform to the requirement of this code, or relined with a suitable liner or replaced with a gas vent or chimney suitable for the appliances to be attached.

1011.35 CLEANOUTS: Cleanouts shall be of such construction that they will remain tightly closed when not in use. Tee fittings used as cleanouts or condensate drains shall have tight fitting caps to prevent entrance of air into the chimney or gas vent at that point.

1011.4 INSTALLATION REQUIREMENTS.

1011.41 SIZE OF VENTS: The gas vent or chimney when connected to a single appliance shall not be less than the size of the draft hood outlet.

When more than one appliance is connected to a gas vent or chimney, the area shall be not less than the area of the largest vent connector plus fifty (50) percent of the areas of additional vent connectors.

In lieu of the above, the gas vent or chimney may be sized in accordance with section 1002.2.

Any shape gas vent may be used provided its venting capacity is equal to the capacity of round pipe for which it is substituted and the minimum internal dimension of the gas vent is not less than two (2) inches.

1011.42 GAS VENT TERMINATION: The gas vent or chimney shall extend high enough above the building or other neighboring obstruction so that wind from any direction will not create a positive pressure in the vicinity of the gas vent or chimney termination. Except as provided in section 1008.61, gas vents or chimneys shall extend at least two (2) feet above the highest point where they pass through a roof of a building and at least two (2) feet higher than any portion of a building within ten (10) feet; provided the following conditions are met:

a) no gas vent or chimney shall terminate less than four (4) feet in vertical height above the highest connected appliance draft hood outlet or flue collar.

1011.43 EXCEPTION: A listed gas vent equipped with a listed or approved top may be terminated below the peak of a pitched roof in accordance with the terms of the listing or approval.

1011.44 TOP ASSEMBLY: Gas vents and factory-built chimneys shall extend above the roof surface and through the flashing and shall terminate in a top or roof assembly with a venting capacity not less than that of the vent. The top shall prevent rain and debris from entering the vent.

1011.45 SUPPORT OF GAS VENTS: All portions of gas vents and chimneys shall be adequately supported for weight and design of materials employed. Listed gas vents and factory-built chimneys shall be supported and spaced in accordance with their listings and manufacturer's instructions and section 1007, 1008 and 1009.

1011.46 OUTSIDE GAS VENTS.

1011.47 MATERIALS: Outside gas vents and chimneys shall not be used in exposed locations except when permitted by the building official. When they are permitted to be used, the material shall possess high insulation qualities or be adequately insulated.

1011.48 CONDENSATE DRAIN: Where local experience with gas vent materials indicates that the condensate may be a problem, a capped tee and drain pipe shall be installed at the base of the riser to drain off condensate.

1011.5 PROHIBITED INSTALLATIONS.

1011.51 PROHIBITED TERMINATION: Natural draft vents extending through outside walls shall not terminate below eaves adjacent to such walls or parapets.

1011.52 UNVENTED ROOM HEATERS PROHIBITED: Unvented room heaters are prohibited in accordance with Chapter 688 of the Acts of 1962 of the General Laws of the Commonwealth of Massachusetts.

SECTION 1012.0 FIREPLACES

1012.1 CONSTRUCTION: The back and jambs of fireplaces shall be constructed of solid masonry or reinforced concrete not less than eight (8) inches thick, with a lining of fire brick, soapstone, cast iron or other approved noncombustible material not less than two (2) inches thick. Such lining may be omitted when the solid masonry or reinforced concrete is not less than twelve (12) inches thick, or the equivalent insulation is provided integrally in approved heating equipment or firing devices installed in the fireplaces. In one- and two-family dwellings (use group L-3), when approved steel fireplace units which are equipped with an air circulating chamber are installed integrally with the fireplace construction, the back and jambs of the fireplace construction, the back and jambs of the fireplace may be reduced to four (4) inches of approved masonry.

1012.2 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 fireresistive materials. All combustible forms or centering shall be removed after completion of the supporting construction.

1012.3 FIREPLACE DAMPER: Every fireplace shall be equipped with an approved damper.

1012.4 FIREPLACE CLEARANCES.

1012.41 FLOOR FRAMING: All header and trimmer beams of combustible floor construction shall be located at least four (4) inches from the face of chimneys and backs of fireplaces and the spaces shall be fire-stopped with approved noncombustible materials.

1012.42 COMBUSTIBLE TRIM: Wood or other combustible material shall not be installed on or about a fireplace less than six (6) inches from the fireplace opening; and combustible materials, located within the twelve (12) inch boundary of the opening shall not project more than one-eighth (1/8) inch from the face of the masonry for each one (1) inch distance from the opening.

1012.5 FIREPLACE HEATERS: No heater shall be placed in a fireplace unless it conforms to the requirements of article 11 for such device and is provided with a flue; except an electric heater which is exempted from vent requirements under the provisions of section 1011.

1012.6 IMITATION FIREPLACES: The depth of an imitation fireplace or recess for heating equipment shall not be more than six (6) inches, unless such recess meets all the construction requirements for fireplaces. The surfaces of the recess shall be of masonry or fireresistive plaster and all combustible materials shall have the clearances or shall be fire-protected as specified herein. No flue other than an approved gas vent shall be installed within such imitation fireplaces.

SECTION 1013.0 CUPOLA CHIMNEYS

1013.1 HEIGHT OF CUPOLAS: A chimney or a metal smokestack for a cupola furnace, blast furnace or similar high heat industrial device shall extend not less than twenty-five (25) feet above any roof within a radius of fifty (50) feet and shall be covered on the top with heavy wire netting or other spark arrester as provided in section 1018.

1013.2 CUPOLA CLEARANCES: No combustible material shall be erected or placed within three (3) feet of any cupola or other high temperature chimney.

SECTION 1014.0 FUEL-FIRED INCINERATOR CHIMNEYS

Chimneys for fuel-fired incinerators shall be constructed of at least four (4) inches of clay or shale brick masonry which is lined with not

less than four and one-half (4½) inches of firebrick for at least forty (40) feet above the roof of the combustion chamber; and beyond the forty (40) foot level shall be enclosed with not less than eight (8) inches of clay or brick masonry.

SECTION 1015.0 MISCELLANEOUS INCINERATOR FLUES

1015.1 FLUE ENCLOSURES: All incinerator flues not provided for in sections 1015 and 1016, including flues for rubbish and waste material incinerators, shall be enclosed with not less than eight (8) inches of clay or shale brick masonry, unless otherwise approved by the building official.

1015.2 CONNECTION TO CHIMNEYS AND STACKS: Nothing in this article shall prohibit the connection of an incinerator by means of an approved breeching to a smokestack or chimney flue which serves a heat appliance; provided the cross-sectional area of such stack or flue is at least four (4) times that of the incinerator breeching and such stack or flue and the connection meet the requirements of this article for incinerator flues.

SECTION 1016.0 DUCT AND PIPE SHAFTS

In all buildings other than one- and two-family dwellings, vertical ducts or pipes arranged in groups of two or more which extend through two (2) or more stories and occupy an area of more than one (1) square foot shall be enclosed in construction of not less than three-quarter (3/4) hour fireresistance to comply with section 911.

SECTION 1017.0 CONSTRUCTION OF METAL DUCTS AND VENTS

All metal vents, ducts and duct systems required under the provisions of articles 10 and 11 for heating systems and equipment, and under the provisions of articles 5 and 18 for ventilating and air-conditioning systems shall be constructed and installed in accordance with the requirements of this Code and accepted engineering practice.

1017.1 MATERIAL: Ducts and vents shall be constructed of aluminum, copper, monel metal, galvanized steel, cement-asbestos or other approved, noncombustible, corrosion-resistive materials of adequate strength, durability and for the temperatures involved; and the seams shall be securely welded or riveted and made substantially air and gas tight.

1017.2 THICKNESS OF METAL: The weight and thickness of material, type of joints, connections, bracing and other structural features shall conform to the approved rules; but shall be at least equivalent to the minimum thickness prescribed in table 10-1. Aluminum shall be of not less than No. 26 B & S gage, copper of not less than 16 ounce sheets, galvanized iron and monel metal of not less than No. 28 U.S. gage, except as provided for one- and two-family dwellings in table 10-2.

TABLE 10-1 - METAL DUCT AND VENT CONSTRUCTION, OTHER THAN DWELLINGS

Diameter, or diagonal of rectangular ducts, dimension in inches	Minimum thickness: Galvanized Steel U. S. gage number	Minimum thickness: Aluminum B & S gage number
Up to 12	28	26
12 - 20	26	24
20 - 30	24	22
30 - 48	22	20
48 - 60	20	18
60 - 90	18	16
90 and over	16	14

1017.3 ONE AND TWO-FAMILY DWELLINGS.

1017.31 MATERIAL: Warm air supply ducts in heating and air-conditioning systems of one and two-family dwellings shall be constructed of aluminum, copper, galvanized steel, as specified in table 10-2, or other approved noncombustible materials of equal strength and durability.

1017.32 SUPPORTS: All ducts shall be securely supported by metal or other approved noncombustible straps, hangers, lugs and brackets.

TABLE 10-2 - DUCTS FOR DWELLINGS

Diameter, or diagonal of rectangular ducts, dimensions in inches	Minimum thickness and weight: Tin weight per square in pounds	Minimum thickness and weight: Galvanized steel U. S. gage number	Minimum thickness and weight: Aluminum B & S gage number
Up to 12	IC 107	30	26
12 - 18	IX 135	28	26
18 and over	IX 135	26	24

1017.33 CLEARANCES: Horizontal runs of such ducts shall be located not less than one (1) inch from adjacent combustible construction unless insulated or protected as required in section 1017.4; and ducts in vertical partitions or concealed ceiling spaces shall be insulated in all cases with not less than twelve (12) pound asbestos paper with five-sixteenths (5/16) inch intermediate air space or protected with one-quarter (¼) inch air-cell asbestos or equivalent.

1017.4 HIGH TEMPERATURE DUCTS.

1017.41 CONSTRUCTION: A single metal duct for a high temperature system which is enclosed in a combustible partition, or in a concealed ceiling space shall be of double construction with a continuous intervening air space of not less than one (1) inch; or the duct shall be covered on the exterior with approved noncombustible, insulating materials not less than one-fourth (¼) of an inch thick of air-cell asbestos or its equivalent. Approved asbestos cement ducts, not less than one-quarter (¼) inch thick, shall be insulated by an air-space of not less than one-eighth (1/8) inch. When not insulated, clearances shall comply with section 1011.

1017.42 EXCEPTION: When sufficiently insulated to prevent more than two hundred and fifty (250) degrees F. temperature on the exterior, the clearances herein specified shall not be required.

1017.5 DUCT LINING: The lining of high temperature ducts shall be of approved noncombustible materials.

1017.6 COLD AIR DUCTS: The construction of cold air ducts shall comply with all the provisions governing warm air supply ducts except as to heat insulation.

1017.7 FIRESTOPPING: Whenever the passage of ducts in walls, floors or partitions requires the removal of firestopping, the surrounding spaces shall be completely filled with approved noncombustible materials; and the required clearance shall be maintained by a metal thimble which is filled with approved noncombustible insulating materials, or closed at both ends with metal collars.

1017.8 DUCTS FROM WARM AIR FURNACES: The clearances of a metal duct from combustible materials for a distance of six (6) feet from warm air furnaces shall comply with section 1112. A duct which enters a floor, wall or partition of combustible construction within six (6) feet from the furnace shall change direction through an angle of ninety (90) degrees or more before it enters such floor, wall or shaft and shall be enclosed with approved fireresistive assemblies as required in section 1016 for duct shafts.

1017.9 FIRE-CLAY VENTS: Where prohibited for use with gas-fired appliances, fire-clay vents shall have a thickness of not less than one-half (½) inch for an internal diameter of six (6) inches or less and three-quarter (3/4) inch for an internal diameter of more than six (6) inches. The joints shall be made gastight with caulked bell and spigot, sheet metal sleeves or galvanized iron bands of not less than No. 26 U.S. gage, all thoroughly cemented and secured in place with high temperature cement mortar.

SECTION 1018.0 SPARK ARRESTORS

All chimneys, stacks and flues including incinerator stacks, which emit sparks that create a fire hazard, shall be provided with a spark arrestor of approved noncombustible construction in which the maximum size of mesh shall not exceed three-quarter (3/4) inches. The total area of spark arrestors shall be not less than four (4) times the flue area.

Reference Standards - Article 10

ASTM	C106	1967	Refractories for Incineraotrs
ASTM	C178	1958	Air Setting Refractory Mortar
ASTM	C270	1971	Mortar for Unit Masonry
ASTM	C279	1954	Chemical-Resistant Masonry Units
ASTM	C315	1972	Clay Flue Linings
ASTM	C401	1968	Castable Refractories
ANSI	A131.1	1971	Factory-Built Chimneys
NFPA	211	1972	Chimneys, Fireplaces and Venting Systems
ULI	103	1964	Factory-Built Chimneys
ULI	641	1965	Testing Standards for Low Temperature Type L Venting Systems
ANSI	A62.4	1947	Sizes of Flue Linings
ANSI	Z21.12	1937	Listing Requirements for Draft Hoods

ARTICLE 11

HEATING EQUIPMENT AND APPLIANCES-MOUNTING, CLEARANCES AND CONNECTIONS

SECTION 1100.0 SCOPE

The provisions of this article shall control the construction, inspection and maintenance of all heating, blower and exhaust systems in all buildings and structures in respect to structural strength, fire safety and operation.

1100.1 ACCEPTED ENGINEERING PRACTICE: All such systems and equipment constructed, installed and maintained in accordance with the applicable standards listed in the reference standards of this article shall be deemed to conform to the provisions of this code.

1100.11 COMMONWEALTH OF MASSACHUSETTS REGULATIONS: All installations of gas appliances must comply with the Massachusetts Code for Installation of Gas Appliances and Gas Piping established under Chapter 737, Acts of 1960. The construction, installation and operation of oil burning equipment is subject to the provisions of FPR-3, established in accordance with Chapter 148, Section 10 of the M.G.L.A, as amended. The construction, installation, testing and inspection of boilers, air tanks, ammonia compressor valves, and refrigeration and air-conditioning systems of five (5) tons or more capacity are subject to the Rules and Regulations issued by the Board of Boiler Rules under authority of Chapter 146 of the M.G.L.A., as amended.

1100.2 COOPERATING AGENCIES: Nothing herein contained shall be deemed to nullify the provisions of other legal statutes or regulations of the Commonwealth of Massachusetts governing the operation and maintenance of boilers and other heating appliances and equipment.

1100.3 LABELED HEATING AND COOKING APPLIANCES: Approved oil-fired warm air furnaces, floor furnaces, unit heaters, domestic incinerators, cooking and heating stoves and ranges and other heating equipment, inspected and approved by approved agencies shall be accepted by the building official when installed with the reduced clearance and details of installation therein recommended provided they meet the requirements of this code for fire protection.

1100.4 CLEARANCE FROM COMBUSTIBLE CONSTRUCTION: All heating and cooking appliances shall be installed with adequate clearances from combustible construction or shall be provided with integral insulation of the appliance of fire-protection of the structural members so that continued or intermittent operation shall not raise the temperature on the surface of combustible floors, walls or partitions above two hundred and fifty (250) degrees F.

SECTION 1101.0 DEFINITIONS

BOILER: a heating appliance intended to supply hot water or steam for space and heating, processing or power purposes.

FLOOR FURNACE: a self-contained furnace suspended from the floor of the space which is being heated, with means of observing the flame and lighting the furnace from such space.

LOW PRESSURE BOILER: a steel or cast iron boiler in which the maximum allowable gage working pressure is limited to fifteen (15) pounds per square inch for steam and thirty (30) pounds per square inch for hot water.

HEATING APPLIANCE: any device designed or constructed for the generation of heat from solid, liquid or gaseous fuel or electricity.

HIGH PRESSURE BOILER: a boiler in which steam or other vapor to be used externally to itself, is generated at a pressure of more than fifteen (15) pounds per square inch gage.

SPACE HEATER (ROOM HEATER): an above-the-floor device for direct heating of the space in and adjacent to that in which the device is located without external heating pipes or ducts.

UNFIRED PRESSURE VESSEL: a closed metal vessel which contains air, steam, gas or liquid pressure in excess of fifty (50) pounds per square inch gage which is supplied from an external source.

UNIT HEATER: an appliance which consists of an integral combination of heating element and fan within a common enclosure and which is located within or adjacent to the space to be heated.

WALL HEATER: a unit heater which is supported from or recessed in the wall of the room or space to be heated.

WARM AIR FURNACE: a solid, liquid or gas-fired appliance for heating air to be distributed with or without duct systems to the space to be heated.

MECHANICAL WARM AIR FURNACE: a warm air furnace equipped with a fan to circulate the air.

SECTION 1102.0 PLANS AND SPECIFICATIONS

Plans and specifications for the installation, repair, extension or removal of any heating appliance herein defined or of a heating, blower or exhaust system shall be submitted to the building official and a permit shall be secured prior to the commencement of any installation, except as herein provided.

1102.1 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, kind of fuel, method of operation and the method preventing the emission with the products of combustion of solids and gases detrimental to health.

1102.2 PERMIT: Upon approval of the plans, a permit shall be secured from the building official before any work is started on the installation; and the permit or a copy thereof shall be posted at the site at all times during the course of installation.

SECTION 1103.0 BOILERS AND UNFIRED PRESSURE VESSELS

1103.1 COMMONWEALTH OF MASSACHUSETTS REGULATIONS: All boilers and unfired pressure vessels shall be subject to the provisions of Chapter 146 of the M.G.L.A., as amended.

1104.0 SMOKE ABATEMENT: All furnaces and heating appliances fired with solid or liquid fuels which are subject to the provisions of section 1102, including all rubbish burners and incinerators, shall be so designed that they will not discharge under normal conditions of operation excessive smoke, soot, cinders, flyash or other materials which are deleterious to the safety or health of the public. Under any circumstances, any combustion device intended for use as specified in this section must conform to the applicable standards of the Commonwealth of Massachusetts relative to control of emissions and air quality standards.

SECTION 1105.0 INDUSTRIAL HEATING APPLIANCE CLASSIFICATION

1105.1 LOW HEAT APPLIANCES: A steam boiler which operates at fifty (50) pounds per square inch or less gage pressure; or a steam boiler of less than ten (10) boiler horse power, regardless of operating pressure; or any equipment otherwise classified as a medium heat appliance, but not larger than one hundred (100) cubic feet in size, in which the products of combustion at the point of entrance to the flue under normal operating conditions have a temperature of six hundred (600) degrees F. or less shall be calssified as a low heat appliance.
Low heat appliances shall include among others:

Baking Ovens	Forge Furnaces (Solid fuel-fired)
Candy Furnaces	Gypsum Kilns
Coffee Ovens	Lead Melting Furnaces
Core Ovens	Paraffine Furnaces
Fertilizer Ovens	Resin Melting Furnaces

Zinc Amalgamating Furnaces

1105.2 MEDIUM HEAT APPLIANCES: A steam boiler which operates at fifty (50) pounds or more per square inch gage pressure; or a steam boiler of over ten (10) boiler horse power regardless of operating pressure, or any heat appliance, in which the products of combustion at the point of entrance to the flue have a temperature of between six hundred (600) degrees and one thousand (1000) degrees F. under normal

operating conditions shall be classified as a medium heat appliance. Medium heat appliances shall include among others:

Alabaster Gypsum Kilns	Gas Producers
Annealing Furnaces	Hardening Furnaces
Charcoal Furnaces	Lime Kilns
Feed Dryers (direct fired)	Linseed Oil Boiling
Fertilizer Dryers (direct fired)	Pulp Dryers (direct fired)
Galvanizing Furnaces	Wood Distilling Furnaces
	Wood Gas Retorts

1105.3 HIGH HEAT APPLIANCES: Any appliance rated at higher horsepower or operating at higher temperatures or pressures than a low or medium heat appliance shall be classified as a high heat appliance. High heat appliances shall include among others:

Bessemer Retorts	Cupolas
Blast, Billet and Bloom and Open Hearth Furnaces	Glass Kilns and Furnaces
	Porcelain Baking and Glazing Kilns
Brass Furnaces	Reverberatory Furnaces
Cement, Brick and Tile Kilns	Welding Furnaces
Coal and Water Gas Retorts	Wood Carbonizing Furnaces

SECTION 1106.0 FIRE RESISTANCE REQUIREMENTS FOR HEAT APPLIANCE FOUNDATIONS

Unless specifically exempted in section 1109, all floor-mounted industrial heat appliances shall be mounted on the ground, or on a foundation of the following specified fireresistive construction with the required noncombustible insulated flooring or finish. No combustible material shall be permitted against the underside of the appliance or under the foundation unless specifically exempted. Such construction and insulation shall extend not less than the specified distances from the sides of the appliance. The fireresistive floor and its finish shall have equal heat insulation value as the protection herein required or such protection shall cover the entire surface under the appliance. The installation of heating appliances which operate at higher temperatures or pressures and industrial power or process boilers and furnaces shall be governed by accepted engineering practice.

1106.1 LOW HEAT APPLIANCES: Under a low heat appliance, the floor shall be of masonry or other noncombustible construction which affords not less than two (2) hour fireresistance and shall extend not less than twelve (12) inches beyond the appliance on all sides. When solid fuel is used, the floor on the firing side or where the ashes are removed shall be protected for at least eighteen (18) inches with not less than one-quarter (¼) inch asbestos lumber covered with No. 24 U.S. gage sheet metal, or its approved equivalent.

1106.2 MEDIUM HEAT APPLIANCES: Under a medium heat appliance, the floor shall be of masonry or other noncombustible construction which affords not less than three (3) hours fireresistance and shall extend not less than three (3) feet beyond the appliance on all sides. When solid fuel is used, the fireresistive floor shall extend not less than eight (8) feet at the front or side from which the appliance is fired or the ashes are removed and shall be protected with not less than No. 24 U.S. gage sheet metal.

1106.3 HIGH HEAT APPLIANCES: Under a high heat appliance, the floor shall be of masonry or other noncombustible construction which affords not less than four (4) hours fireresistance and shall extend not less than ten (10) feet beyond the appliance and not less than thirty (30) feet at the front or side where hot products are removed and shall be protected with not less than No. 24 U.S. gage sheet metal.

SECTION 1107.0 MOUNTING EXCEPTIONS FOR HEAT APPLIANCES

When heat appliances are approved for installation on combustible construction they shall be mounted in accordance with the conditions of the approval and within the limitations of this section.

1107.1 TWENTY-FOUR INCH CLEARANCE: When medium heat appliances are mounted on legs which provide an open ventilated space of not less than twenty-four (24) inches in height under the base and the appliance is arranged to prevent flame or hot gases from coming into contact with the base, the supporting floor shall be protected with four (4) inches of hollow clay or concrete tile covered with sheet metal of not less than twenty-four (24) U.S. gage. The masonry tile course shall be laid with ends unsealed and joints matched so as to provide through circulation of air.

1107.2 EIGHTEEN INCH CLEARANCE: When low heat appliances are mounted on legs which provide an open ventilated space of not less than eighteen (18) inches in height under the base, and one or more metal baffles are furnished between the burners and the floor and the appliance is arranged to prevent flame or hot gases from coming in contact with the base, the supporting floor shall be insulated with not less than one-quarter (¼) inch asbestos mill board covered with No. 24 U.S. gage steel sheets under the appliance, projecting not less than eighteen (18) inches from the sides of the appliance where fired and where hot products of combustion are removed.

1107.3 EIGHT INCH CLEARANCE: When low heat appliances are mounted on legs which provide an open ventilated space of eight (8) inches in height under the base, and the appliance is arranged to prevent flame or hot gases from coming into contact with the base, the supporting floor shall be protected with not less than three-eighths (3/8) inch asbestos mill board covered with not less than No. 24 U.S. gage sheet metal; and said protection shall project at least six (6) inches beyond all sides of the appliance and eighteen (18) inches therefrom on firing sides and where hot products of combustion are removed.

1107.4 FOUR INCH CLEARANCE: When low heat appliances are mounted on legs which provide an open ventilated space of not less than four (4) inches in height under the base, and the appliance is so arranged as to prevent the flame or hot gases from coming in contact with the base, the supporting floor shall be protected with four (4) inches of hollow clay or concrete tile covered with sheet metal of not less than No. 24 U.S. gage. The masonry tile course shall be laid as provided in section 1109.1.

1107.5 DOUBLE TILE BASE PROTECTION: When low heat appliances are not mounted on legs, the supporting floor shall be protected with two (2) courses of four (4) inch hollow clay or concrete tile covered with a three-sixteenth (3/16) inch steel plate. The tile courses shall be laid at right angles to each other, with the ends unsealed and joints matched in such manner as to provide a free circulation of air through the hollow masonry. On the firing side or where hot products of combustion are removed, the mounting and protection shall extend not less than eighteen (18) inches from the side of the appliance.

1107.6 WATER-COOLED BASE: A low heat boiler with a water-cooled base, which has a grate area of less than three (3) square feet or one in which the combustion chamber is located not less than twelve (12) inches above the floor, may rest directly on a sheet metal base of not less than No. 14 U.S. gage steel without heat insulation on combustible construction.

SECTION 1108.0 MOUNTING EXCEPTIONS FOR HOUSE HEATING APPLIANCES

Boilers and furnaces used for heating buildings and structures including low pressure steam and hot water boilers, warm air furnaces and floor mounted direct-fired unit heaters shall be installed in accordance with accepted engineering standards listed in the reference standards of this article within the limitations of this code governing fire protection and fire safety. Mounting of such heating equipment shall conform with section 1108 for low heat appliances except as follows:

1108.1 FOUR INCH CLEARANCE: When heating boilers and furnaces that are mounted on legs which provide an open ventilated space of not less than four (4) inches in height under the base, the floor shall be protected with not less than one-quarter (¼) inch mill board covered with sheet metal of not less than No. 24 U.S. gage which shall extend not less than six (6) inches beyond the appliances and not less than eighteen (18) inches where ashes are removed;

1108.2 TILE MASONRY MOUNTING: When heating boilers and furnaces are not mounted on legs, the floor shall be protected with hollow clay or concrete tile masonry not less than four (4) inches in thickness complying with section 1109.4, extending not less than eighteen (18) inches for ash removal;

1108.3 WATER BASE TYPE: All floor insulation herein required may be omitted under heating boilers of the water-cooled base type when the water jacket extends under all of the ash pit and fire box or under the entire fire chamber when there is no ash pit.

1108.4 MECHANICAL WARM AIR FURNACES: All floor insulation herein required may be omitted under mechanical warm air furnaces when the fire chamber provides a completely ventilated air space of not less than eighteen (18) inches in height beneath the firing chamber and at least one (1) metal baffle is provided between firing chamber and floor.

1108.5 ONE AND TWO-FAMILY DWELLINGS: The mounting and clearances herein defined may be modified for heating installations in one- and two-family dwellings as required under the specific provisions in this code for gas boilers, warm air furnaces, floor furnaces, unit and space heaters.

SECTION 1109.0 MOUNTING EXCEPTIONS FOR RESTAURANT APPLIANCES

Floor mounted restaurant type cooking appliances including ranges, ovens, boilers and similar heating appliances designed for use in hotel and restaurant kitchens shall conform to section 1108 for low heat appliances except as follows:

1109.1 EIGHTEEN INCH CLEARANCE: When restaurant type appliances are mounted on legs which provide an open ventilated space of not less than eighteen (18) inches in height under the base or which have no burners, oven or broiler within eighteen (18) inches of the floor, no special floor protection shall be required provided there is at least one (1) metal baffle between burners and floor;

1109.2 EIGHT INCH CLEARANCE: When restaurant type appliances are mounted on legs which provide an open ventilated space of not less than eight (8) inches in height under the base, the floor shall be protected as provided in section 1107.3;

1109.3 FOUR INCH CLEARANCE: When restuarant type appliances are mounted on legs which provide an open ventilated space of not less than four (4) inches in height under the base, the floor shall be protected as required in section 1107.4;

1109.4 DOUBLE TILE MOUNTING: When restaurant type appliances are not mounted on legs, the floor under the appliance shall be protected as required in section 1107.5 with a double tile base.

SECTION 1110.0 MOUNTING EXCEPTIONS FOR DOMESTIC APPLIANCES

Domestic type floor mounted heating and cooking appliances including stoves, ranges, space heaters, steam and hot water radiators and water heaters, shall conform to section 1108 for low heat appliances except as follows:

1110.1 EIGHTEEN INCH CLEARANCE: When domestic heating and cooking appliances are mounted on legs which provide an open ventilated space not less than eighteen (18) inches in height under the base or which have no burners, oven or broiler within eighteen (18) inches of the floor, no special floor protection shall be required provided there is at least one (1) metal baffle between the corners and the floor;

1110.2 FOUR INCH CLEARANCE: When domestic heating and cooking appliances are mounted on legs which provide an open ventilated space not less than four (4) inches in height under the base, the floor shall be protected with sheet metal of not less than No. 24 U.S. gage or other approved noncombustible material. When solid fuel-fired, the protection shall not extend not less than eighteen (18) inches on sides where ashes are removed.

1110.3 TILE MASONRY MOUNTING: When domestic heating and cooking appliances are not mounted on legs, the floor shall be protected as required in section 1109.4.

SECTION 1111.0 SIDE AND TOP CLEARANCES

Clearances shall be provided from wood and other combustible construction in walls, ceilings and partitions adjacent to heating appliance and equipment as follows:

1111.1 LOW HEAT APPLIANCES: A low heat appliance shall be installed to provide a clearance from combustible material of not less than eighteen (18) inches at the top, sides and rear and of not less than four (4) feet at the front;

1111.2 MEDIUM HEAT APPLIANCES: A medium heat appliance shall be installed to provide a clearance from combustible material of not less than three (3) feet at the sides and rear, of not less than four (4) feet at the top, and of not less than eight (8) feet at the front or sides where hot products of combustion are removed;

1111.3 HIGH HEAT APPLIANCES: A high heat appliance shall be installed to provide a clearance from combustible material of not less than ten (10) feet at the sides and rear, of not less than fifteen (15) feet at the top, and of not less than thirty (30) feet at the front or sides where hot products of combustion are removed.

SECTION 1112.0 CLEARANCE EXCEPTIONS

The building official may approve the installation of heating appliances with lesser clearances than specified in section 1113 within the limitations herein provided; and such variations shall be cited in the conditions of approval together with the reason therefor. Heating appliances labeled by authoritative testing agencies which are approved for installation with lessor requirements than herein provided may be installed in accordance with the conditions of such approvals.

1112.1 CLEARANCE VARIATIONS: House heating appliances, domestic type ranges and space heaters may be installed with modified clearances as herein specified from combustible materials:

	Clearance in Inches			
	Side and Top	Rear	Front	Smoke-pipe
Heating boilers and furnaces when water or masonry jacketed	6	6	48	18
When jacketed with 1½" asbestos cement.	9	6	48	18
Mechanical warm air with 250o F. temperature limit control	6	6	48	18
Domestic ranges and stoves	36	18	36	18
Ranges and stove with fire clay lining	24	18	24	18
Space heaters	36	18	36	18
Water heaters	12	12	12	18

1112.2 GAS-FIRED EQUIPMENT: The front clearance for boilers and furnaces which are gas-fired may be reduced to eighteen (18) inches. Gas-fired ranges and steam or hot water radiators may be reduced to six (6) inch front, side and rear clearances. Vent pipes for gas-fired appliances shall conform to section 1011.

1112.3 FIRE PROTECTION: The clearances from combustible materials or construction for all types of heating appliances, systems, pipes, flues, and vents which contain hot gases may be decreased from those required elsewhere in this code when the exposed construction is protected with noncombustible materials to afford the fireresistances specified in table 11-1, or the equivalent protection is secured by an approved arrangement of plates and baffles.

TABLE 11-1 - REDUCED WALL AND CEILING CLEARANCES

Fireresistance of protected construction	Fraction of specifed clearances	
	Top	Sides and rear
1/3-hour	seven-eighths	five-eighths
1/2-hour	three-quarters	one-half
3/4-hour	five-eighths	three-eighths
1-hour	one-half	one-quarter

1112.4 MASONRY ENCLOSURES: When appliances of low or medium heat capacity are insulated on the exterior with approved masonry, the clearances from combustible materials or construction may be reduced to two-thirds (2/3) of the specified clearances.

SECTION 1113.0 BOILER ROOMS

1113.1 ENCLOSURES: Except in one and two-family dwellings and as specifically required for industrial furnaces and accessory equipment or for high hazard uses in article 4, all heating boilers installed in a building or structure shall be located in a separate room or compartment completely enclosed by floors, walls and ceilings of the required fireresistance; but in no case shall the enclosure of boiler rooms have less than two (2) hour fireresistance for high pressure boilers and not less than three-quarter (3/4) hours for low pressure boilers.

1113.2 HIGH HAZARD USES: When required by the provisions of article 4, all boiler rooms connected with high hazard use groups and special occupancies, including uses involving explosion hazards in section 400.6, dry cleaning plants in section 411.3 and storage or public garages in section 413.5 shall be separately enclosed with entrance from the outside of the building only; or shall be located in segregated accessory structures with walls, floors and roofs of fireproof or noncombustible construction.

1113.3 BOILER ROOM EXITWAYS: Primary and emergency exitways from all boiler rooms shall be provided to comply with section 616.2.

1113.4 AIR SUPPLY FOR COMBUSTION.

1113.41 SOLID AND LIQUID FUELS: All rooms and spaces in which boilers, furnaces and other gas and electric-fired heating appliances are located shall be provided with sufficient fresh air supply to insure proper combustion. The direct connection of air inlets to ashpits or combustion chambers of boilers or furnaces shall be prohibited. Such air supply inlets for solid or liquid fuel-fired equipment shall have a net area of not less than one (1) square inch for each five thousand (5000) B.T.U. of input rating or fraction thereof.

1113.42 GAS-FIRED EQUIPMENT: For gas-fired equipment located in enclosed spaces, openings shall be provided near floor and ceiling of the enclosing wall or partition of not less than one (1) square inch net clear area for each one thousand (1000) B.T.U. input per hour when adequate air supply cannot be provided from adjacent spaces within the building. Openings to the outer air shall be installed and protected with approved corrosion-resistive screens with not larger than one-half (½) inch mesh.

1113.5 BOILER ROOM VENTILATION: Boiler rooms which contain a medium or high heat appliance shall be provided with gravity or mechanical ventilation complying with articles 5 and 18 to prevent the accumulation of hot air over or near the appliance. All other rooms containing heating appliances shall be provided with gravity or mechanical ventilation.

1113.6 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.

1113.7 ONE AND TWO-FAMILY DWELLINGS: In one and two-family dwellings, central heating warm air or floor furnaces may be located in utility rooms in the basement or first floor provided the appliances are mounted on noncombustible floor construction of not less than three-quarter (3/4) hour fireresistance, insulated on top with not less than one-quarter (¼) inch asbestos mill board, covered with No. 24 U.S. gage metal or the equivalent. The enclosure of utility rooms on the first floor shall be of noncombustible construction with clearances and ventilation as herein provided. Heating furnaces shall not be installed in attics except of an approved type complying with the mounting and clearance provisions of this article and equipped with type B vents.

SECTION 1114.0 ASH PITS AND BINS

1114.1 ASH PIT ENCLOSURES: Ash pits and bins shall be constructed of masonry or concrete with walls not less than six (6) inches thick, or of steel or other approved noncombustible materials or combinations thereof as herein provided.

1114.2 FLOORS AND ROOFS: The floor and roof of such pits and bins shall be of approved two (2) hour fireresistive construction; and the ceilings of rooms which contain uncovered ash pits shall be constructed of two (2) hour fireresistance; except that roofs over ash pits may be constructed of approved noncombustible materials.

1114.3 OPENING PROTECTIVES: All openings to ash storage bins shall be protected with tightly fitted approved sheet metal doors with metal frames and bucks securely anchored to the walls and roof.

SECTION 1115.0 STEAM AND HOT WATER PIPES

1115.1 CLEARANCES: Unless otherwise specifically provided in article 4 for special uses and occupancies, all high pressure steam pipes shall have a minimum clearance of one (1) inch from all combustible materials; and when such pipes pass through combustible floors or partitions, the openings shall be protected by metal or other approved noncombustible sleeves; and vertical risers arranged in groups extending through two (2) or more stories shall be enclosed in a shaft of fireresistive construction as specified in section 1016. The clearance of low pressure steam and hot water piping in walls, floors, and ceilings of combustible construction shall be not less than one-half (½) inch.

1115.2 FLOOR SLEEVES: When heating pipes pass through floors which may be subject to serious flooding, metal sleeves shall be installed to a height of at least six (6) inches above the finished floor surface and shall be provided with perforated cap plates.

1115.3 FIRESTOPPING: When heating pipes pass through floors and partitions, the open sleeve space shall be filled with noncombustible materials.

1115.4 INSULATION: All coverings or insulation used on steam and hot water pipes shall be of approved noncombustible materials; and where such pipes pass through stock shelving or are in close proximity to other combustible materials, the insulation shall be not less than one (1) inch thick.

1115.5 FREEZING TEMPERATURES: All concealed heating pipes located in exterior walls shall be protected against freezing in accordance with the approved rules.

1115.6 EXPANSION AND CONTRACTION: All heating pipes shall be installed to provide for all expansion and contraction movements due to temperature changes.

1115.7 HOT WATER LINE EXCEPTIONS: Hot water lines which are equipped with approved automatic temperature control devices which prevent a temperature of the circulating water in excess of one hundred and seventy (170) degrees F. shall be exempt from the requirements of section 1117.

SECTION 1116.0 HEATING PANELS

Air chambers or spaces in walls, partitions or ceilings used as heat exchangers in warm air heating systems shall be used only with automatic temperature limit controls that cannot be set at more than two hundred (200) degrees F. Such spaces shall be entirely enclosed with noncombustible material with noncombustible interior linings. Where hung or supported from the wall or floor construction, the bases, hangers and other supports shall be of steel or other approved noncombustible materials.

SECTION 1117.0 HOT AND COLD AIR DUCTS

1117.1 HOT AIR DUCTS: Hot air ducts for both low and high temperature systems shall be constructed entirely of noncombustible material equivalent in structural strength to the materials specified in tables 10-1 and 10-2 of section 1017. All vision panels for inspection purposes shall be constructed of wired glass or tightly fitted and secured metal panels.

1117.2 COLD AIR DUCTS: Cold air ducts shall comply with all the provisions governing hot air supply ducts except in respect to the requirements for heat insulation and clearance from combustible construction.

1117.3 FLOOR OPENINGS: Where warm air ducts pass through combustible floors, the surrounding space shall be tightly fitted with asbestos cement or other noncombustible insulating material. Where such ducts enter combustible floors, walls or partitions within six (6) feet of the heating furnace, a five-sixteenth (5/16) inch clearance shall be provided around the duct for the entire six (6) foot length. Where required firestopping is removed from walls, floors and partitions by the passage of ducts, the surrounding space shall be completely filled with asbestos, mineral wool or other noncombustible materials.

1117.4 INTEGRAL DUCTS: When hot air ducts form an integral part of the structure, the duct walls shall be constructed of not less than one-half (½) hour fireresistance.

1117.5 INSULATION: Only noncombustible exterior coverings shall be used on ducts carrying air at a temperature of more than two hundred (200) degrees F. and on the interior of ducts when required.

1117.6 CLEARANCES: Clearances of hot air metal ducts from unprotected combustible construction shall be not less than one (1) inch unless the duct is insulated with not less than one-half (½) inch of approved noncombustible materials or the exposed construction is protected to afford not less than one-half (½) hour fireresistance.

1117.7 AIR RECIRCULATION: No return duct of a mechanical warm air system shall be permitted from a kitchen, bathroom or garage or other place in which flammable or noxious vapors may be present; nor shall the recirculation of air from one dwelling unit to another dwelling unit be permitted.

1117.8 AIR FILTERS.

1117.81 CONSTRUCTION: Air filters shall be of a flameresistive type which do not give off large volumes of smoke or other objectionable products of combustion in the event of fire. Air filters shall be kept clean in accordance with the approved rules.

1117.82 FILTER COATINGS: Liquid adhesive coatings used on filters shall have a flash point not less than three hundred and fifty (350) degrees F. in an open cup tester.

1117.9 AIR CONDITIONING: The construction and installation of fire doors, dampers, fresh air inlets, emergency controls and fire-extinguishing equipment and outlets for air conditioning, ventilating and heating systems in other than one and two-family dwellings shall comply with the provisions of article 18.

SECTION 1118.0 WARM AIR HEATING SYSTEMS

1118.1 CLASSIFICATION: Warm air heating systems in one and two-family dwellings shall be classified as follows:

1118.11 LOW TEMPERATURE SYSTEMS: Low temperature systems shall include all systems which use low pressure steam or hot water for heating the air and those systems which have automatically fired warm air furnaces equipped with fans to circulate the air. The operation shall be controlled by automatic limit temperature controls that cannot be set higher than two hundred (200) degrees F.;

1118.12 HIGH TEMPERATURE SYSTEMS: High temperature systems shall include all gravity warm air hand-fired and automatically controlled.

systems in which the temperature limit controls can be set above two hundred (200) degrees F.; and any other system that does not conform to the requirements for low temperature systems.

1118.2 FURNACE CONTROLS OF LOW TEMPERATURE SYSTEMS.

1118.21 AUTOMATIC SHUT-OFF: The furnaces of an automatically-fired low temperature system which is equipped with an air-circulating fan shall be provided with an approved automatic control of the fuel supply whenever the temperature of the air in the furnace bonnet or at the main supply duct exceeds two hundred (200) degrees F.

1118.22 OVER-RUN CONTROL: When the furnace is stoker-fired, it shall be equipped with an automatic over-run control to operate the fan when the air in the furnace bonnet or at the main supply duct reaches a temperature of two hundred (200) degrees F. after the stoker and fan have shut down in normal operation.

1118.3 FURNACE CONTROLS OF HIGH TEMPERATURE SYSTEMS: A high temperature system which has an automatic fuel supply controlled by thermostat shall have the same controls as a low temperature system; except that the temperature setting may permit a maximum of two hundred and fifty (250) degrees F.

1118.4 WARM AIR FURNACES.

1118.41 MOUNTING AND CLEARANCES: The mounting of warm air heating furnaces shall comply with section 1110 and clearances with section 1114. Top clearances shall be measured from the top of the furnace bonnet or the warm air plenum chamber, whichever is higher.

1118.42 GRAVITY SYSTEMS: Gravity warm air furnaces shall be encased in a double metal casing with intervening air space extending from the top of the casing down to the bottom of the fire-box. The top of the bonnet shall be insulated with not less than three (3) inches of sand or the equivalent in magnesia, asbestos or other approved noncombustible material. Gravity furnaces shall be equipped with automatic controls to shut off the fuel supply when the temperature of the warm air pipe at any point within twenty-four (24) inches of the furnace exceeds two hundred and fifty (250) degrees F.

1118.5 REGISTERS.

1118.51 COMBUSTIBLE CONSTRUCTION: When a register is located in a floor or wall of combustible construction, the register box shall be covered with twelve (12) pound asbestos paper and a clear space of not less than five-sixteenth (5/16) inch shall be left between the sides of the box and any combustible material.

1118.52 OVER-HEAD FURNACE REGISTER: When a register is installed in the floor over the furnace, the register box shall be of double construction, with an intervening air space of not less than four (4) inches, except when the warm air duct is surrounded by a cold air passage.

1118.53 NON-AUTOMATIC SYSTEM: A system which is not automatically fired and which is not equipped with an approved temperature limit control shall be provided with dampers and shutters which are not capable of shutting off more than eighty (80) per cent of the total duct area; or in lieu thereof, one register or grille shall be installed without a closeable shutter, and the duct leading thereto shall be installed without a damper.

1118.54 RETURN AIR CONNECTIONS: Registers on more than one floor shall not be connected to the same vertical duct stack for return air to the heater.

SECTION 1119.0 CENTRAL RECIRCULATING SYSTEMS

1119.1 AIR SUPPLY: A central fan heating system of the recirculating type for use in structures with large open areas such as garages and airplane hangers, shall provide a positive air recirculation of at least one (1) cubic foot per minute when the average ceiling height is fifteen (15) feet or less; and with greater heights the air recirculation shall be increased proportionately; but in no case shall less than five (5) per cent of the air moved by the fan be taken directly from outside the building.

1119.2 AIR DUCT: Air ducts for fresh air shall be installed without dampers and shall be fully open at all times.

SECTION 1120.0 FLAMMABLE VAPOR SYSTEMS

1120.1 EXHAUST OUTLET: A duct designed to remove flammable vapors from a room of a building or structure under the requirements of section 403 shall lead as directly as possible to the outside air and the outlets shall be kept not less than ten (10) feet clear from combustible construction or finish.

1120.2 LOCATION OF DUCTS: Flammable vapor ducts shall not be incorporated in a wall except to pass directly through it. Such ducts shall never be located in a fire wall or a fire division wall.

1120.3 TRANSMISSION OF POWER: The motive power for fans located within the room from which flammable vapors are removed shall be transmitted from an outside source through a shaft operating in a bushed shaft hole, unless otherwise approved by the building official.

SECTION 1121.0 UNIT HEATERS

1121.1 CLEARANCES: Steam and hot water heaters shall be installed to provide clearances from combustible material of not less than one (1) inch to all heated portions thereof, including the steam and hot water supply piping.

1121.2 SUPPORTS: All ceiling type direct-fired unit heaters shall be substantially supported by metal hangers, brackets or other approved noncombustible supports with the clearances specified for low heat appliances in sections 1113 and 1114.

1121.3 WALL HEATERS: A wall heater shall not be located in a wall of combustible construction unless approved by the building official and shall be installed in accordance with the conditions of such approval.

1121.4 FIREPLACE HEATERS: Unit gas-fired heaters, labeled for use in fireplace recesses, shall not be used elsewhere.

1121.5 ROOM HEATERS: The installation or use of unlisted electric room heaters is prohibited. The installation or use of unlisted or unvented gas, oil or other fuel burning room heaters is prohibited.

SECTION 1122.0 FLOOR FURNACES

1122.1 LOCATION: A floor furnace shall be located so as to be readily accessible and shall not be installed in the floor of any corridor, aisle or passageway, nor in any exitway in a place of public assembly; nor shall any but a gas-fired floor furnace be installed above the first story of a building, and then only when the furnace assembly projects below the floor into a non-habitable space, enclosed in two (2) hour fireresistive walls, with clearances of at least six (6) inches on all sides and bottom, except as provided for one and two-family dwellings in section 1124.5

1122.2 ENCLOSURES: Enclosures of floor furnaces shall be constructed entirely of noncombustible materials with a fireresistance rating of not less than three-quarter (3/4) hours, provided with suitable means for combustion-air intake which furnishes adequate direct air supply to insure proper combustion complying with section 1115.42 and with means of access for purposes of servicing the furnace.

1122.3 FURNACE SUPPORTS: Floor furnaces shall be installed only in floors of noncombustible construction of not less than two (2) hours fireresistance, except as provided for one and two-family dwellings in section 1124.5 with the following clearances:

1122.31 PIT CLEARANCES: Such floor furnaces, when other than gas-fired shall be mounted independently of the floor, grille with the following clearances: six (6) inches at the bottom and twelve (12) inches at the sides, except that the clearance on the control side shall be not less than eighteen (18) inches;

1122.32 PIT WATERPROOFING: When there is likelihood of water rising above the bottom clearance, the pit shall be constructed with an approved watertight enclosure with the sides extending not less than four (4) inches above the ground level.

1122.33 PIT ACCESS OPENINGS: The access foundation wall opening or floor trap door shall be at least eighteen by twenty-four (18x24) inches in size; and the under floor passage to the furnace shall be at least twenty-four by twenty-four (24x24) inches in cross-section.

1122.4 FURNACE CLEARANCES: Floor furnace clearances shall comply with section 1112 and flue and vent clearances with section 1011.

1122.5 ONE AND TWO-FAMILY DWELLINGS: Furnace enclosures may be constructed of noncombustible materials with a fireresistance of not less than three-quarter (3/4) hours and a minimum clearance of six (6) inches at sides and bottom for servicing. Means shall be provided for supporting the furnace when the floor grille is removed.

1122.6 PRESSURE REGULATOR: The outlet duct temperatures shall be not greater than two hundred and fifty (250) degrees F. unless such installation is specifically approved by the building official; and in gas-fired furnaces, a gas pressure regulator shall be provided so that the gas input does not exceed the manufacturer's rating.

SECTION 1123.0 INDUSTRIAL FURNACES AND POWER BOILERS

Industrial furnaces and power boilers shall be designed and installed to provide fire and structural safety based on their character, size, temperature and explosion hazard in accordance with accepted engineering practice and within the limitations of this code for high heat appliances.

1123.1 FOUNDATIONS OF FURNACES: Foundations for high heat boilers, furnaces and other appliances shall be isolated and insulated from floor slabs, foundations and footings of the building. The foundation bed shall be properly insulated to avoid disintegration or other structural injury of the foundation due to high temperatures.

1123.2 STRUCTURAL INSULATION.

1123.21 STRUCTURAL FRAME: The furnace setting and supports shall not be located in direct contact with unprotected structural steel or reinforced concrete framing, but shall be insulated or separated therefrom by a clearance of not less than six (6) inches.

1123.22 HEAT INSULATION: Steel or reinforced concrete framing adjacent to a boiler or furnace in industrial plants and subject to temperature in excess of seven hundred and fifty (750) degrees F. shall be protected with fireproofing of not less than four (4) hour fireresistance, or the design stress shall be reduced to provide structual safety.

1123.3 AIR SUPPLY: Sufficient air supply for combustion shall be provided in conformity to section 1115.

1123.4 STATE APPROVAL: Thermal energy utilization units and appurtenances having an energy input capacity of at least one hundred million BTU (100,000,000) per hour require the written approval of plans and specifications by the Massachusetts Department of Public Health in accordance with rules and regulations promulgated in accordance with section 142B, Chapter 111, of M.G.L.A., as amended.

SECTION 1124.0 UNFIRED PRESSURE VESSELS

All unfired pressure vessels shall comply with the construction, clearance and fire protection requirements of this article for high pressure boilers designed for the generation of steam or power and with the boiler code standards listed in the references of this article.

1124.1 INSPECTION: An owner or user shall not permit the operation or use of an unfired pressure vessel until such installation has been inspected for structural strength and safety and a certificate of operation has been secured from the authorized agency.

1124.2 CERTIFICATE: The certificate of approval shall state the maximum pressure which may be maintained in the vessel.

1124.3 IDENTIFICATION LABEL: Every approved unfired pressure vessel shall be assigned a serial number for the purpose of identification, which shall be stamped or otherwise permanently and prominently indicated thereon and recorded in the building department.

SECTION 1125.0 RESTAURANT COOKING APPLIANCES

All ranges, ovens, broilers and other miscellaneous low heat appliances of the types designed for floor mounting in hotel and restaurant kitchens shall comply with the provisions of sections 1109 and 1112 for low heat appliances and as herein provided.

1125.1 VENTILATING HOODS: Unless enclosed and vented in an approved manner, a range, candy kettle, cruller furnace, appliance for the frying of bakery and confectionery products and any similar apparatus generating hot and noxious smoke and gases shall be provided with a ventilating hood and ducts to remove such smoke, gases and vapors directly to the outer air.

1125.2 CONSTRUCTION: Hoods and their ducts shall be constructed of approved noncombustible materials with tight joints and the width and length of the hood shall be not less than that of the appliance served.

1125.21 HEIGHT: The hood shall be installed not more than seven (7) feet above the floor and shall completely cover the appliance served with not less than eighteen (18) inch clearances to combustible material unless the construction is protected as specified in section 1114.3.

1125.22 FLUE CONNECTION: The hood or duct from a restaurant range or similar appliance shall connect directly to an approved masonry flue or metal smokestack complying with article 10. Connections to any other ventilating system shall be prohibited.

1125.3 VENTS: The vent of a floor-mounted restaurant type cooking appliance installed under a hood may discharge into the space under the hood, providing the vent extends through or beyond any grease screen installed in the hood.

1125.4 FILTERS AND SCREENS: The exhaust duct shall be equipped with filters or screens which are readily accessible for removal and cleaning to prevent grease from accumulating in the smoke flue, chimney or smokestack to which it is connected.

SECTION 1126.0 HOT WATER SUPPLY HEATERS

All range boilers, hot water heaters and storage tanks shall be equipped with temperature limit controls and pressure relief valves as herein required and shall conform to the applicable accepted engineering practice standards listed in the reference section of this article.

1126.1 AUTOMATIC HOT WATER SUPPLY: Automatic or remote control ignition equipment on domestic hot water heating devices using liquid fuel shall be installed only in connection with a burner equipped with a safety pilot or other approved device arrange to automatically shut off the fuel supply to the main burners if the pilot flame is extinguished. All water heaters with an automatic remote-control pilot, or with means of lighting other than a manual method, shall be equipped with approved down draft diverters on the flue pipe from the heater arranged to prevent extinguishment of the pilot or heating flame.

1126.2 DIRECT-FIRED GAGE EQUIPMENT: Approved relief valves and pressure gages shall be installed in all direct-fired cast iron water heaters with cored sections, and in all heaters with a check valve located between the water meter and the heater or tank.

1126.3 PRESSURE RELIEF VALVES: The rate of discharge of pressure valves shall limit the pressure to rise to ten (10) per cent of the pressure at which the valve is set to open for any given heat input.

1126.4 TEMPERATURE RELIEF VALVES: Temperature relief valves shall be capable of discharging sufficient hot water at two hundred and ten (210) degrees F. without any further rise in temperature.

1126.5 VACUUM RELIEF VALVES: All copper tanks shall be equipped with approved vacuum relief valves.

1126.6 RELIEF OUTLET WASTES: The size of relief outlet waste valves shall be less than the cross-sectional area of the valve discharge outlet. No pressure, temperature or other type relief valve shall discharge directly to the building drainage system.

1126.7 PROHIBITED USES: No solid or liquid fuel or gas-fired water heaters shall be installed in bathrooms, bedrooms, or other habitable spaces or in any space with a volume of less than three hundred (300) cubic feet unless such space contains adequate provision for ventilation, clearances, and combustion air; nor shall vent pipes designed for use with gas appliances be used with solid or liquid fuel-fired equipment except as provided for alternate flue construction.

SECTION 1127.0 OIL BURNERS

1127.1 REGULATIONS OF THE COMMONWEALTH OF MASSACHUSETTS: Oil burners and related equipment are subject to the Rules and Regulations promulgated in FPR-3, made in accordance with the provisions of Section 10, of Chapter 148 of the M.G.L.A., as amended. Wnvented room heaters are regulated by section 1011.52.

SECTION 1128.0 DRYING ROOMS

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.

1128.1 PIPING CLEARANCE: All overhead heating pipes shall have a clearance of not less than two (2) inches from combustible contents of the dryer.

1128.2 INSULATION: When the operating temperature of the dryer is one hundred and 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 (¼) inch asbestos mill board or other approved equal insulation.

1128.3 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.

SECTION 1129.0 NON-FUEL-FIRED INCINERATORS

Non-Fuel-Fired Incinerators are prohibited by the regulations published by the Department of Public Health in accordance with Section 142D of Chapter 111 of the M.G.L.A., as amended.

SECTION 1130.0 FUEL-FIRED INCINERATORS

All fuel-fired incinerators shall conform to the requirements of this section.

1130.1 COMBUSTION CHAMBER:

1130.11 NINE SQUARE FEET GRATE AREA: The combustion chamber for incinerators with a capacity of less than two hundred and fifty (250) pounds refuse per hour or grate area not more than nine (9) square feet shall be constructed of eight (8) inches of approved masonry which is lined with four and one-half (4½) inches of fire brick laid in fire clay mortar.

1130.12 OVER NINE SQUARE FEET GRATE AREA: When the capacity exceeds two hundred and fifty (250) pounds of refuse per hour or grate area more than nine (9) square feet, the combustion chamber shall be constructed of eight (8) inches of approved masonry which is lined with nine (9) inches of fire brick laid in fire clay mortar.

1130.13 STEEL ENCLOSURE: The exterior four (4) inches of masonry on the unfired side may be replaced by a steel plate casing not less than three-sixteenth (3/16) inches thick.

1130.2 STRUCTURAL REINFORCEMENT: The walls of the combustion chamber shall be strongly braced and stayed with structural steel shapes, or reinforced concrete or other approved reinforcement.

1130.3 LOCATION: Combustion chambers and waste material bins or containers shall be located in a room or compartment devoted to no other purpose; or they may be located in the same room with the boiler or heating plant. Such room shall be separated from the rest of the building by floors, walls and ceilings of not less than two (2) hours fire-resistance with approved one and one-half (1½) hour fire doors or the approved labeled equivalent in all openings complying with article 9.

1130.4 INCINERATOR SMOKEPIPES.

1130.41 THICKNESS OF METAL: Flue connections and breechings shall be constructed of not less than No. 16 U.S. gage sheet metal when less than twelve (12) inches and No. 12 U.S. gage metal when more than twelve (12) inches in diameter or largest dimension.

1130.42 LINING: When the breeching is between twelve (12) and eighteen (18) inches in diameter, it shall be lined with not less than two and one-half (2½) inches of fire brick; and when it is over eighteen (18) inches in diameter, it shall be lined with not less than four and one-half (4½) inches of fire brick laid in fire clay mortar.

1130.43 COMBINED BREECHINGS: When an incinerator breeching combines with a smokepipe from another appliance, such connection shall also be lined as required for a direct incinerator flue connection; except that when the cross-sectional area of the combined connection is not less than four (4) times the area of the incinerator breeching, the lining may be omitted.

1130.5 CLEARANCE OF INCINERATOR SMOKEPIPES: A flue connection or breeching shall have a clearance on all sides from combustible materials or construction of not less than thirty-six (36) inches, except as provided in section 1114.3.

SECTION 1131.0 MISCELLANEOUS REFUSE INCINERATORS

1131.1 INTEGRAL CONSTRUCTION: When constructed as an integral part of a building, incinerators for the reduction of garbage, refuse or other waste materials shall be installed in accordance with the provisions of section 1134.0.

1131.2 PORTABLE EQUIPMENT: Incinerators that do not form an integral part of the building construction shall comply with the provisions of sections 1105, 1106 and 1123 for low or medium heat industrial furnaces. The chimneys and smokepipes shall comply with the requirements of sections 1005, 1009 and 1010 for low and medium temperature flues and smokestacks.

SECTION 1132.0 REFUSE CHUTES

1132.1 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) hours fireresistance, unless otherwise approved by the building official.

1132.2 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.

1132.3 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 927.

1132.4 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 three-quarter (3/4) hours and in which the openings are equipped with fire doors or other approved protectives of not less than three-quarter (3/4) hours fireresistance rating or their approved labeled equivalent.

1132.5 OPENING PROTECTIVES: All openings between refuse rooms, chutes and incinerator rooms shall be protected with one and one-half (1½) hour fire doors or their approved labeled equivalent complying with article 9.

SECTION 1133.0 REFUSE VAULTS

1133.1 REFUSE VAULT ENCLOSURES: A vault for receiving combustible refuse from an exhaust system shall be constructed of not less than three (3) hour fireresistive assemblies.

1133.2 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 (1½) hour fireresistance rating or the approved labeled equivalent complying with article 9.

1133.3 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 1017.

1133.4 FIRE PROTECTION: A vault for combustible refuse which exceeds three hundred and sixty (360) cubic feet in volume shall be protected by an automatic sprinkler or other approved automatic fire-extinguishing system conforming to article 12.

SECTION 1134.0 BLOWER AND EXHAUST SYSTEMS

1134.1 DUCTS FOR BLOWER SYSTEMS: The ducts for blower and exhaust systems for disposal of dust, stock and vapors from industrial and material processes shall be constructed of metal or other approved non-combustible materials as provided in table 11-2 for transporting non-abrasive and abrasive materials and table 11-3 for clearance of ducts carrying flammable vapors and dust from combustible construction. For vapor and dust temperatures in excess of nine hundred (900) degrees F., all ducts shall be lined with approved refractory materials.

TABLE 11-2 - THICKNESS OF STEEL SHEET EXHAUST DUCTS IN U.S. STANDARD GAGE

Diameter in inches	Non-abrasive	Abrasive
Less than 9	24	20
9 to 18	22	18
18 to 30	20	16
30 to 36	18	14
More than 36	16	12

TABLE 11-3 - CLEARANCE OF EXHAUST DUCTS IN INCHES

Temperature of vapor or dust in degrees F.	3 to 8 inch ducts	Over 8 inch ducts
175 to 600	8	12
600 to 900	18	24
Higher than 900	24	24

1134.2 CHUTES: No room, hallway, attic, or other part of a building or structure and no hollow or other concealed space in walls or partitions shall be used as an integral part of a blower or exhaust system handling combustible materials or vapors, unless designed and constructed as required for approved chutes in section 1138 or approved ducts for flammable vapor systems in section 1122.

1134.3 LOCATION OF FAN: The fan for blowing flammable materials or vapors shall comply with the approved rules and shall be located and intalled so as to be readily accessible. No fan for blowing flammables shall be located in a fire wall or fire division wall.

1134.4 ELECTRIC GROUND: All metal parts of the apparatus used for blower and exhaust systems and all shafting in connection therewith shall be electrically grounded as required in the Massachusetts Electrical Code.

SECTION 1135.0 DUST, STOCK AND REFUSE CONVEYOR SYSTEMS

1135.1 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.

1135.2 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. In no case shall a collector or separator 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.

1135.3 DISCHARGE PIPES: Discharge pipes shall conform to all the requirements for ducts including clearances required for high heat appliances in sections 1017, 1117 and 1812. 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 which utilizes induced or forced draft.

1135.4 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.

1135.5 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.

1135.6 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.

1135.61 SCREENS: When a screen is used in a safety relief vent, it shall be so attached as to permit ready release under emergency pressure.

1135.62 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.

Reference Standards - Article 11

AMSE		1965, 1966, 1968, 1971	Boiler and Pressure Vessel Code
ASTM	C106	1967	Refractories for Incinerators
ASTM	C401	1960	Castable Refractories
ASTM	C178	1947	Air-Setting Refractory Mortar
ASTM	C612	1967	Mineral Fiber Block and Board Thermal Insulation
ASTM	E84	1970	Method of Test for Surface Burning Characteristics of Building Materials
ASTM	C105	1947	Ground Fire Clay as a Mortar
IIA		1970	Incinerator Standards
NFPA	90B	1973	Standard for the Installation of Residence Type Warm Air Heating Systems
NFPA	91	1973	Standard for the Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal or Conveying

ARTICLE 12

FIRE PROTECTION AND FIRE-EXTINGUISHING EQUIPMENT

SECTION 1200.0 SCOPE

The provisions of this article shall control the installation of fire alarms, fire communications systems, and fire-extinguishing service equipment. All electrical equipment and the details of wiring for fire-extinguishing installations shall comply with the provisions of the Commonwealth of Massachusetts State Electrical Code and the applicable standards listed in the reference at the end of this article.

Plans submitted under section 113.5 of this Code relative to this article must have the approval of the various officials having jurisdiction before installation begins.

1200.1 APPROVED DEVICES: The building official shall accept only that equipment and material which has been approved by the State Building Code Commission of the Commonwealth of Massachusetts and said equipment and materials shall be installed to comply with those requirements established for the conditions of their use by the said Commission.

SECTION 1201.0 DEFINITIONS

AUTOMATIC FIRE ALARM SYSTEM: a system which automatically detects a fire condition and actuates a fire alarm signal device.

AUTOMATIC WATER SUPPLY SOURCE: water supplied through a gravity or pressure tank, or automatically operated fire pumps, or from a direct connection to an approved city water main.

AUTOMATIC SPRINKLER HEAD: a device connected to a water supply system that opens automatically at a predetermined fixed temperature and disperses a stream or spray of water.

AUTOMATIC SPRINKLER SYSTEM: an arrangement of piping and sprinklers designed to operate automatically by the heat of fire and to discharge water upon the fire.

CENTRAL STATION SYSTEM: an automatic sprinkler or fire alarm system in which all equipment is supervised by a central or proprietary station to which all alarm signals are transmitted and relayed to the municipal fire department.

DELUGE SYSTEM: a sprinkler system designed to deliver large quantities of water through open sprinkler heads, in which the water supply is controlled by a valve actuated by a thermostatic device

on a predetermined temperature of rate of temperature rise.

FIRE DRILL: the organized procedure conducted with or without a private fire brigade for vacating the occupants of a building and for operating the first-aid fire appliances and equipment for the extinguishing of fire and safeguarding of life.

HORIZONTAL FIRE LINE: a fire line installed around the interior walls and columns of a building, pier or wharf, with hose outlets located so that every part of the floor area is within reach of at least one fire stream.

MANUAL FIRE ALARM SYSTEM: an interior alarm system composed of sending stations and signaling devices in a building, operated on an electric circuit, so arranged that the operation of any one station will ring all signals throughout the building or at one or more approved locations. Signals may be either non-coded, or coded to indicate the floor area in which the signal originated and may be transmitted to an outside central station.

NON-AUTOMATIC SPRINKLER SYSTEM: a sprinkler system in which all pipes are maintained dry and which is equipped with a siamese fire department connection.

ONE-SOURCE SPRINKLER SYSTEM: an automatic sprinkler system which is supplied from one of the approved automatic sources of water supply.

PARTIAL SPRINKLER SYSTEM: an automatic sprinkler system consisting of a limited number of automatic sprinkler heads serviced from the building water supplies with one or more fire department siamese connections as required, for use in exitway facilities and isolated hazardous locations when approved by the building official.

SPRINKLER SYSTEM, CHEMICAL: a system of automatic sprinklers controlled by thermostatic operating devices for the diffusion of approved fire-extinguishing chemicals or gases.

SPRINKLER SYSTEM, DRY PIPE: a system in which all pipes and sprinkler heads are filled with air under pressure and the water supply is controlled by an approved automatic dry-pipe valve in the event of fire, actuated either by the release of air or by thermostatic electric control.

SPRINKLER SYSTEM, THERMOSTATIC: an open or closed head sprinkler system operated through an auxiliary thermostatic device which functions at a predetermined rate of temperature rise.

SPRINKLER SYSTEM, WET PIPE: a system of automatic sprinklers in which all pipes are filled with water at all times.

SPRINKLERED: equipped with an approved automatic sprinkler system properly maintained.

STANDPIPE: a wet or dry fire line installed exclusively for the fighting of fire, extending from the lowest to the topmost story of a building or structure with hose outlets at every floor equipped with reducing valves and designed to operate at required working pressures.

STANDPIPE, DRY: a standpipe fire line without permanent or automatic water supply equipped with a siamese connection for use of the fire department.

STANDPIPE, FIRST-AID: an auxiliary vertical or horizontal fire line designed primarily for emergency use by the occupants of the building or by a private fire brigade before the arrival of the municipal fire department.

STANDPIPE, WET: a standpipe fire line having a primary water supply constantly available at every hose outlet, or made available by opening the hose outlet or by automatic functioning of a control station.

SUPERVISED SPRINKLER SYSTEM: a system in which all water supply, valves and accessory equipment is provided with electrical contact devices to transmit signals to an outside central supervisory station.

TWO-SOURCE SYSTEM: an automatic sprinkler system which is supplied from a combination of any two of the approved automatic sources of water supply, or from two (2) pressure tanks, or by direct connections to the municipal water supply on two (2) streets in which the water mains are separately controlled.

WATER CURTAIN: a system of approved open or closed sprinkler heads or perforated pipes installed on the exterior of a building at eaves, cornices, window openings, and on mansard or peak roofs with water supply under manual control; or installed around openings in floors or walls of a building with water supply under thermostatic control.

SECTION 1202.0 PLANS AND SPECIFICATIONS

Before any standpipe or sprinkler equipment is installed or existing equipment which involves ten (10) or more sprinkler heads in any one fire area or on any one floor is remodeled, or before the installation or extension of any interior fire alarm signal system, a preliminary set of plans, drawn to suitable scale shall be submitted by a qualified registered professional engineer to the building official with specifications in sufficient detail showing essential features of the construction, heights of stories, location, size and arrangement of all required piping and accessories for each proposed standpipe fire line and sprinkler installation, and layout and wiring of the fire alarm signal system. Plans and specifications for fire suppression systems as required in this article for high-rise structures

with a height of seventy (70) feet or more above mean grade must be submitted by a registered professional engineer qualified by experience to design and specify the appropriate elements of the fire suppression system.

1202.01 APPROVAL BY OTHER AGENCIES: Approval by other agencies having jurisdiction is required for any change in fire protection and fire extinguishing equipment.

1202.1 STANDPIPE FIRE LINES: Plans for the standpipe installation shall show the size and location of siamese connections, tanks and pumps, hose stations and length of hose, stairways, stair sections and all subdividing partitions and walls.

1202.2 SPRINKLER SYSTEMS: Plans for the sprinkler installation shall show the location and capacity of water supply, connecting piping, feed lines and risers, all gate, check, alarm and dry-pipe valves, location and number of all heads, locations and number of all actuating devices, and standpipe fire lines, if any.

1202.3 INTERIOR FIRE ALARMS: Plans for the interior fire alarm signal system shall show location and number of all sending stations and signals with specifications of the type, construction, and operation of the system.

1202.4 APPROVED PLANS: After acceptance of the preliminary plans, three (3) final sets of plans shall be filed for final approval of every installation of standpipe fire line, sprinkler and fire alarm signal system.

SECTION 1203.0 ACCEPTANCE TESTS

Before final approval and acceptance of fire-extinguishing equipment in any building, pier, wharf or other structure, the installation shall be subjected to the tests prescribed herein or in the approved rules. It shall be unlawful to cover up or permanently conceal piping, wiring and accessory devices in any portion of a newly constructed system until it has been tested and approved.

1203.1 STANDPIPE TESTS: Upon completion of a standpipe installation, every standpipe fire line shall be tested for static pressure and flow, including the top and bottom outlets in the presence of the fire official authorized to witness such test.

1203.11 PRESSURE TEST: The test shall demonstrate that the system will sustain a hydrostatic pressure of not less than one hundred (100) pounds per square inch at the topmost hose outlet, and not less

than three hundred (300) pounds per square inch at the fire department connection to the risers. In buildings not exceeding three (3) stories nor more than forty (40) feet in height, the test pressures may be reduced to not more than twenty-five (25) percent in excess of the normal operating pressure.

1203.12 TEMPORARY CONSTRUCTION STANDPIPES: The feed mains, risers, interconnections and branch lines of temporary standpipes in structures under erection shall be maintained watertight when work is not being done on the system.

1203.2 SPRINKLER TESTS.

1203.21 WET PIPE SYSTEMS: Automatic wet pipe systems shall be subjected to a hydrostatic pressure test for two (2) hours duration of not less than two hundred (200) pounds per square inch in every part of the installation exclusive of water supply tanks; except that in buildings of not more than three (3) stories nor more than forty (40) feet in height, the test pressure need not be more than fifty (50) pounds per square inch in excess of the normal pressure carried in the system or in excess of the pressure necessary to operate the highest sprinklers in non-automatic systems.

1203.22 AUTOMATIC DRY PIPE SYSTEMS: Automatic dry pipe systems shall be tested to forty (40) pounds per square inch air pressure for twenty-four (24) hours duration with a maximum permissible pressure loss of two (2) pounds per square inch.

1203.23 PRESSURE TANKS: Pressure tanks shall be tested to a pressure of one and one-half (1½) times the working pressure.

1203.3 FIRE ALARM TESTS: Upon completion of a fire alarm system, the installation shall be subject to a test to demonstrate its efficiency of operation. All wiring shall be so installed that when completed the system will be free from short circuits and from grounds other than as provided in article 250 of the Massachusetts State Electrical Code.

SECTION 1204.0 PERIODIC INSPECTIONS AND TESTS

1204.1 INSPECTIONS: Inspections and field tests of fire-extinguishing equipment shall be made by the owner, his authorized representative, or insurance organization and the fire department of the municipality as herein required to enforce the maintenance of all service equipment in operating condition and to familiarize the fire-fighting force with existing conditions in all buildings and structures.

1204.2 MAINTENANCE AND TEST RECORDS: All fire-fighting and fire-extinguishing service equipment and appliances, including valves, hose, tools and accessories shall be maintained readily available and in good working order at all times for immediate use of the occupants of the building and the fire department. Records of required inspections and tests shall be available for examination by or filed with the fire official as he may direct.

1204.3 TEST EXPENSE: All tests shall be conducted at the owner's risk and expense and not less than forty-eight (48) hours' notice shall be given to the building or fire official having jurisdiction before any test is made.

SECTION 1205.0 EXISTING BUILDINGS AND FIRE SERVICE EQUIPMENT

1205.1 EXISTING STANDPIPES: Standpipe fire lines heretofore approved shall not be required to be altered to conform to the provisions of this article except when the building is extended in height or in area, or the occupancy is changed to a use requiring superior protection; except that the following minimum requirements shall apply to all installations:

1205.11 WATER SUPPLY: There shall be a reserve of fifteen hundred (1500) gallons of water in the gravity tank for exclusive use of the standpipe:

1205.12 GRAVITY TANK: The gravity tank shall be fed by direct city water connection at a rate of not less than sixty-five (65) gallons per minute or by booster pump of equal capacity; and the bottom of the tank shall be located not less than twenty (20) feet above the topmost hose outlet;

1205.13 FIRE DEPARTMENT CONNECTION: Existing siamese hose connections shall be maintained in a manner satisfactory to the fire official.

1205.2 EXISTING SPRINKLERS: Sprinkler systems and devices heretofore approved shall not be required to conform to the provisions of this article except when the fire hazard due to construction and use of the building is increased, or when substantial additions are made to the building or when additional protection is deemed necessary for the safety of the occupants.

1205.21 VOLUNTARY PROTECTION: Existing sprinkler systems not required by the Basic Code which have been installed voluntarily need not conform to the provisions of this article except that the siamese hose connection shall be maintained as directed by the fire official.

1205.22 COMMUNICATING BUILDINGS: When a completely sprinklered building communicates with another not so equipped, the communicating openings shall be provided with an opening protective on both sides of the wall having a combined fireresistance rating not less than required by table 9-1 and section 908 for fire walls or fire division walls.

1205.23 WATER SUPPLY: The service supply of existing systems shall be of sufficient size to operate the largest number of sprinklers in one (1) fire area except that the building official may accept systems in buildings of low fire hazard when the supply is adequate to furnish at least ten (10) sprinkler heads, and the supply line is at least one and one-half (1½) inches in diameter.

1205.3 EXISTING FIRE ALARMS: Fire alarm signal systems heretofore installed in buildings and structures in accordance with the rules then in force shall be accepted so long as they are maintained in good working order satisfactory to the administrative official.

SECTION 1206.0 WET STANDPIPE REQUIREMENTS

Except as herein required, all buildings and structures hereafter erected, other than one- and two-family dwellings (use group L-3) and all buildings heretofore erected which are not already equipped with two and one-half (2½) inch or larger standpipes, shall comply with the provisions of this article.

1206.1 STANDPIPE REQUIREMENTS.

1206.11 CONDITIONS REQUIRING STANDPIPES: All buildings, except use group L-3, over three (3) stories in height shall require standpipes; and other buildings according to table 12-1 below:

TABLE 12-1 CONDITIONS REQUIRING STANDPIPES

Use Group	Conditions
ALL (Except L-3)	>3 stories
B-1	3 stories or >3,000 ~~ø~~ per floor
C	3 stories or >3,000 ~~ø~~ per floor
D	3 stories or >3,000 ~~ø~~ per floor
E	3 stories or >3,000 ~~ø~~ per floor
F	3 stories
F-1, F-2, F-3	>300 occupants
H	3 stories
L-1	3 stories

1206.12 STANDPIPE SIZES: Standpipes shall extend from the lowest portion of the building to a height of five (5) feet above the finished floor of the topmost story and shall have a minimum diameter as follows:

TABLE 12-2

Maximum Building Height			Minimum Standpipe Size
STORIES		FEET	CENTER DIAMETER
3	or	40	2½ inches
4	or	50	2½ inches
5	or	65	4 inches
6	or	75	4 inches
7[1]	or	85	6 inches
8[1]	or	95	6 inches
		95 to 250	6 inches
		over 250	8 inches

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

1206.2 NUMBER OF STANDPIPE RISERS.

1206.21 BASED ON FLOOR AREA: The number of standpipe risers shall be such that all parts of every floor area can be reached by a thirty (30) foot stream from a nozzle attached to one hundred (100) feet of hose connected to the riser outlet.

1206.22 BASED ON STREET FRONTS: There shall be at least one (1) riser for each street front on which the building or structure faces; except that a corner building need not be considered as facing on more than (1) street.

1206.23 BUILDINGS SEVENTY (70) FEET IN HEIGHT OR OVER: All buildings seventy (70) feet in height or over must have each floor supplied by a minimum of two (2) combination risers.

1206.24 COMBINED USE: The standpipe system risers may also serve as the fire sprinkler system risers in all buildings having both systems whether required or not.

1206.3 LOCATION OF STANDPIPES: Insofar as practicable, standpipes shall be located with outlets within stairway enclosures; but when stairway enclosures are not available, the standpipes shall be located in a common corridor or accessible from an interior or exterior stairway or a smokeproof tower; but in any case, one riser shall be located in the main stairway or smokeproof tower.

1206.4 STANDPIPE PROTECTION: Standpipe fire lines shall be protected from freezing and mechanical and fire damage.

1206.5 STANDPIPE CONSTRUCTION.

1206.51 HEIGHT: Standpipe fire lines shall extend from the lowest to the topmost story of the building or part of building which they serve and shall be installed progressively with the erection of the building.

1206.52 INTERCONNECTIONS: When more than one (1) standpipe is required in a building they shall be interconnected at their bases by pipes of size equal to that of the largest riser so as to permit water from any source to supply all risers. Each riser shall be equipped with the O.S.& Y.valve so as to permit individual risers to be taken out of service if damaged or broken without interrupting the water supply to other risers.

1206.53 HOSE CONNECTIONS: Subject to the provisions of section 1209, standpipes shall be equipped in every story with 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 municipal fire department's standard, located not more than five (5) feet above the floor level.

1206.6 HOSE: Except as provided in section 1209, standpipes located inside buildings and structures shall have not less than one hundred (100) feet of one and one-half (1½) inch diameter hose equipped with a one-half (½) inch nozzle and couplings conforming to the municipal fire department's standard at each outlet complying with section 1206.3 and hung in an approved rack or cabinet.

1206.7 FIRE DEPARTMENT CONNECTION.

1206.71 LOCATION: Every standpipe fire line shall be equipped with an approved siamese fire department inlet connection constructed of approved corrosion-resistive metal, located on a street front of the building not less than two (2) feet nor more than four (4) feet above grade.

1206.72 PROJECTION: When located two (2) feet or more above grade, the fire department connection shall not project beyond the street lot line or legal building line.

1206.73 STANDPIPE FEEDER: The pipe connecting the siamese to the standpipe shall be at least four (4) inches in diameter, but not less than the size of the interconnecting feed lines. When the automatic supply is from a city main or a yard hydrant system, a two and one-half (2½) inch valved and threaded hose outlet shall be provided to enable the system to be drained.

1206.74 HOSE THREADS: All hose threads in the fire department connection shall be uniform with that used by the municipal fire department.

1206.75 IDENTIFICATION: The fire department connection shall be suitably marked with raised letters not less than one (1) inch high, reading "TO STANDPIPE," or otherwise identified for dry standpipes, automatic or open sprinkler systems as provided in sections 1208.3 and 1212.8.

SECTION 1207.0 STANDPIPE WATER SUPPLIES

The source of water supply to standpipes shall be adequate to maintain a flow of two hundred (200) gallons per minute with not less than fifty (50) pounds per square inch pressure at the topmost outlet of the building or structure and shall conform to the minimum requirements of this section.

1207.1 PUBLIC WATER STANDPIPE SUPPLY: When supplied by a street main, the acceptable flow shall be not less than five hundred (500) gallons per minute from a hydrant within two hundred (200) feet of the building under the minimum pressures herein specified.

1207.2 GRAVITY TANK STANDPIPE SUPPLY: When supplied by a gravity tank, the tank shall be so located that the bottom shall be not less than twenty-five (25) feet above the topmost outlet. The tank shall

have a capacity of not less than five thousand (5000) gallons; and if jointly used for house supply and sprinkler systems it shall be arranged to provide a reserve supply of not less than five thousand (5000) gallons at all times for the standpipe fire line and such additional capacity to provide for yard hydrants when required.

1207.3 PRESSURE TANK STANDPIPE SUPPLY: When supplied by a pressure tank, the tank shall be located in the top story or on the roof of the building or structure and shall have an air pressure and water capacity to supply not less than forty-five hundred (4500) gallons and such additional capacity to provide for yard hydrants when required.

1207.4 FIRE PUMP STANDPIPE SUPPLY: When supplied by an automatic fire pump, the combined pump capacity shall be not less than five hundred (500) gallons per minute for a four (4) inch standpipe; seven hundred and fifty (750) gallons per minute for a six (6) inch standpipe or for two (2) four (4) inch standpipes; and not less than one thousand (1000) gallons per minute for an eight (8) inch standpipe, or for two (2) six (6) inch standpipes. When pumps are not supplied from the street main, the source shall furnish sufficient water for full operation of the standpipe for not less than one (1) hour.

SECTION 1208.0 DRY STANDPIPE FIRE LINES

When in the opinion of a qualified registered professional engineer or architect, the fire hazard involved in the use of the building type of construction does not warrant a constant, automatic water supply to insure fire safety, the building official may accept a dry standpipe fire line in buildings not more than seventy (70) feet in height. One riser shall be provided for each ten thousand (10,000) square feet of fire area or fraction thereof.

1208.1 SIZE AND CAPACITY OF DRY STANDPIPES: Dry standpipes shall have a minimum diameter of four (4) inches and shall be capable of delivering two hundred and fifty (250) gallons of water per minute simultaneously from each of any three (3) outlets under the operation of one (1) fire engine or pumper; except that in existing installations, the fire official may accept a smaller size when deemed adequate by him.

1208.2 FIRE DEPARTMENT CONNECTION FOR DRY STANDPIPES: Siamese fire department connections shall be provided as herein specified; two-way connection on two and one-half (2½) and four (4) inch fire lines; three-way connection on five (5) inch fire lines; and four-way connection on six (6) inch or larger fire lines.

1208.3 IDENTIFICATION OF FIRE DEPARTMENT CONNECTION: Fire department connections shall be suitably marked with raised letters at least one (1) inch in height reading "TO DRY STANDPIPE."

SECTION 1209.0 FIRST-AID STANDPIPE FIRE LINES

First-aid standpipe fire lines for use of the occupants of a building or of the trained fire brigade shall comply with the provisions of this section. Such systems can be combined with the main standpipe fire lines by direct connection to the standpipe riser as provided in section 1206.52.

1209.1 SIZE OF FIRST-AID STANDPIPES: The minimum size of first-aid standpipe fire lines shall be one and one-half (1½) inches in buildings which are not more than six (6) stories nor more than seventy (70) feet in height.

1209.2 NUMBER OF FIRST-AID RISERS: The number and location of risers shall be such that all parts of every floor area requiring protection can be reached within twenty (20) feet by a three-eighths (3/8) inch nozzle attached to not more than seventy-five (75) feet of one and one-half (1½) inch hose connected to the standpipe outlet mounted on a rack or in a cabinet at each outlet.

1209.3 FIRST-AID WATER SUPPLY: The water supply for first-aid protection shall be sufficient to service two (2) hose streams for a period of thirty (30) minutes with a flow of seventy (70) gallons per minute at the topmost outlet at a minimum pressure of fifteen (15) pounds per square inch.

1209.4 HIGH HAZARD BUILDINGS: First-aid standpipes shall be provided in storage buildings of moderate fire hazard (use group B-1) and in mercantile (use group C), industrial (use group D), and business (use group E) buildings, in which flammable materials, products or other hazardous conditions are present and which are more than thirty (30) feet or two (2) stories in height and with more than three thousand (3000) square feet of undivided floor area; except that such buildings shall be exempt from this provision when equipped with an approved two-source automatic sprinkler system with supervisory service.

1209.5 INSTITUTIONAL BUILDINGS: First-aid standpipes shall be provided in hospitals, asylums, places of detention and other institutional buildings (use groups H-1 and H-2) and hotels, boarding houses and dormitories (use group L-1) with sleeping accommodations for more than twenty-five (25) persons and which are more than thirty (30) feet or two (2) stories in height.

1209.6 ASSEMBLY BUILDINGS: First-aid standpipes shall be provided in theatres and night clubs (use groups F-1 and F-2); and in assembly halls, lecture halls and recreation centers (use group F-3) with an occupancy load of more than three hundred (300) as required in article 4.

SECTION 1210.0 HORIZONTAL FIRE LINES

In one-story buildings of moderate or high fire hazard more than seven thousand five hundred (7500) square feet in area and on wharves and

piers as provided in section 1211 which are not equipped with an approved automatic sprinkler system, there shall be provided a horizontal fire line complying with the requirements of this section.

1210.1 CONSTRUCTION OF HORIZONTAL FIRE LINES.

1210.11 SIZE: The horizontal fire line shall be constructed of two and one-half (2½) inch pipe supported on the interior walls of the building or attached to interior columns or girders of noncombustible construction.

1210.12 WATER SUPPLY: Adequate water supply shall be provided to service not less than two (2) hose connections, but in no case less than a two (2) inch service tap connected to a public water supply main.

1210.13 HOSE: Approved hose valves, hose and nozzles shall be provided at intervals not exceeding one hundred and twenty-five (125) feet.

1210.2 EXEMPTION FROM FIREPROOF CONSTRUCTION: When the area of buildings of types 2, 3, and 4 construction which are not more than two (2) stories or thirty (30) feet in height, designed for use as a storage garage, or for industrial uses which are not deemed unusually hazardous by the building official, but in which a considerable amount of combustible contents are stored or processed, does not exceed the tabular limits by more than fifty (50) percent, a sprinkler system, approved by the building and fire officials may be accepted in lieu of fireproof construction.

SECTION 1211.0 PIER AND WHARF PROTECTION

1211.1 FIRE AREA OF PIERS: All piers and wharves shall be subdivided to maximum areas of fifty thousand (50,000) square feet by fire walls complying with the provisions of article 9. The fire walls shall be located at horizontal intervals of not more than three hundred (300) feet and shall extend two (2) feet above the roof and below the low water level when the substructure is of wood or other combustible construction.

1211.2 FIRE PROTECTION OF PIERS: When not protected with an approved two-source automatic sprinkler system, both substructure and superstructure shall be equipped with an approved standpipe fire line complying with the provisions of this article.

SECTION 1212.0 AUTOMATIC SPRINKLER SYSTEMS

The requirements of this section shall apply to sprinkler equipment specified by the provisions of the Basic Code. All such systems shall be designed, constructed and maintained in accordance with the accepted engineering standards listed in the reference standards of this article and within the limitations of the approved devices of recognized testing agencies.

1212.1 BUILDINGS REQUIRING SPRINKLERS: Approved automatic sprinkler systems shall be provided in all buildings herein specified or as required for special uses and occupancies in article 4.

1212.11 FIRE SUPPRESSION SYSTEMS IN HIGH-RISE BUILDINGS: All buildings and structures which are seventy (70) feet in height or more above grade, and those which fall within the categories listed in table 12-3, shall require a fire suppression system in accordance with the provisions of section 1212.112.

1212.111 FIRE SUPPRESSION SYSTEMS IN HIGH-RISE BUILDINGS: All buildings and structures which are seventy (70) feet in height, or more, above grade, will require a fire suppression system in accordance with the provisions of sections 1212.112 through 1212.120.

1212.112 REQUIREMENTS FOR THE DESIGN OF FIRE SUPPRESSION SYSTEMS: All buildings and structures required by section 1213.111 to have a fire suppression system shall incorporate a complete system of automatic sprinklers conforming to the requirements of the National Fire Protection Association Publication NFPA-13 of 1973.

1212.113 MONITORING OF THE SPRINKLER SYSTEM: Such a system shall be provided with waterflow monitoring devices adequate to ensure that the operation of any sprinkler head will serve to actuate an alarm system and at the same time will indicate the location of the waterflow monitoring device on a register (or annunciator or central control board, etc.). The system shall also be provided with a distinct supervisory signal to indicate a condition that will impair the satisfactory operation of the sprinkler system. This shall include, but need not be limited to the monitoring of control valves, fire pump power supply and running condition, and other components necessary for the satisfactory operation of the sprinkler system. The system shall be so arranged that when water flows in the sprinkler system, an alarm shall be automatically transmitted to the fire department that is legally committed to serve in the area in which the building is located by the most direct and reliable method, as approved by the head of the fire department.

1212.114 ALARM SYSTEM REQUIREMENTS: (a) The operation of the waterflow monitoring device shall sound an audible alarm on the floor on which the sprinkler operates, and the floor immediately above; (b) the operation of any waterflow monitoring devices or any fire detection device shall automatically activate a voice alarm system on a predetermined selective basis, dependent upon the locations of the detectors and waterflow devices. The central control station shall contain controls for the voice alarm system so that a selective or general voice alarm may be manually initiated. Upon activation of the voice alarm system, a pre-recorded message shall be automatically transmitted via one (1) of the voice communication systems.

1212.115 VOICE COMMUNICATION SYSTEMS: A one-way (address) communication system shall be provided for the transmission of the voice alarm system message to the building occupants. The system shall provide one-way communication capabilities between the Central Control Station

TABLE 12-3

CONDITIONS REQUIRING SPRINKLERS

	TYPES OF CONSTRUCTION								
USE	1	2A	2B	2C	3A	3B	3C	4A	4B
A	>3 ST or >40 FT >10,000 ⌀	>3 ST or >40 FT >7,500 ⌀	>2 ST or >30 FT >6,000 ⌀	>1 ST or >20 FT >3,000 ⌀	>2 ST or >30 FT >6,000 ⌀	>1 ST or >20 FT >3,000 ⌀	>1 ST or >20 FT >3,000 ⌀	>1 ST or >20 FT >3,000 ⌀	
	AND WHEN > 3,000 AND < 6 FT ABOVE GRADE								
B-1	>3 ST or >40 FT >10,000 ⌀	>3 ST or >40 FT >7,500 ⌀	>2 ST or >30 FT >6,000 ⌀	>1 ST or >20 FT >3,000 ⌀	>2 ST or >30 FT >6,000 ⌀	>1 ST or >20 FT >3,000 ⌀	>1 ST or >20 FT >3,000 ⌀	>1 ST or >20 FT >3,000 ⌀	
	AND WHEN > 3,000 ⌀ AND < 6 FT ABOVE GRADE								
B-2	ALL BUILDINGS > 70 FT IN HEIGHT ABOVE GRADE								
C	>20,000 ⌀	>20,000 ⌀	>10,000 ⌀	>7,500 ⌀	>10,000 ⌀	>7,500 ⌀	>7,500 ⌀	>6,000 ⌀	>6,000 ⌀
D UNPIERCED ENCLOSURES	>20,000 ⌀	>20,000 ⌀	>10,000 ⌀	>7,500 ⌀	>10,000 ⌀	>7,500 ⌀	>7,500 ⌀	>6,000 ⌀	>6,000 ⌀
	ALL COMPLETELY ENCLOSED BUILDINGS (NOTE SECTION 1212.13)								
E	ALL BUILDINGS > 70 FT IN HEIGHT ABOVE GRADE								

ABBREVIATIONS

WKSHP - Workshop
ST - Stories
⌀ - Square feet

HCM - Highly combustible material
> - More than, greater than
< - Less than

≥ - equal to or greater than

≤ - equal to or less than

TABLE 12-3 (CONTINUED)

TYPES OF CONSTRUCTION

USE	1	2A	2B	2C	3A	3B	3C	4A	4B
F-1	1. ALL PORTIONS USED FOR STORAGE OR WKSHP INVOLVING HCM 2. ALL AREAS SPECIFIED IN SECTION 416.91 (THEATRES) 3. ALL BUILDINGS > 70 FT IN HEIGHT ABOVE GRADE								
F-2	1. ALL PORTIONS USED FOR STORAGE OR WKSHP INVOLVING HCM 2. ALL BUILDINGS > 70 FT IN HEIGHT ABOVE GRADE								
F-3	>12,000◻	>12,000◻	>12,000◻	>12,000◻	>12,000◻	>12,000◻	>12,000◻	>12,000◻	
	ALL BUILDINGS > 70 FT IN HEIGHT ABOVE GRADE								
F-4	1. ALL PORTIONS USED FOR STORAGE OR WKSHP INVOLVING HCM 2. ALL BUILDINGS > 70 FT IN HEIGHT ABOVE GRADE								
F-5	ALL BUILDINGS > 70 FT IN HEIGHT ABOVE GRADE								
F-6	REFER TO FORM F-6 -- (SCHOOLHOUSE STRUCTURAL STANDARDS) FOR REQUIREMENTS								
F-7	USE REQUIREMENTS FOR USE GROUP E								

ABBREVIATIONS

WKSHP - Workshop
ST - Stories
◻ - Square feet

HCM - Highly combustible materials
> - More than, greater than
< - Less than

≥ - equal to or greater than
≤ - equal to or less than

TABLE 12-3 (Continued)
TYPES OF CONSTRUCTION

USE	1	2A	2B	2C	3A	3B	3C	4A	4B
H-1	1. ALL PORTIONS USED FOR STORAGE OR WKSHP INVOLVING HCM 2. ALL BUILDINGS > 70 FT IN HEIGHT ABOVE GRADE								
H-2	1. ALL PORTIONS USED FOR STORAGE OR WKSHP INVOLVING HCM 2. ALL BUILDINGS > 70 FT IN HEIGHT ABOVE GRADE 3. SPRINKLERS SHALL NOT BE REQUIRED IN PATIENT ROOMS IN HOSPITALS								
L-1 L-2 L-3	1. ALL PORTIONS USED FOR STORAGE OR WKSHP INVOLVING HCM 2. ALL BUILDINGS > 70 FT IN HEIGHT ABOVE GRADE								
GARAGES FPR-4	> 10,000 ⌀ ON ANY FLOOR	> 2 ST	> 2 ST	> 2 ST & ROOF DECK	> 2 ST	> 2 ST	> 2 ST	> 2 ST	N.P.
FPR-4 OPEN PKG. GARAGES	> 6 ST AND > 10,000 ⌀ ON ANY ONE FLOOR REQUIRES SPRINKLERS ABOVE 6TH FLOOR								
TRUCK	> 70 FT IN HEIGHT ABOVE GRADE			> 4 ST > 10,000 ⌀	> 4 ST > 10,000 ⌀	> 4 ST > 10,000 ⌀	> 4 ST > 10,000 ⌀	> 4 ST > 10,000 ⌀	> 4 ST > 10,000 ⌀
	STORAGE OF TRUCKS LOADED WITH COMBUSTIBLE MATERIALS								
BUS	ALL > 2 ST OR 30 FT		Or	PASSENGER TERMINALS {STORAGE AND LOADING}		FOR > 3 BUSES			
GROUP 1	WHERE UPPER STORIES USED FOR OTHER PURPOSES (SECTION 1213.13)								
PUBLIC BELOW GRADE	ALL STORIES WHICH HAVE > 1/2 HEIGHT BELOW GRADE								
UNLIMITED AREA BLDGS.	≤ 1 ST, ≤ 85 FT							N.P.	N.P.

ABBREVIATIONS

WKSHP - Workshop
ST - Stories
⌀ - Square feet
HCM - Highly combustible material
> - More than, greater than
< - Less than
≥ - equal to or greater than
≤ - equal to or less than

and the following terminal areas: elevators, elevator lobbies; exitway access corridors and exitway stairways; office areas exceeding one thousand (1,000) square feet in area; dwelling units; and hotel guest rooms or suites.

A two-way fire department communication system may be required at the discretion of the appropriate fire department authority and shall be designed to comply with the requirements of the fire department.

1212.116 SMOKE CONTROL: In buildings of Use Group E (Business), L-1 (Residential-Hotel) and L-2 (Residential-Multi-family) over seventy (70) feet high, natural or mechanical ventilation for the removal of products of combustion shall be provided in every story and shall consist of one (1) or more of the following:

a) Mechanical air handling equipment designed to direct return and exhaust air directly to the outdoors under fire conditions.

b) Panels or windows, in the exterior wall, which can be opened from an approved location other than the fire door. Such venting facilities shall be provided at the rate of twenty (20) square feet per fifty (50) lineal feet of exterior wall in each story, and distributed around the perimeter at not more than fifty (50) foot intervals. Such panels shall be clearly identified as required by the fire department.

c) Approved tempered glass may be used in lieu of the openable panels described above.

d) A continuous shaft through which smoke and heat can be mechanically vented to the outdoors. The size of the shaft shall be uniform throughout and of such dimensions as to provide one (1) air change per minute in the largest compartment served anywhere in the building. Openings into the shaft shall be protected with an automatic single-piece shutter located as high in the room as possible and designed to vent the entire compartment.

e) Any other approved design (see section 108.13) which will produce equivalent results.

1212.117 ELEVATORS: In buildings of Use Group E (Business), L-1 (Residential-Hotel) and L-2 (Residential-Multi-family) over seventy (70) feet high, at least one (1) elevator shall be provided for fire department emergency access to all floors. Elevator operation shall be in accordance with the Department of Public Safety, Board of Elevator Regulations.

1212.12 ASSEMBLY USES: A two-source system shall be provided in such parts of all theatres and assembly halls (use groups F-1 and F-3) designated in article 4. A one-source system shall be provided to protect exhibition halls, museums or other use group F-3 occupancies

used for the display or sale of combustible products, goods or materials, or having combustible display equipment, either on a temporary or permanent basis, whenever the area of such use exceeds twelve thousand (12,000) square feet in area.

1212.13 UNPIERCED ENCLOSURES: All completely enclosed buildings designed for industrial occupancy which are provided with artificial means of light and ventilation as specified in section 511, shall require a two-source automatic sprinkler system protected with central supervisory service; except in refrigerating plants and buildings or parts thereof used for cold storage of meats or other food products.

1212.2 NUMBER OF RISERS: In each fire area, there shall be at least one (1) riser of adequate size to furnish all the heads therein contained in one (1) story.

1212.3 PROHIBITED CONNECTIONS: No auxiliary connection shall be made to sprinkler risers for sill cock, house service, standpipe or other hose outlet purpose.

1212.4 MECHANICAL PROTECTION: Risers shall be protected from mechanical injury and shall not be located close to windows.

1212.5 PROTECTION FROM FREEZING: All discharge, heating or filling pipes where exposed to the weather shall be protected from freezing and the water in all sprinkler tanks subject to freezing shall be provided with internal heating equipment or approved frostproof enclosures.

1212.6 PROTECTION FROM CORROSION: Wherever necessary, sprinkler pipes and hangers shall be protected against corrosion from moisture and the heads shall be covered with an approved chemically-treated coating for protection from chemical fumes when required by the building official.

1212.7 DRAINAGE OF DISCHARGE: Provision shall be made for discharge of the overflow of water on every floor of sprinklered buildings designed for industrial and storage uses to comply with the Massachusetts State Plumbing Code.

1212.8 FIRE DEPARTMENT CONNECTION: Every sprinkler system shall be equipped with one (1) or more approved fire department connections as required by the fire department. The size, threads and accessories shall be uniform with the equipment of the local fire department. Each such connection shall be suitably marked with raised letters "FIRE DEPARTMENT CONNECTION - AUTOMATIC SPRINKLERS"; or when only stories below grade are so equipped, "FIRE DEPARTMENT CONNECTION - BASEMENT SPRINKLERS" or "CELLAR SPRINKLERS" as the case may be.

1212.9 MAIN CONTROL VALVE: Every sprinkler system shall be provided with a readily accessible outside screw and yoke valve or an indicator gate valve to control all sources of water supply except that from the fire department connection.

SECTION 1213.0 SPRINKLER WATER SUPPLIES

Automatic sprinkler systems shall have at least one (1) approved automatic source of water supply meeting the requirements of this section.

1213.1 PUBLIC WATER SPRINKLER SUPPLY: Direct connections to public water supplies shall be capable of supplying water at not less than fifteen (15) pounds per square inch pressure for the maximum number of sprinkler heads in the designated fire area.

1213.2 SPRINKLER GRAVITY TANK: Gravity tanks shall be capable of supplying twenty-five (25) percent of the number of sprinkler heads in the maximum protected fire area for a period of twenty (20) minutes but in no case shall the capacity of any one (1) tank be less than five thousand (5,000) gallons.

1213.3 SPRINKLER PRESSURE TANK: Pressure tanks shall be capable of supplying twelve and one-half (12 1/2) percent of the number of sprinkler heads in the maximum protected fire area; but in no case shall the capacity be less than three thousand (3,000) gallons of water for a wet pipe system, nor less than five thousand (5,000) gallons for a dry pipe system; nor shall any single tank have a capacity of more than six thousand (6,000) gallons. The tank shall be maintained two-thirds full of water under a pressure of seventy-five (75) pounds per square inch at all times.

1213.4 SPRINKLER FIRE PUMP: Automatic fire pumps shall be of an approved type with a supply capacity of at least five hundred (500) gallons per minute. The pumps shall be adequate to supply fifty (50) percent of the sprinkler heads in the maximum protected fire area and shall be located in a room enclosed with two (2) hour fire-resistive construction.

1213.5 COMBINED WATER SUPPLY: When the sprinklers and standpipes are supplied from one (1) tank, it shall comply with the provisions of section 1207.2 and the standpipe supply shall be drawn from the top portion of the tank.

1213.6 PARTIAL SPRINKLER SYSTEMS: Where approved by the building and fire officials, partial systems serviced from the building water supplies may be used in isolated hazardous locations.

SECTION 1214.0 DRY PIPE AUTOMATIC SYSTEMS

When a building or structure requiring an automatic sprinkler system under the provisions of the Basic Code is subject to temperatures below freezing, an automatic dry pipe system or other approved thermostatically controlled open or closed sprinkler system shall be installed in accordance with the approved rules.

1214.1 THERMOSTATIC CONTROL: In other than standard dry pipe systems the thermostatic control shall be arranged to admit water to the system and simultaneously give an alarm.

1214.2 AUXILIARY MANUAL CONTROL: All such thermostatically controlled systems shall also be provided with auxiliary manual controls.

SECTION 1215.0 NON-AUTOMATIC SPRINKLER SYSTEMS

1215.1 SPECIAL FLOODING INSTALLATIONS: In buildings equipped with automatic sprinkler systems, the enclosures housing special hazardous processes or used for the storage of flammable or highly combustible materials may be protected with an open pipe sprinkler installation equipped with jumbo or deluge heads with such control as may be directed by the fire official.

SECTION 1216.0 SPECIAL FIRE PROTECTION

1216.1 ELEVATOR SERVICE: In buildings of Use Group E (Business) and L-1 (Residential-Hotel) in every building or structure exceeding one hundred and fifty (150) feet in height and in buildings during the course of construction exceeding seventy (70) feet in height, at least one elevator shall be available at all times for fire department use as provided in Department of Public Safety, Board of Elevator Regulations ELV-2. Every building or structure exceeding seventy (70) feet in height must have an elevator complying with the provisions of section 1212.117. In all other buildings or structures exceeding one hundred fifty (150) feet in height and in buildings during the course of construction exceeding seventy (70) feet in height, at least one elevator shall be available at all times for fire department use.

1216.2 FIRE ALARM SYSTEMS: All buildings over seventy (70) feet in height shall have a fire alarm system as required in section 1212.114. Furthermore, all buildings and structures where required by the provisions of section 1218 shall be protected with an approved fire alarm system, or by approved watchman supervisory and manual fire alarm services where allowed.

1216.3 CENTRAL STATION ALARM SYSTEMS: When required under the provisions of this Code, in buildings designed for special hazard uses, including film studios, and proxylin manufacturing (use group A), large public assembly buildings (use group F) with an occupancy load of more than three hundred (300), and hospitals and similar institutional buildings (use group H-2) requiring automatic fire extinguishing equipment under the provisions of the Basic Code, protective signaling equipment shall be provided with connections to a local central station in the building, to an outside supervisory central station, or with direct fire department connection over private wire.

1216.4 WATER CURTAINS FOR WALL OPENINGS: In all buildings and structures designed for high hazard (use group A), storage (use group B), mercantile (use group C), and industrial (use group D) uses involving the storage, sale or processing of flammable materials or products, the exterior wall openings located on or within six (6) feet of interior lot lines shall be protected with an approved water curtain.

1216.5 UNENCLOSED EXITWAYS: In existing multi-family (use group L-1) and other residential buildings, (use group L-2) existing exitways not now enclosed as provided in article 6 may be protected with water curtains or partial sprinkler systems when approved by the building official.

1216.6 WATER CURTAINS FOR FLOOR OPENINGS: Unenclosed floor openings shall be protected with automatically controlled water curtains as specified in section 515.

1216.7 YARD SYSTEMS: Shipyards, oil storage plants, lumber yards, amusement or exhibition parks, and similar occupancies and uses involving high fire and life hazards shall be provided with, in addition to the fire suppression and safety equipment required within the structures by the Basic Code, an installation of fire hydrants and associated fire-fighting equipment, as required by the fire department authority.

1216.8 CHEMICAL AND SPECIAL EXTINGUISHING SYSTEMS: All buildings and structures and parts thereof designed for uses subject to fires of extreme severity and explosion hazards as provided in article 4 shall be protected with approved automatic extinguishing systems installed and maintained as required by accepted engineering standards.

SECTION 1217.0 MANUAL FIRE-EXTINGUISHING EQUIPMENT

All hand-operated auxiliary fire-extinguishing equipment shall be of an approved type suitable to the occupational use of the building and shall be installed in corridors and other locations, visible and readily accessible to the occupants of the building in accordance with the requirements of the fire official and as herein specified.

1217.1 CABINETS: When auxiliary emergency equipment is enclosed in cabinets, they shall be of an approved type of noncombustible construction equipped with readily openable keyless doors or with readily broken glass access panels.

SECTION 1218.0 FIRE ALARM SYSTEMS

1218.1 PLANS AND SPECIFICATIONS: Where required by this Code, the plans and specifications for fire alarm systems shall show the location

and number of all sending stations and signals with specifications of the type, construction, and operation of the system including all automatic detection devices. Installation of all equipment shall conform to the standards of the reference section of this article.

1218.2 WHERE REQUIRED: Fire alarm systems are required in the locations listed in section 1218.21. The details of the criteria in each location are listed also in section 1218.21.

EXCEPTIONS: All buildings and structures over seventy (70) feet in height above grade shall have fire alarm systems as required by the provisions of section 1212.114.

All buildings and structures and sections of buildings and structures equipped with an automatic fire suppression system are not required to be equipped with an automatic fire alarm system (except for buildings and structures seventy (70) feet in height above grade or more) but shall have a manual fire alarm system conforming to the provisions of section 1218.21 for the use and conditions as specified in the appropriate section.

1218.21 FIRE ALARM SYSTEMS LOCATIONS

1218.211 AUTOMATIC FIRE WARNING SYSTEMS IN RESIDENTIAL USES L-1, L-2 AND L-3: Every building or structure not exceeding seventy (70) feet in height above the mean grade erected or substantially altered to be occupied for residential purposes, and existing buildings as specified herein, shall be subject to the following provisions. All systems shall conform with the provisions of NFPA 101 and NFPA 74.

a) L-1 Use Group

1) all buildings less than thirty (30) feet in height above mean grade or containing no more than twelve (12) dwelling units shall contain automatic smoke detectors or automatic smoke and heat detectors connected to audible alarms.

2) all buildings thirty (30) feet or more above mean grade or containing thirteen (13) or more dwelling units shall contain automatic smoke detectors or automatic smoke and heat detectors connected to an audible alarm and the system shall be of the supervised type. All existing buildings, including those over seventy (70) feet in height above mean grade, shall be subject to the provisions of these requirements.

b) L-2 Use Group

1) all new or hereafter-altered buildings to be used for L-2 use group, which are less than thirty (30) feet in height above mean grade or containing no more than

twelve (12) dwelling units; and any existing buildings of this use group over two (2) stories in height shall be subject to the provisions of (a) (1) above.

2) all new or hereafter-altered buildings to be used for L-2 use group, which are more than thirty (30) feet in height above mean grade or containing thirteen (13) or more dwelling units shall be subject to the provisions of (a) (2) above.

c) L-3 Use Group

1) all new or hereafter-altered buildings to be used for L-3 use group, which are less than thirty (30) feet in height above mean grade shall be subject to the provisions of (a) (1) above.

2) all new or hereafter-altered buildings to be used for L-3 use group, which are more than thirty (30) feet in height above mean grade shall be subject to the provisions of (a) (2) above.

1218.212 INSTITUTIONAL (USE GROUP H): Fire alarm systems in institutional use group H-2 of new and existing buildings which are used as health care facilities, including hospital, nursing home, residential-custodial care facilities, and similar uses shall have fire alarm systems complying with the provisions of NFPA 101 of 1967.

In all other new and existing buildings of use group H, an approved automatic fire alarm system is required. In addition, an approved manual fire alarm system is required in conjunction with the automatic fire alarm system. For buildings of up to one (1) story in height and less than two thousand five hundred (2,500) square feet in area, an uncoded alarm system may be used. Otherwise, an individually coded closed circuit general alarm shall be used.

Where an institutional use comprises more than one building, a combination unit or zone and general alarm coded system shall be used and an approved indicating annunciator installed as required by the building official and the fire official.

1218.213 NURSERY, DAY CARE CENTER AND SIMILAR USES (USE GROUP H): All facilities operated on a regular basis as a nursery, day care center, kindergarten or similar uses shall have a fire alarm system provided as follows:

a) Facilities for up to twenty-four (24) children shall be provided with a local alarm system.

b) Facilities for twenty-five (25) or more children shall be provided with an approved electrical fire alarm system

consisting of approved smoke or smoke and heat detectors located in all occupied rooms and as required by the building official. The alarms shall be distinctive and audible everywhere on the floor. There also shall be at least one (1) manual alarm on each floor which shall sound all alarms on other floors simultaneously and continuously when operated.

An approved secondary or emergency source of power shall be provided for the entire alarm system.

1218.214 SCHOOLS (USE GROUP F-6): All new public schools and all new private and university teaching buildings shall have an approved automatic fire alarm system. An approved manual fire alarm system is also required in conjunction with the automatic fire alarm system. In all existing public schools and all existing private and university teaching buildings, a manual fire alarm system shall be required. All protective signaling equipment shall be provided with connections to a local central station in the building, to an outside supervisory central station, or with direct fire department connection over private wire.

1218.215 MERCANTILE (USE GROUP C): All mercantile buildings which have one (1) or more levels above grade to which the public is admitted shall have an approved manual fire alarm system. For buildings one (1) story or less and less than twenty-five hundred (2,500) square feet in area, an uncoded closed circuit fire alarm shall be used. Otherwise, an individually coded closed circuit general fire alarm system shall be used.

1218.216 INDUSTRIAL (USE GROUP D): All industrial buildings where twenty five (25) or more individuals are employed above the first or ground floor shall have an approved manual fire alarm system. In buildings not exceeding two (2) stories in height with not more than twenty five hundred (2,500) square feet of area in any one (1) story, and having not more than one hundred (100) persons in a single factory, nor more than fifty (50) persons in a multiple-tenant factory above the first or ground floor, an uncoded closed circuit fire alarm system may be used. Otherwise, an individually coded closed circuit fire alarm system shall be used.

1218.217 BUSINESS (USE GROUP E): All office buildings of three (3) stories or more, but less than seventy (70) feet in height unless equipped with an approved fire suppression system, shall have an approved manual fire alarm system. This system shall be an individually coded closed circuit general fire alarm system.

Reference Standards - Article 12

NFPA	No. 13	1973	Installation of Sprinkler Systems
NFPA	No. 14	1973	Standpipes and Hose Systems
NFPA	No. 101	1967	Life Safety Code
NFPA	No. 101	1971	Life Safety Code
NFPA	No. 101	1973	Life Safety Code
NFPA	No. 71	1972	Central Station Signaling Systems
NFPA	No. 72A	1972	Local Protective Signaling Systems
NFPA	No. 72B	1972	Auxiliary Signaling Systems
NFPA	No. 72C	1972	Remote Station Signaling Systems
NFPA	No. 72D	1972	Proprietary Signaling Systems

ARTICLE 13

PRECAUTIONS DURING BUILDING OPERATIONS

SECTION 1300.0 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. In addition, the following regulations also shall apply when not covered by this Code: Department of Labor and Industries, Division of Industrial Safety Industrial Bulletin No. 12, Rules and Regulations for the Prevention of Accidents in Construction Operations.

SECTION 1301.0 PLANS, SPECIFICATIONS AND SPECIAL PERMITS

1301.1 TEMPORARY CONSTRUCTION: Before any construction operation is started, plans and specifications when required by the building official shall be filed with him 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 (2½) 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

When inspection of any construction operation reveals that any unsafe or illegal conditions exist, the building official shall notify the owner as specified in section 122.12 and direct him to take the necessary remedial measures to remove the hazard or violation.

1303.1 FAILURE TO COMPLY WITH ORDERS: Unless the owner so notified proceeeds 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 and 125. All expenses incurred in the correction of such unsafe conditions shall become a lien on the property.

SECTION 1304.0 EXISTING BUILDINGS

1304.1 PROTECTION: All existing and adjoining public and private property shall be protected from damage incidental to construction operations.

1304.2 CHIMNEY, SOIL AND VENT STACKS: Whenever a new buiding 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 1006.

1304.3 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 1306.

1304.31 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.

1304.32 BEAM POCKETS: When a structure involving a party wall is being demolished, the owner of the demolished structure shall, at his own expense, secure all wall anchors at the beam ends of the standing wall and shall brick-up all beam and joist pockets and otherwise maintain the safety and usefulness of the wall.

1304.33 PARTY WALL EXITWAYS: No party wall balcony or horizontal exit shall be destroyed unless and until a substitute means of egress has been provided and approved by the building official.

1304.4 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 1305.0 PROTECTION OF PUBLIC AND WORKMEN

Whenever a building or strucutre 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.

1305.1 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 specified in section 714.0.

1305.2 SIDEWALK SHED.

1305.21 WITHIN TEN (10) 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 then 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.

1305.22 WITHIN TWENTY (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.

1305.23 BUILDING HIGHER THAN SIX (6) STORIES: When the building being demolished or erected is more than six (6) stories or seventy (70) feet in height, unless set back from the street lot line a distance more than one-half (½) its height, a sidewalk shed shall be provided.

1305.3 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. No thrust-out platforms shall be used for the storage of material.

1305.4 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 1306.0 EXCAVATIONS

1306.1 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.

1306.11 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.

1306.12 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.

1306.13 RESPONSIBILITY OF ADJOINING OWNER: The person making or causing an excavation to be made shall, before starting the work, give at least one 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.

1306.14 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.

1306.2 PERMANENT SUPPORT: Whenever an excavation is made below the established grade, 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.

SECTION 1307.0 REGULATION OF LOTS

1307.1 GRADING OF LOT: When a building or structure has been demolished or removed and no building operation has been projected or approved, the vacant lot shall be filled with non-organic fill, graded and maintained in conformity with adjacent grades. 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; provisions shall be made to prevent the accumulation of water or damage to any foundations on the premises or the adjoining property.

1307.2 UTILITY CONNECTIONS: All service utility connections shall be discontinued and capped in accordance with section 116.1 of this Code.

SECTION 1308.0 RETAINING WALLS AND PARTITION FENCES

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 869.3 and shall be provided with a guard-rail or fence not less than four (4) feet in height.

SECTION 1309.0 STORAGE OF MATERIALS

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.

1309.1 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.

1309.2 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.

1309.3 PEDESTRIAN WALKWAYS: No materials or equipment shall 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.

1309.4 OBSTRUCTIONS: Materials 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 1310.0 REMOVAL OF WASTE MATERIAL

No material shall be dropped by gravity or thrown outside the exterior walls of a building during demolition or erection. Enclosed 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 1311.0 PROTECTION OF ADJOINING PROPERTY

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 1306.

SECTION 1312.0 SCAFFOLDS

1312.1 LOAD CAPACITY: All scaffolds shall be designed to support two and one-half (2½) times the superimposed live load to be placed thereon but in no case less than one hundred and twenty (120) pounds per square foot.

1312.2 FIRERETARDANT CONSTRUCTION

1312.21 ALL BUILDINGS: All scaffolding exceeding seventy (70) feet or six (6) stories in height used in construction operations involving the erection, alteration or maintenance of buildings, shall be constructed of noncombustible or fireretardant materials complying with the provisions of Section 903.

1312.22 INSTITUTIONAL BUILDINGS: All scaffolding used in construction operations involving the repair or partial demolition of institutional buildings (use groups H-1 and H-2) during occupancy of the building shall be constructed of noncombustible or fireretardant materials complying with the provisions of section 903.

SECTION 1313.0 STAIRWAYS AND LADDERS

1313.1 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 temporary lighted stairway shall be provided unless one or more of the permanent stairways are erected as the construction progresses.

1313.2 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 1314.0 FIRE HAZARDS

1314.1 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 1206.51. Free access from the street to such standpipes shall be maintained at all times; and no materials shall be stored within five (5) feet of any fire hydrant or in the roadway between such hydrant and the center line of the street.

SECTION 1315.0 DISPUTES

The building official, when requested by any person, aggrieved or otherwise, shall serve a written notice on any owner who fails to conform to the requirements of this article directing him to take the necessary remedial action. If the owner fails to proceed to fully comply with such notice within three (3) days after service or within a reasonable time thereafter as determined by the buiding official, the building official may cause the necessary work to be done when the health, safety, and general welfare of the public are involved. The cost of such work shall become a lien against the property of the offending owner and the legal authority of the municipality shall institute appropriate action for its recovery.

ARTICLE 14

SIGNS AND OUTDOOR DISPLAY STRUCTURES

SECTION 1400.0 SCOPE

The provisions of this article shall govern the construction, alteration, repair and maintenance of all signs and outdoor display structures together with their appurtenant and auxiliary devices in respect to structural and fire safety.

1400.1 ZONING LAW: Where more restrictive in respect to location, use, size or height of signs and outdoor display structures, the limitations of the zoning laws affecting required light and ventilation requirements and use of land shall take precedence over the regulations of the Basic Code.

1400.2 APPROVED RULES: In the absence of approved rules governing details of construction, the provisions of the applicable standards listed in the references of this article shall be deemed to conform to the requirements of the Basic Code unless otherwise specified in this article.

SECTION 1401.0 DEFINITIONS

APPROVED COMBUSTIBLE PLASTIC: a plastic material more than one-twentieth (1/20) inch in thickness which burns at a rate of not more than two and one-half (2½) inches per minute when subjected to the ASTM standard test for flammability of plastics in sheets of six-hundredths (0.06) inch thickness.

BILL BOARD: (poster panel.) a board panel or tablet used for the display of printed or painted advertising matter.

CLOSED SIGN: a display sign in which the entire area is solid or tightly enclosed or covered.

COMBINATION SIGN: a sign which combines the characteristics of two (2) or more of the types of signs defined in this section.

DISPLAY SIGN: any fabricated sign, including its structure, consisting of any letter, figure, character, mark, point, plane, marquee sign, design, poster, pictorial picture, stroke, stripe, line, trademark, reading matter, or illuminating device which is constructed, attached, erected, fastened, or manufactured in any manner whatsoever

so that the same is used for the attraction of the public to any place, subject, person, firm, corporation, public performance, article, machine or merchandise whatsoever, and is displayed in any manner whatsoever out of doors for recognized advertising purposes.

DISPLAY SURFACE: the surface which is made available by the structure either for the direct mounting of letters and decoration or for the mounting of the facing material that is intended to carry the entire advertising message.

FACING: the surface of the sign upon, against, or through which the message of the sign is exhibited.

GROUND SIGN: a sign which does not extend or project into or over a public way and is supported by one or more uprights or braces that are in or upon the ground.

LETTERS AND DECORATIONS: the letters, illustrations, symbols, figures, insignia and other devices which are employed to express and illustrate the message of the sign.

MARQUEE SIGN: a sign which is attached to a marquee.

MARQUEE: a fixed or non-adjustable covered structure which is attached to, wholly supported by and projects from a building.

OPEN SIGN: a display sign in which at least fifty (50) percent of the enclosed area is uncovered, or open to the transmission of wind.

POSTER PANEL: (see bill board).

PROJECTING SIGN: a sign which is affixed to a building or structure and extends twelve (12) inches or more beyond the building wall, structure or parts thereof.

ROOF SIGN: a sign which is erected, constructed, or maintained above the roof of a building and does not project more than twelve (12) inches beyond the wall line of the building.

STRUCTURE: the supports, uprights, bracing and framework of a sign.

TEMPORARY SIGN: a sign or cloth or other combustible material, with or without a frame, which is usually attached to the outside of a building on a wall or store front, intended for a limited period of display.

WALL SIGN: a sign which is supported wholly or partially by an exterior wall of a building and extends not more than twelve (12) inches therefrom.

SECTION 1402.0 PLANS, SPECIFICATIONS AND PERMITS

1402.1 OWNERS CONSENT: Before any permit is granted for the erection of a sign or outdoor display structure, plans and specifications shall be filed with the building official showing the dimensions, materials and required details of construction including loads, stresses and anchorage. The applications shall be accompanied by the written consent of the owner or lessee of the premises upon which the sign is to be erected.

1402.2 NEW SIGNS: No new sign shall hereafter be erected, constructed, altered or maintained except as herein provided and until after a permit has been issued by the building official.

1402.21 COMMONWEALTH OF MASSACHUSETTS REGULATIONS: Outdoor advertising subject to the rules and regulations of the Outdoor Advertising Board requires the approval of the said Board prior to permit issuance.

1402.3 ALTERATIONS: No sign shall be enlarged or relocated except in conformity to the provisions of this article for new signs, nor until a proper permit has been secured. The changing of movable parts of an approved sign that is designed for such changes, or the repainting or reposting of display matter shall not be deemed an alteration provided the conditions of the original approval and the requirements of this article are not violated.

1402.4 PLANS AND SPECIFICATIONS: Any sign twelve (12) feet or over in height above average adjoining grade, or any free-standing sign with an area of over sixty (60) square feet, or any roof signs, projecting signs, or marquee sign, shall have structural drawings and specifications, including foundations, submitted by a registered professional engineer.

SECTION 1403.0 EXEMPTIONS

The building official shall be notified prior to the painting, erection or alteration of signs or outdoor display structures covered by the provisions of this section and upon determination by said building official, permits may be required for such signs. The provisions of this section shall not be construed to relieve the owner of the sign from responsibility for its painting, erection and maintenance in a safe manner.

1403.1 WALL SIGNS:

1403.11 PAINTED SIGNS: Signs painted on the surface of masonry, concrete, frame or other approved building walls;

1403.12 STORE SIGNS: Non-illuminated signs erected over a show window or over the door of a store or business establishment which announce the name of the proprietor and the nature of the business conducted therein;

1403.13 GOVERNMENT BUILDING SIGNS: Signs erected on a municipal, state or federal bulding which announce the name, nature of the occupancy and information as to use of or admission to the premises;

1403.14 OTHER WALL SIGNS: Any wall sign erected on a building or structure, which is not more than one (1) square foot in area;

1403.15 FENCE SIGNS. Signs painted on the surface of enclosure or division fences, or on picket or other ornamental fences.

1403.2 GROUND SIGNS:

1403.21 SALE OR RENT: Signs erected to announce the sale or rent of the property so designated, provided such signs are not over ten (10) feet in height nor more than sixty (60) square feet in area;

1403.22 TRANSIT DIRECTIONS: The erection or maintanance of a sign designating the location of a transit line, a railroad station or other public carrier when not more than three (3) square feet in area;

1403.23 STRRET SIGNS: Signs erected by the municipality for street direction.

1403.3 TEMPORARY SIGNS:

1403.31 CONSTRUCTION SIGNS: Construction signs, engineers' and architects' signs and other similar signs which may be authorized by the building official in connection with construction operations;

1403.32 SPECIAL DISPLAYS: Special decorative displays used for holidays, public demonstrations or promotion of civic welfare or charitable purposes, when authorized by the municipal authorities, on which there is no commercial advertising.

SECTION 1404.0 UNSAFE AND UNLAWFUL SIGNS

1404.1 NOTICE OF UNSAFE SIGNS: When any sign becomes insecure, in danger of falling, or otherwise unsafe, or if any sign shall be unlawfully installed, erected or maintained in violation of any of the provisions of the Basic Code, the owner thereof or the person or firm maintaining same, shall upon written notice of the building official, forthwith in the case of immediate danger and in any case within not more than ten (10) days, make such sign conform to the provisions of this article or shall remove it. If within ten (10) days the order is not complied with, the building official may remove such sign at the expense of the owner or lessee thereof as provided in section 125.0.

1404.2 UNLAWFUL SIGNS.

1404.21 EGRESS OBSTRUCTIONS: The building official shall notify the owner or lessee of the building or structure as provided in section 122.12 whenever a sign is so erected as to obstruct free ingress to or egress from a required door, window, fire escape or other required exit-way element.

1404.22 PROJECTING SIGNS: A projecting display sign erected at other than right angles to the wall of a building or structure outside of the building line which extends above the roof cornice or parapet wall, or above the roof level when there is no cornice or parapet wall and which obstructs access to the roof is hereby deemed unlawful. Such signs shall be reconstructed or removed as herein required.

1404.23 ALLEY SIGNS: No signs shall be permitted to project beyond public alley lot lines.

SECTION 1405.0 MAINTENANCE AND INSPECTION

The building official may order the removal of any sign that is not maintained in accordance with the provisions of this article.

1405.1 MAINTENANCE: All signs for which a permit is required, together with all their supports, braces, guys, and anchors shall be kept in repair in accordance with the provisions of this article and section 104.0; and when not galvanized or constructed of approved corrosion-resistive noncombustible materials shall be painted when necessary to prevent corrosion.

1405.2 HOUSEKEEPING: It shall be the duty and responsibility of the owner or lessee of every sign to maintain the immediate premises occupied by the sign in a clean, sanitary and healthful condition.

1405.3 INSPECTION: Every sign for which a permit has been issued and every existing sign for which a permit is required including roof, ground, wall, marquee and pole signs, shall be inspected at least once in every calendar year.

SECTION 1406.0 EXISTING SIGNS

1406.1 REMOVING OR RECONSTRUCTING SIGNS: No sign heretofore approved and erected shall be repaired, altered or moved, nor shall any sign, or any substantial part thereof, which is blown down, destroyed or removed, be re-erected, reconstructed, rebuilt or relocated unless it is made to comply with all applicable requirements of this article.

1406.2 REPAIR OF UNSAFE SIGNS: This section shall not be construed to prevent the repair or restoration to a safe condition as directed by the building official of any part of an existing sign when damaged by natural deterioration, storm or other accidental emergency.

1406.3 RELOCATING SIGNS: Any sign that is moved to another location either on the same or to other premises shall be considered a new sign and a permit shall be secured for any work performed in connection therewith when required by this article.

SECTION 1407.0 REGISTRATION AND IDENTIFICATION

1407.1 REGISTRATION: Every ground sign and roof sign shall be registered with the building official by the person maintaining the same.

1407.2 IDENTIFICATION: Every sign for which a permit has been issued and hereafter erected, constructed or maintained shall be plainly marked with the name of the person, firm or corporation owning, erecting, maintaining or operating such sign.

SECTION 1408.0 GENERAL REQUIREMENTS FOR ALL SIGNS

All signs shall be designed and constructed in conformity to the provisions for materials, loads and stresses of articles 7 and 8 and the requirements of this article.

1408.1 DESIGN LOADS.

1408.11 WIND: The effect of special local wind pressures shall be thoroughly considered in the design; but in no case shall the wind load be assumed less than thirty (30) pounds per square foot of net exposed area for roof signs, twenty (20) pounds per square foot for ground signs over fifty (50) feet in height and fifteen (15) pounds per square foot for ground signs not more than fifty (50) feet in height.

1408.12 EARTHQUAKE: Signs adequately designed to withstand wind pressures shall generally be considered capable of withstanding earthquake shocks except as provided in section 719 and for combined loading in section 720.

1408.2 ILLUMINATION: Signs shall be illuminated by electrical means and electrical devices and wiring shall be installed in accordance with the requirements of the Massachusetts State Electrical Code. In no case shall any open spark or flame be used for display purposes unless specifically approved by the building official.

1408.3 OBSTRUCTIONS TO EXITWAYS: No sign shall be erected, constructed or maintained so as to obstruct any fire escape, required exitway, window or door opening used as an element of a means of egress or to prevent free passage from one part of a roof to another part thereof or access thereto as required by the provisions of article 6 or for the municipal fire-fighting forces.

1408.4 OBSTRUCTION TO VENTILATION: No sign shall be attached in any form, shape or manner which will interfere with any opening required for ventilation in article 5.

1408.5 USE OF COMBUSTIBLES

1408.51 ORNAMENTAL FEATURES: In all illuminating signs required to be constructed of noncombustible materials under the provisions of this Code, wood or other materials of combustible characteristics similar to wood may be used for moldings, cappings, trim, nailing blocks, letters, latticing, and other purely ornamental features.

1408.52 SIGN FACINGS: Sign facings may be made of approved combustible plastics provided the area of each face is not more than one hundred (100) square feet.

SECTION 1409.0 GROUND SIGNS

1409.1 OBSTRUCTIONS TO TRAFFIC: No ground sign shall be erected so as to obstruct free access to or egress from any building.

1409.2 BOTTOM CLEARANCE: The bottom capping of all ground signs shall be at least thirty (30) inches above the ground but the intervening space may be filled with open lattice work or platform decorative trim.

1409.3 MAXIMUM SIZE: In all locations, when constructed entirely of noncombustible material, ground signs may be erected to a height of one hundred (100) feet above the ground; and to greater heights when approved by the building official and located so as not to create hazard or danger to the public.

SECTION 1410.0 ROOF SIGNS

1410.1 MATERIALS: All roof signs shall be constructed entirely of metal or other approved noncombustible materials except as provided in section 1408.5. Provision shall be made for electric ground of all metallic parts; and where combustible materials are permitted in letters or other ornamental features, all wiring and tubing shall be kept free and insulated therefrom.

1410.2 BOTTOM CLEARANCE: There shall be a clear space of not less than four (4) feet between the lowest part of the sign and the roof level except for necessary structural supports.

1410.3 CLOSED SIGNS: A closed roof sign shall not be erected to a height greater than fifty (50) feet above fireproof and noncombustible building (types 1 and 2) nor more than thirty-five (35) feet above the roof of nonfireproof (type 3) buildings.

1410.4 OPEN SIGNS: An open roof sign shall not exceed a height of one hundred (100) feet above the roof of buildings of fireproof and noncombustible construction, (types 1 and 2); and not more than sixty (60) feet above the roof of buildings of non-fireproof (type 3) construction.

1410.5 COMBUSTIBLE SUPPORTS: Within the Fire District no roof sign which exceeds forty (40) feet in height shall be supported on or braced to wooden beams or other combustible construction of a building or structure unless otherwise approved by the building official.

SECTION 1411.0 WALL SIGNS

1411.1 MATERIALS: Wall signs which have an area exceeding forty (40) square feet shall be constructed of metal or other approved noncombustible materials except for nailing rails and as provided in section 1408.5.

1411.2 REFLECTORS: Lighting reflectors may project eight (8) feet beyond the face of the wall provided such relectors are at least twelve (12) feet above the sidewalk level; but in no case shall such reflectors project beyond a vertical plane two (2) feet inside the curb line.

1411.3 EXTENSION: Wall signs shall not be erected to extend above the top of the wall, nor extend beyond the ends of the wall to which they are attached unless meeting all the requirements for roof signs, projecting signs or ground signs as the case may be.

SECTION 1412.0 PROJECTING SIGNS

1412.1 MATERIALS: Projecting signs shall be constructed entirely of metal or other approved noncombustible materials except as provided in section 1408.5.

1412.2 MAXIMUM PROJECTION: No such sign shall project over a street or other public space more than ten (10) feet from the face of the building or structure, nor in any case beyond a vertical plane two (2) feet inside the curb line.

1412.3 CLEARANCES: A clear space of not less than ten (10) feet shall be provided below all parts of such signs.

SECTION 1413.0 MARQUEE SIGNS

1413.1 MATERIALS: Marquee signs shall be constructed entirely of metal or other approved noncombustible materials except as provided in section 1408.5.

1413.2 HEIGHT: Such signs shall not exceed seven (7) feet in height nor shall they project below the facia of the marquee nor lower than ten (10) feet above the sidewalk.

1413.3 LENGTH: Marquee signs may extend the full length but in no case shall they project beyond the ends of the marquee.

SECTION 1414.0 MISCELLANEOUS AND TEMPORARY SIGNS

1414.1 POLE SIGNS: Pole signs shall be constructed entirely of non-combustible materials except as provided in section 1408.5; and shall conform to the requirements for ground or roof signs as the case may be. Such signs may extend beyond the street lot line if they comply with the provisions of section 1412 for projecting signs.

1414.2 BANNER AND CLOTH SIGNS: Temporary signs and banners attached to or suspended from a building, constructed of cloth or other combustible material shall be strongly constructed and shall be securely attached to their supports. They shall be removed as soon as torn or damaged and in no case later than sixty (60) days after erection; except the permits for temporary signs suspended from or attached to a canopy or marquee shall be limited to a period of ten (10) days.

1414.3 MAXIMUM SIZE: Temporary signs of combustible construction shall be not more than ten (10) feet in one dimension nor more than five hundred (500) square feet in area.

1414.4 RIGID FRAMES: When more than one hundred (100) square feet in area, temporary signs and banners shall be made of rigid materials with rigid frames.

1414.5 PROJECTION: Temporary signs of cloth and similar combustible construction shall not extend more than twelve (12) inches over or into a street or other public space except that such signs when constructed without a frame may be supported flat against the face of a canopy or marquee or may be suspended from the lower facia thereof but shall not extend closer to the sidewalk than eight (8) feet.

1414.6 SPECIAL PERMITS: All temporary banners suspended from buildings or hung on poles, which extend across streets or other public spaces shall be subject to special approval of the municipal authority having jurisdiction.

SECTION 1415.0 ILLUMINATED SIGNS

1415.1 PERMITS: All electrically illuminated signs shall conform to the requirements of the Massachusetts State Electrical Code. Permits shall be issued for the erection of illuminated signs within the limitations set forth in this article for the location, size and type of sign or outdoor display.

1415.2 RELETTERING SIGNS: The requirements of this section shall not apply to the relettering of illuminated signs, except where such relettering requires a change of wiring or piping of the sign.

Reference Standards - Article 14

Mass-OAB		1973	Rules and Regulations for the Control and Restriction of Billboards, Signs and other Advertising Devices
Mass-DPS	FPR-11		Massachusetts State Electrical Code
ANSI	A60.1	1949	Standard for Signs and Outdoor Display Structures
ASTM	D374	1973	Tests for Thickness of Solid Electrical Insulation
ASTM	D568	1972	Test for Flammability of Flexible Plastics
ASTM	D635	1972	Test for Flammability of Self-Supporting Plastics

ARTICLE 15

ELECTRICAL WIRING AND FIXTURES

Chapter 143, Section 3L of the Massachusetts General Laws Annotated, as amended, provides that all installation, repair and maintenance of electrical wiring and electrical fixtures used for light, heat and power purposes in buildings and structures shall be in conformance with the Massachusetts Electrical Code (Form FPR-11) promulgated by the Board of Fire Prevention Regulations of the Commonwealth of Massachusetts Department of Public Safety.

ARTICLE 16

ELEVATOR, DUMBWAITER, ESCALATOR, AND MOVING WALK REGULATIONS

Chapter 143, Section 69 of the Massachusetts General Laws Annotated, as amended, provides that elevators, dumbwaiters, moving stairways (escalators), and moving walks shall be installed, relocated, or materially changed in conformance with Elevator and Escalator Regulations (Form ELV-1, Revised May, 1969) and Elevator, Dumbwaiter, Escalator, and Moving Walk Regulations (Form ELV-2, Revised 1971) promulgated by the Board of Elevator Regulations of the Commonwealth of Massachusetts Department of Public Safety.

ARTICLE 17

PLUMBING, DRAINAGE AND GASPIPING

Chapter 142, Section 2 of the Massachusetts General Laws Annotated, as amended, provides that all construction, alteration, repair and inspection of plumbing shall be in conformance with the Commonwealth of Massachusetts Uniform State Plumbing Code promulgated by the Board of State Examiners of Plumbers of the Commonwealth of Massachusetts Department of Public Utilities.

Chapter 737 of the Acts of 1960 provides that all construction, alteration, repair and inspection of gas piping shall be in conformance with the Massachusetts Code for Installation of Gas Appliances and Gas Piping promulgated by the Gas Regulatory Board of the Commonwealth of Massachusetts Department of Public Utilities.

ARTICLE 18

AIR CONDITIONING, REFRIGERATION AND MECHANICAL VENTILATION

SECTION 1800.0 SCOPE

The provisions of this article shall control the design and installation of air-conditioning, refrigerating, ventilating, cooling and air exhaust systems hereafter installed, and all alterations or additions to existing systems; except refrigerating systems subject to inspection and regulation under federal law, or where specific exemption is made in this article, or where a special kind of ventilating or exhaust installation is required in a structure or occupancy use group in article 4, or in sections 521 and 522 for emergency ventilation.

1800.1 ACCEPTED ENGINEERING PRACTICE: All such systems and equipment constructed, installed and maintained in accordance with the reference standards of this article shall be deemed to conform to the provisions of this Code.

1800.11 COMMONWEALTH OF MASSACHUSETTS RULES AND REGULATIONS: All installations of gas appliances shall be subject to and must comply with the Massachusetts Code for Installation of Gas Appliances and Gas Piping established under Chapter 737 of the MGLA as amended. Regulations made in accordance with section 10 of Chapter 148 of the MGLA as amended, governing the construction, installation and operation of oil burning equipment. Also, compliance shall be required with the provisions of the rules and regulations issued by the Board of Boiler Rules under the authority of Chapter 146 of the MGLA as amended, governing the construction, installation, testing and inspection of boilers, air tanks, ammonia compressor safety valves, and refrigeration and air-conditioning systems of five (5) tons or more capacity.

1800.2 COOPERATING AGENCIES: Nothing herein contained shall be deemed to nullify the federal, state or municipal rules and regulations governing the storage and use of flammable and explosive gases and chemicals, or the requirements of the Interstate Commerce Commission or other federal statutes governing the transportation and use of hazardous gases, explosives and other flammable substances.

SECTION 1801.0 DEFINITIONS:

AIR CONDITIONING: the process of treating air so as to control simultaneously the temperature, humidity, cleanliness and distribution to meet the requirements of the conditioned space.

AIR DUCT: a tube or conduit, or an enclosed space or corridor within a wall or structure used for conveying air.

FIRE DAMPER: an approved automatic or self-closing noncombustible barrier designed to prevent the passage of air, gases, smoke or fire through an opening, a duct or plenum chamber.

LIMIT CONTROL: a thermostatic device installed in the duct system to shut off the supply of heat at a predetermined temperature of the circulated air.

MECHANICAL VENTILATION: the mechanical process for introducing fresh air or for providing changes of air in a building or structure.

PLENUM CHAMBER: an air compartment or enclosed space to which one or more distributing air ducts are connected.

REFRIGERANT: the medium used to produce cooling or refrigeration by the process of expansion or vaporization.

REFRIGERATION: the mechanical process of removing heat from the air in an enclosed space of a building or structure.

RUPTURE MEMBER: a mechanical device that will rupture at a predetermined pressure to control automatically the compressor or maximum pressure of operation of the refrigerant.

SMOKE DETECTOR: a device installed in the plenum chamber or in the main supply air duct of an air-conditioning system to automatically shut off the blower and close a fire damper in the presence of smoke.

TON OF REFRIGERATION: the unit of capacity of refrigeration equivalent to the removal of heat at the rate of twelve thousand (12,000) B.T.U. per hour.

VENTILATION: the process of supplying or removing air by natural or mechanical means to or from any space. Such air may or may not have been conditioned.

SECTION 1802.0 PLANS, SPECIFICATIONS AND PERMITS

1802.1 PLANS AND SPECIFICATIONS: Where a permit is required, an application shall be filed with the building official and if, due to the size of the equipment involved or the complications that might arise from the installation of the equipment, the building official deems it necessary, such application shall be accompanied by specifications and diagrammatic mechanical drawings in sufficient detail, complying with the provisions of article 1, before a permit shall be issued for an air-conditioning, refrigerating or ventilating system. The plans shall be drawn to a scale of not less than one-eight (1/8) inches to the foot and shall show the location and arrangement of all

equipment and distribution elements, including safety and pressure controlling devices. All mechanical systems required by the provisions of this Code as part of a fire suppression system shall have drawings and specifications submitted by a qualified registered professional engineer bearing his seal and signature.

1802.2 PERMITS: A permit shall be required for all new installations and for all major replacements in existing installations which may result in violation of the Basic Code; or where required for the remedying of existing defective installations; except that permits will not be required for the following systems:

1802.21 RESIDENTIAL BUILDINGS: One and two-family and multi-family dwellings (use groups L-2 and L-3) shall not be required to have permits unless the refrigerating systems contain more than ten (10) pounds of refrigerants or are actuated by motors or engines of one and one-half (1½) horsepower or larger.

1802.22 UNIT REFRIGERATING SYSTEMS: In business, commercial, industrial and residential use groups, B, C, D, E, H, and L, no permit shall be required for the installation of new self-contained unit refrigerating systems which contain not more than six (6) pounds of group 1 refrigerants.

1802.3 APPROVED REFRIGERANTS: It shall be unlawful to maintain or operate any refrigerating system without a permit when such is required by the provisions of section 1802.2, and no refrigerant other than that specified in the permit shall be employed in the system without the written approval of the building official.

SECTION 1803.0 TESTS

No air-conditioning, refrigerating or ventilating system requiring a permit shall be operated until it has been tested and found safe by the building official. All tests shall be conducted in accordance with the standard safety code for air conditioning and ventilating systems, hereafter referred to as the standard safety code and the approved rules adopted thereunder. All mechanical systems required under the provisions of this Code as part of a fire suppression system shall be tested and certified by a qualified registered professional engineer in the presence of the building official.

SECTION 1804.0 INSPECTIONS AND CERTIFICATES

All systems requiring permits shall be inspected by the building official upon their completion. If the system is found safe and in conformity to the requirements of the Basic Code and the approved application, a certificate shall be issued by the building official upon request.

1804.1 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 a regrigerating system requiring a permit until an inspection has been made thereof and due notice given that the work has been approved.

1804.2 PERIODIC INSPECTION: Refrigerating systems in buildings for assembly uses (use group F) and institutional uses (use group H) shall be inspected periodically. All refrigerating systems shall be subjected to such inspections and tests deemed necessary by the building official for the adequate protection of the public safety.

1804.3 DEFECTS AND REPAIRS: Upon inspection or reinspection of a refrigerating, air-conditioning or ventilating system, any defects or deficiencies which require repair to insure safe operation shall be rectified before the system is placed in use.

1804.4 POWER OF CONDEMNATION: When a system or any part thereof is found unsafe to life or property, it shall be condemned and no such system shall be restored to use until it has been made safe and approved by the building official.

SECTION 1805.0 OPERATION AND MAINTENANCE

1805.1 HOUSEKEEPING: All air-conditioning and refrigerating systems shall be maintained in a clean and orderly manner, free from accumulations of dust, oily waste or other debris; and all piping and machinery shall be kept readily accessible at all times for inspection and repair. Plenum chambers, air ducts, cooling and heating coils shall be kept clean, and unit filters shall be cleaned or renewed to insure adequate air flow in accordance with accepted engineering practice.

SECTION 1806.0 EXISTING BUILDINGS AND INSTALLATIONS

1806.1 EXISTING APPROVALS: Existing refrigerating, air-conditioning and ventilating equipment heretofore legally installed may be continued in use, provided the public safety is not endangered thereby, and the system is maintained in a safe operating condition as required by the building official and in accordance with the standard safety code.

1806.2 UNSAFE INSTALLATIONS: If in the opinion of the building or fire officials, the continued use of existing equipment is unsafe, the building official shall order such use to cease until all defects are remedied.

SECTION 1807.0 USE OF REFRIGERANTS

Only approved refrigerants shall be used in any installation as determined by the life hazard of the use and occupancy of the building or structure, and as provided in the standard safety code.

1807.1 CLASSIFICATION OF BUILDINGS: For the purpose of this article buildings shall be classified in respect to use as follows:

1807.11 INDUSTRIAL BUILDINGS shall include use groups A, B-1, B-2 and D;

1807.12 COMMERCIAL BUILDINGS shall include use groups C and E;

1807.13 PUBLIC ASSEMBLY BUILDINGS shall include use groups F-1, F-2, F-3, F-4, F-5, F-6 and F-7;

1807.14 INSTITUTIONAL BUILDINGS shall include use groups H-1 and H-2;

1807.15 RESIDENTIAL BUILDINGS shall include use groups L-1, L-2 and L-3;

1807.16 MIXED USE BUILDINGS: In buildings of mixed use and occupancy as provided in section 213, the requirements of the standard safety code which secure the greatest public safety shall apply to the entire building; except that the requirements of the standards shall apply to each part separately when such uses are completely separated by horizontal and vertical fire divisions complying with the highest fire grading of table 9-1 for the separated uses. When high hazard uses are incidental to the main use of the building or part thereof, the area devoted to such high hazard use shall be enclosed with fireresistive construction complying with the Basic Code.

1807.2 STORAGE OF REFRIGERANTS.

1807.21 MACHINERY ROOMS: All Class T machinery rooms when required under the standard safety code shall be enclosed with vapor-tight construction of not less than two (2) hours fireresistance with one and one-half (1½) hour self-closing fire doors or their approved labeled equivalent complying with article 9. Such rooms shall be ventilated to the outer air in accordance with the standard safety code. Every refrigerating machinery room shall be adequately lighted to furnish an illumination of not less than three (3) foot candles on all parts of the floor.

1807.22 QUANTITY OF REFRIGERANT: Not more than three hundred (300) pounds of refrigerant shall be stored in approved containers in the machinery room. Quantities in excess of three hundred (300) pounds shall be stored in a separate accessory building or in a room used for no other purpose enclosed with not less than three (3) hour fireresistive construction.

1807.23 SMOKE DETECTOR: When in the opinion of the building or fire officials, the life safety of any use or occupancy is exceptionally hazardous, or when required for automatic operation of exhaust systems, all mechanical ventilating and air-conditioning systems shall be provided with an approved smoke detector as specified in section 1812.6.

SECTION 1808.0 HEATING AND COOLING EQUIPMENT

1808.1 STEAM AND HOT WATER HEATING EQUIPMENT: The installation of all steam and hot water apparatus in air-conditioning systems shall comply with the requirements of articles 10 and 11 for piping, flues and flue connections. Direct heating units when used in air-conditioning systems shall not exceed fifteen (15) pounds per square inch gage working pressure.

SECTION 1809.0 PLUMBING AND WATER CONNECTIONS

1809.1 DISCHARGE LINES: Discharge lines from condensers and other equipment shall not be directly connected to the waste or sewer system but shall discharge over and above the rim of a trapped and vented plumbing fixture or other interceptor or into a separate storm water sewer as provided in the Massachusetts State Plumbing Code.

1809.2 WATER CONNECTIONS: Water lines shall be connected to condensers to prevent siphoning into potable water supplies and no water used for removing heat from a refrigerating system shall be discharged into any water supply directly or indirectly intended for human consumption.

SECTION 1810.0 AUTOMATIC FIRE DOORS AND DAMPERS

1810.1 FIRE WALLS AND FIRE DIVISIONS: An approved fire door or an approved automatic fire damper complying with the provisions of article 9 shall be provided at each side of a fire wall or fire division which is pierced by a duct of an air-conditioning or ventilating system. Such opening protectives shall be installed so as to be readily accessible for inspection and repair. Approved fire dampers shall comply with section 903.56 and shall be installed in locations prescribed in the standard safety code listed in the references of this article.

1810.2 FLAMMABLE RESIDUES: Ducts for exhaust ventilating and air-conditioning systems which discharge or contain flammable vapors, dust or other solid residues shall extend to the exterior of the structure in the most direct manner possible and shall not pierce floors except when enclosed with construction of the required fireresistance as regulated by the fire grading in table 9-1; nor shall such ducts transporting flammable matters extend through fire walls, nor shall they be incorporated in the structural elements of the building.

SECTION 1811.0 INLET AND OUTLET OPENINGS

1811.1 EXTERIOR INTAKE OPENINGS: Exterior fresh air intake openings when located on a street or alley lot line shall be installed not less than twelve (12) feet above grade; and all intakes shall be protected by approved corrosion-resistive screens. Fresh air intakes with less

than thirty (30) feet exposure distance to openings in adjoining walls or buildings shall be protected with approved automatic fire shutters, curtains or other approved opening protectives complying with article 9.

1811.2 EXTERIOR EXHAUST OPENINGS: The exhaust openings shall be located on the exterior of structures with approved protecting guards, covers or other approved means of preventing the creation of a nuisance; and shall not circulate air downward in such manner as to strike pedestrians. The discharge outlet shall be located not less than twelve (12) feet above grade and not less than twenty (20) feet horizontally from a fire escape, exterior stairway or other required exitway.

1811.3 VENTILATION DUCT OUTLETS: Ventilation ducts from all range hoods including residential exhaust fans shall discharge to the outside atmosphere.

SECTION 1812.0 DUCTS, LININGS AND COVERINGS

1812.1 MATERIALS AND SUPPORTS: All ducts shall be constructed of approved, noncombustible, corrosion-resistive materials in accordance with the requirements of this article and the provisions of sections 1017 and 1119. Ducts may be of independent construction or may be incorporated in the walls or other parts of the structure, provided that the portion of the structure forming the duct enclosure meets the minimum requirements for strength and fireresistance specified herein or in article 9. They shall be made reasonably air-tight throughout, without openings other than those required for the proper operation and maintenance of the air-conditioning or ventilating system. Ducts and all parts of the duct system shall be substantially supported and securely fastened to the structural members of the building with supports of approved, durable noncombustible materials. Duct size shall be based on the discharge capacity and size of the refrigerating system as specified in the standards.

1812.2 LININGS AND COVERINGS: Only approved noncombustible materials shall be used for duct lining; nor shall combustible coverings be used on the outside of ducts carrying air of temperatures greater than one hundred and seventy-five (175) degrees F. Insulating materials forming a component or auxiliary part of any duct system shall meet the test requirements of article 9 for noncombustible materials.

1812.3 LOCATION OF DUCTS: All ducts shall be installed so that they will not vitiate the strength of any structural member nor be subject to mechanical damage or rupture; nor shall the effectiveness of the fire protection of structural members be impaired. The firestopping of floors, partitions and walls shall not be destroyed where ducts pass through floors, ceilings, walls or partitions.

1812.4 CLEARANCES: Metal ducts shall be installed not nearer than two (2) inches to any combustible construction unless protected by at least one-quarter (¼) inch of asbestos or other approved noncombustible insulating material.

1812.5 PLENUM CHAMBERS: Plenum chambers shall conform to all the minimum requirements for duct systems, and when such chambers are enclosed in walls or partitions, the enclosures shall be constructed in accordance with the requirements of article 8 for enclosure walls, but in no case shall the fireresistance rating be less than two (2) hours.

1812.6 CORRIDORS AS RETURN DUCTS: In all common hallways or exitways which are used as the return exhaust of air-conditioning systems, an approved smoke detector or other device shall be provided to automatically and instantaneously stop the exhaust fan in the presence of smoke as required in section 604.2. The louvres provided for the transmission of air to and from air-conditioned spaces to such hallways shall be arranged to automatically close after stopping of the fans and shall be equipped with auxiliary manually-operated closing devices.

Reference Standards - Article 18

ANSI	B9.1	1971	Safety Code for Mechanical Refrigeration
NFPA	90A	1973	Air Conditioning and Ventilating Systems
NFPA	90B	1973	Warm Air Heating and Air Conditioning Systems, Residence Type
NFPA	96	1973	Ventilation of Cooking Equipment

ARTICLE 19

MANUFACTURED BUILDINGS, BUILDING COMPONENTS AND MOBILE HOMES

SECTION 1900.0 SCOPE

The provisions of this Article shall govern the materials and methods of construction, the design, manufacture, handling, storage, transportation and installation of manufactured buildings, building components and mobile homes intended for installation in the Commonwealth of Massachusetts and manufactured in said State for shipment to any other state or local governmental jurisdictions in which such buildings, building components and mobile homes and the labels thereon are accepted. Manufactured buildings, building components or mobile homes in any jurisdiction of this State if such manufactured buildings, building components or mobile homes have been approved and certified in accordance with the applicable codes as provided in this article and the rules and regulations pursuant thereto and accepted engineering practice.

1900.1 APPROVAL: The Commonwealth of Massachusetts, Department of Public Safety, Division of Inspection, hereinafter referred to in this article as the Division of Inspection, shall evaluate manufactured buildings, building components and mobile home systems and recommend approval to the Commission of those which it determines to be in compliance with this article and the rules and regulations promulgated pursuant hereto entitled, "Massachusetts State Building Code Commission Rules and Regulations for Manufactured Buildings, Building Components and Mobile Homes," hereinafter referred to in this article as the rules and regulations.

However, all approvals of plumbing, electrical or gas systems shall be made by the appropriate state agencies having jurisdiction, as specified in the said rules and regulations.

1900.11 APPROVED TESTS: The Division of Inspection may utilize the results of approved tests to determine whether a manufactured building, building component or mobile home meets the requirements of this article and the said rules and regulations, if that determination cannot be made from evaluation of plans, specifications and documentation alone.

1900.12 APPROVAL OF COMPLIANCE ASSURANCE PROGRAMS: The Division of Inspection shall evaluate manufacturers compliance assurance programs and make recommendations for approval to the Commission of those which it determines to be in compliance with this article and the said rules and regulations.

1900.13 AUTHORIZATION TO VARY: A manufactured building, building component and mobile home system, or a compliance assurance program, which has been approved, shall not be varied in any way without prior authorization by the Division of Inspection in accordance with said rules and regulations.

SECTION 1901.0 DEFINITIONS

APPROVAL: approval by the State Building Code Commission.

BUILDING COMPONENT: any sub-system, subassembly or other system designed for use in or as part of a structure, which may include structural, electrical, mechanical, plumbing and fire protection systems and other systems affecting health and safety.

BUILDING SYSTEM: plans, specifications and documentation for a system of manufactured building or for a type or a system of building components, which may include structural, electrical mechanical, plumbing and fire protection systems and other systems affecting health and safety, including variations which are submitted as part of the building system.

CERTIFICATION: any manufactured building, building component or mobile home which meets the provisions of article 19 and the rules and regulations pursuant thereto; and which has been labeled accordingly.

COMPLIANCE ASSURANCE PROGRAM: the system, documentation and methods for assuring that manufactured buildings, building components, building systems and mobile homes including their manufacture, storage, transportation and assembly and handling and installation, conform with article 19 and the rules and regulations promulgated pursuant thereto.

INSTALLATION: the process of affixing, or assembling and affixing, manufactured buildings, building components or mobile homes on the building site, and connecting it to utilities, and/or to an existing building. Installation may also mean the connecting of two (2) or more mobile home units designed and approved to be so connected for use as a dwelling.

LABEL: an approved device or seal evidencing certification in accordance with article 19 and the rules and regulations promulgated pursuant thereto.

LOCAL ENFORCEMENT AGENCY: any local agency responsible for the issuance of building permits and permits of other applicable codes.

MANUFACTURED BUILDING: any building which is of closed construction and which is made or assembled in manufacturing facilities, on or off the building site, for installation, or assembly and installation, on the building site. "Manufactured Building" also means any building or open construction for which certification under article 19 is sought by the manufacturer and which is made or

assembled in manufacturing facilities away from the building site for installation, or assembly and installation, on the building site. "Manufactured Building" does not mean "mobile home."

MOBILE HOME: a dwelling unit built on a chassis and containing complete electrical, plumbing and sanitary facilities, and designed to be installed on a temporary or permanent foundation for permanent living quarters.

MOBILE HOME SYSTEM: the plans, specifications and documentation for a design of mobile homes which may include structural, electrical, mechanical, plumbing and fire protection systems and other systems affecting health and safety, including variations which are submitted as part of the mobile home system.

SECTION 1902.0 CERTIFICATION

Notwithstanding the provisions of any other law, manufactured buildings, building components or mobile homes certified pursuant hereto shall be deemed to comply with the requirements of all laws, rules and regulations of the Commonwealth of Massachusetts, and with all of the ordinances, by-laws and rules and regulations of local municipalities, which govern the matters within the scope of the approval and certification applicable to manufactured building, building components or mobile homes.

1902.1 ISSUANCE OF BUILDING PERMITS: Upon application and in conformity with the provisions of this Code, the building official shall issue building permits for installation of certified manufactured buildings, building components or mobile homes.

1902.2 ISSUANCE OF CERTIFICATES OF OCCUPANCY: The building official shall issue a certificate of occupancy for all manufactured building or mobile homes that have been installed and inspected and that meet the requirements of this article.

SECTION 1903.0 RECIPROCITY

If the Commission finds that the standards for the manufacture and inspection of manufactured buildings, building components or mobile homes, prescribed by the statutes or rules and regulations of another state or other governmental agency meet the objectives of this article and the said rules and regulations; and such standards are enforced satisfactorily by such other state or governmental agency, or by their agents; the Division of Inspection shall accept all manufactured buildings, building components or mobile homes which have been certified by such other state or governmental agency and assure that it is properly labeled.

1903.1 CONDITION OF RECIPROCITY: The standards of another state shall not be deemed to be satisfactorily enforced unless such other

state provides for notification to the Division of Inspection of suspensions or revocations of approval issued by that other state, in a manner satisfactory to the Commission.

1903.2 SUSPENSION OF RECIPROCAL CERTIFICATION: The Division of Inspection shall suspend or cause to be suspended certification for the following reasons:

a) if it determines that the standards for the manufacture and inspection of such manufactured buildings, building components or mobile homes of another state or other governmental agency do not meet the objectives of this article and the said rules and regulations or that the standards are not being enforced to the satisfaction of the Division of Inspection;

b) if another state or governmental agency, or its agent, suspends or revokes its approval or certification, the acceptance or certification or both granted under this section shall be suspended or revoked accordingly.

SECTION 1904.0 INSPECTION

Any person or firm manufacturing buildings, building components or mobile homes desiring certification, shall agree in writing that the Division of Inspection has the right to conduct unannounced inspections at any reasonable time.

1904.1 INSPECTION RESPONSIBILITIES OF DIVISION OF INSPECTION: The Division of Inspection shall:

a) periodically make, or cause to be made, inspections of the entire process of manufacture and certification of buildings, building components or mobile homes produced under approved building and mobile home systems and of buildings, building components and approved mobile home systems and mobile homes already certified, in order to verify the reliability of each compliance assurance program and of each approved inspection agency;

b) in addition to other on-site inspection provided for in this section, the Division of Inspection shall inspect, or cause to be inspected, certified manufactured buildings, building components or mobile homes which it determines to have been sufficiently damaged after certification to warrant such inspection, and to take such action with regard to such buildings, building components or mobile homes as is authorized hereof, or as is otherwise ncessary to eliminate dangerous conditions.

No inspection entailing disassembly, damage to or destruction of certified manufactured buildings, building components or mobile homes shall be conducted except to implement the provisions of this article.

1904.2 RESPONSIBILITY OF LOCAL ENFORCEMENT AGENCIES: Local enforcement agencies shall:

a) inspect all manufactured buildings, building components or mobile homes upon, or promptly after installation at the building site to determine whether all applicable instructions or conditions have been followed. This may include tests for tightness of plumbing and mechanical systems, for malfunctions in the electrical system, and a visual inspection for obvious violations of the rules and regulations promulgated pursuant hereto. Destructive disassembly of certified buildings, building components or mobile homes shall not be performed in order to conduct such tests or inspections;

b) local enforcement agencies shall inspect site preparation work, including foundations, installation of any manufactured building, building component or mobile home; and for all utility service connections; including plumbing, electrical, gas, water and sewer, for compliance with the applicable codes.

Nondestructive disassembly may be performed only in accordance with the rules and regulations promulgated pursuant hereto. Local enforcement agencies shall cause the disposition of noncomplying manufactured buildings, building components or mobile homes in accordance with the said rules and regulations.

SECTION 1905.0 MOBILE HOMES

Compliance with the standard for mobile homes as specified in section 1905.1 shall be acceptable evidence of compliance with this provision for mobile homes.

1905.1 REFERENCE STANDARDS FOR MOBILE HOMES: The applicable standard is the 1973 edition of ANSI A119.1, "Standard for Mobile Homes, Body and Frame Design and Construction Requirements, and the Installation of Plumbing, Heating and Electrical Systems," as approved by the American National Standards Institute.

1905.2 EFFECTIVE DATE: All mobile homes manufactured after January 1, 1975 and sold, delivered to or installed on building sites in any jurisdiction of this State shall comply with the provisions of ANSI A119.1 (1973 edition) and with this article and the rules and regulations pursuant thereto.

SECTION 1906.0 MANUFACTURED BUILDINGS AND BUILDING COMPONENTS OTHER THAN MOBILE HOMES

Compliance with all applicable requirements of the Basic Code shall be acceptable evidence of compliance with this provision. Where manufactured buildings and building components are used in combina-

tion with other components, compliance of the entire resulting building with all applicable requirements of the Basic Code shall be acceptable evidence of compliance with this provision.

1906.1 EFFECTIVE DATE: All manufactured buildings and building components built after January 1, 1975 shall comply with the provisions of the Basic Code.

EXCEPTION: All manufactured buildings and building components built prior to January 1, 1975 with the approval of the building official and which met all of the requirements of state laws, rules and regulations, or local by-laws or ordinances in force at that time shall be deemed approved in accordance with the provisions of section 114.3 of the Basic Code; provided that such manufactured buildings or building components are used for the purpose and within the limitations for which they were approved and provided such uses are not detrimental to the health and safety of the occupants and the public.

SECTION 1907.0 SUSPENSION AND REVOCATION OF CERTIFICATION

The Commission shall suspend or revoke all certifications of any manufactured building, building component, or mobile home which do not comply with the provision of this Code or with the rules and regulations promulgated under this article.

1907.1 LABELS OF CERTIFICATION: The Division of Inspection shall remove all labels of certification from any such manufactured building, building component or mobile home until such time as it is brought into compliance with this article and the said rules and regulations.

1907.2 NOTICE OF SUSPENSION OR REVOCATION: Notice shall be submitted in writing to the affected parties stating the reason for the suspension or revocation.

SECTION 1908.0 APPEALS PROCEDURE

All appeals from suspension or revocation shall be heard by the State Building Code Appeals Board as specified in the pertinent provisions of section 127 of the Basic Code.

ARTICLE 20

LIGHT-TRANSMITTING PLASTIC CONSTRUCTION

SECTION 2000.0 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 922.

2000.1 APPROVED MATERIALS: The use of all plastics which meet the strength, durability, sanitary and fireresistive requirements of the Basic Code and the reference standards of this article, shall be permitted, subject to the limitations of this article.

2000.11 APPLICATION FOR APPROVAL: Applicants desiring to use an approved plastic material, shall furnish evidence of the approval for the intended use from the State Building Code Commission.

2000.2 IDENTIFICATION: All plastic materials approved for use under the Basic Code shall be identified by the trade formula number or name or other acceptable identification so that it can be ascertained that the material is approved.

SECTION 2001.0 DEFINITIONS

APPROVED PLASTIC: any thermoplastic, thermosetting or reinforced thermosetting plastic material which meets the requirements of section 2000.1.

Class SE: plastic materials which are self-extinguishing (ASTM D 635).
Class VSB: plastic materials which have a burning rate less than 0.8 inches per minute (ASTM D 635).
Class SB: plastic materials which have a burning rate of less than 2.5 inches per minute (ASTM D 635).

Materials that give off smoke or gases more dense or more toxic than that given off by conventionally used interior finish materials under comparable exposure to heat or flame shall not be permitted.

LIGHT-DIFFUSING SYSTEM: a suspended construction consisting in whole or in part of lenses, panels, grids or baffles suspended below lighting fixtures.

PLASTIC GLAZING: material glazed or set in frame or sash and not held by mechanical fasteners which pass through the glazing material.

PLASTIC ROOF PANELS: approved plastic materials which are mechanically fastened to structural members or to structural panels or sheathing and which are used as light-transmitting media in roofs.

PLASTIC WALL PANEL: approved plastic materials which are mechanically fastened to structural members or to structural panels or sheathing and which are used as light-transmitting media in exterior walls.

REINFORCED THERMOSETTING PLASTIC: a thermosetting plastic reinforced with a glass fiber mat having not less than one and one-half (1 1/2) ounces of glass fiber per square foot.

THERMOPLASTIC MATERIAL: a solid plastic material which is capable of being repeatedly softened by increase of temperature and hardened by decrease of temperature.

THERMOSETTING MATERIAL: a solid plastic material which is capable of being changed into a substantially non-reformable product when cured under the application of heat or pressure.

SECTION 2002.0 DESIGN AND INSTALLATION

2002.1 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.

2002.2 CONNECTIONS AND SUPPORTS: All fastenings, connections and supports shall be proportioned to safely transmit two and one-half (2 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 2003.0 GLAZING OF UNPROTECTED OPENINGS

2003.1 USE IN TYPE 4-B CONSTRUCTION: Doors, sash and framed openings which are not required to be fire protected may be glazed with approved plastic materials in buildings of Type 4-B construction.

2003.2 USE GROUP D: In all types of construction of use group D, doors, sash and framed openings which are not required to be fire protected may be glazed with approved plastic materials.

2003.3 OTHER CLASSES OF CONSTRUCTION AND USE GROUP: In other classes of construction and use, such openings not required to be fire protected by section 916 may be glazed or equipped with approved plastic materials subject to the following requirements:

a) The area of such glazing shall not exceed twenty-five (25) percent of the wall face of the story in which it is installed. (See section 2003.4.)

b) The area of a unit or pane of glazing installed above the first story shall not exceed twelve (12) 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.

c) Exceptions:

1) Installations of approved thermoplastic materials which will automatically vent a fire prior to ignition of the plastic materials may occupy a maximum of fifty (50) percent of the wall face and the story when installed in the first three (3) stories above grade.

2) Approved thermoplastic materials may be installed in areas up to fifty (50) percent 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.

2003.4 AUTOMATIC SPRINKLERS: When complete automatic fire sprinkler protection is provided in the building the permissible area of glazing permitted by 2003.3 (a) may be increased one hundred (100) percent.

SECTION 2004.0 EXTERIOR WALL PANELS

2004.1 GENERAL: Approved plastic materials may be used as wall panels, in exterior walls not required to have a fireresistive rating (except in Use Groups A, F-1, F-2 and H), subject to the following requirements:

2004.11 INSTALLATION: Exterior wall panels installed as provided herein shall not alter the type-of-construction classification of the building.

2004.12 AREA LIMITATION AND SEPARATION: Area limitation and separation requirements of exterior wall panels shall be as provided in table 20-1.

2004.13 SPANDREL SEPARATION: Vertical spandrel wall separation between stories shall be as follows:

a) Three (3) feet for SE and VSB plastic wall panels.

b) Four (4) feet for SB plastic wall panels.

2004.14 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 be no vertical separation at that floor except that provided by the vertical thickness of the projection.

2004.2 AUTOMATIC SPRINKLERS: When complete automatic fire sprinkler protection is provided in the building, the maximum percent area of exterior wall in plastic panels and the maximum square feet of single area given in table 20-1 may be increased one hundred (100) percent, but in no case shall the area of plastic wall panels exceed fifty (50) percent of the wall area.

TABLE 20-1 - AREA LIMITATION AND SEPARATION REQUIREMENTS FOR PLASTIC WALL PANELS*

Fire Separation (ft.)	Class of Plastic	Max. % Area of Ext. Walls in Plastic Panels	Max sq. ft. Single area	Minimum Separation of Panels (ft.) Vertical	Horizontal
6 ft. or less	-	NP	NP	-	-
6 ft. or more But less than 11 ft.	SE	10	50	8	4
	VSB,SB	NP	NP	-	-
11 ft. or more But less than 30 ft.	SE	25	90	6	4
	VSB,SB	15	70	8	4
Over 30	SE,VSB	50	Not Limited	3**	0
	SB	50	100	6**	3

**See section 2004.14.

2004.3 COMBINATIONS OF GLAZING AND WALL PANELS: Combinations of plastic glazing and plastic wall panels shall be subject to the area, height, percentage limitations and separation requirements applicable to the class of plastics as prescribed for wall panel installations.

SECTION 2005.0 ROOF PANELS

2005.1 GENERAL: Approved plastic roof panels may be installed (except in use groups A, F-1, F-2, F-3 and H) as follows:

a) in roofs of buildings protected by complete automatic sprinklers; or

b) where the roof is not required to have a fireresistance rating by table 2-5.

Roof panels shall meet the requirements of sections 302.6 Roof Coverings, 903.4 Classifications of Roof Coverings, and 928.0 Roof Coverings, except when installed on buildings outside Fire District No. 1.

2005.2 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.

2005.3 LOCATION: Where exterior wall openings are required to be fire protected by section 916, no roof panel or unit shall be installed within six (6) feet of such exterior wall.

2005.4 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 the following:

Class of Plastic	Maximum Area Individual Unit or Panel (sq. ft.)	Maximum Aggregate Area (% of Floor Area)
SE	300	30
VSB	200	25
SB	100	20

2005.5 EXCEPTIONS:

a) one 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 2005.4.

b) low hazard uses such as swimming pool shelters, greenhouses, etc. are exempt from the panel area limitations of section 2005.4 provided the buildings do not exceed twenty-four hundred (2400) square feet in area, twenty (20) feet in height and are not closer than eleven (11) feet to the property line or adjacent buildings.

c) roof coverings over terraces and patios of one and two-family dwellings shall be permitted with approved plastics.

SECTION 2006.0 SKYLIGHT ASSEMBLIES

2006.1 SKYLIGHT ASSEMBLIES: Skylight assemblies may be glazed with approved plastic materials (except in use group A) in accordance with the following provisions.

2006.11 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.

2006.12 MAXIMUM AREA OF SKYLIGHT UNITS: Each skylight unit shall have a maximum area within the curb of one hundred (100) square feet.

2006.13 AGGREGATE AREA OF SKYLIGHTS: The aggregate area of skylights shall not exceed twenty-five (25) percent of the floor area of the room or space sheltered by the roof in which they are installed.

2006.14 SEPARATION: Skylights shall be separated from each other by a distance of not less than four (4) feet measured in a horizontal plane.

2006.15 LOCATION: Where exterior wall openings are required to be fire protected by section 916, no skylight shall be installed within six (6) feet of such exterior wall.

2006.16 EXCEPTIONS: Except for use groups A and H the aggregate area of approved plastic skylights may be increased one hundred (100) percent beyond the limitations set forth in section 2006.13 if the skylights are used as a fire venting system or if the building is equipped with a complete automatic fire sprinkler system.

2006.17 COMBINATIONS OF ROOF PANELS AND SKYLIGHTS: Combinations of plastic roof panels and skylights shall be subject to the area, percentage limitations and separation requirements applicable to roof panel installations.

SECTION 2007.0 LIGHT-DIFFUSING SYSTEMS

2007.1 GENERAL: Light-diffusing systems shall not be installed in use groups A and H nor in exitways. 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 U.S. Standard gauge galvanized wire or equivalent.

2007.2 INSTALLATION: Approved plastic diffusers shall comply with section 922 (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.

2007.3 SIZE LIMITATIONS: Individual panels or units shall not exceed ten (10) feet in length nor sixteen (16) square feet in area.

2007.4 SPRINKLERS: In buildings having a complete automatic sprinkler system plastic light-diffusing systems shall have sprinklers both above and below unless the system has been specifically approved for sprinkler installations only above the light-diffusing system. Areas of light-diffusing systems shall not be limited if properly protected by approved automatic sprinklers.

SECTION 2008.0 PARTITIONS

2008.1 GENERAL: Approved plastic partitions may be installed as provided in section 910.4 Exceptions to Fireresistive Partitions.

SECTION 2009.0 BATHROOM ACCESSORIES

2009.1 USE OF PLASTICS: Approved plastics shall be permitted as glazing in shower stalls, shower doors, bathtub enclosures, and similar accessory units.

Reference Standards Article 20

ANSI	Z97.1	1972	Performance Specifications and Methods of Test for Transparent Safety Glazing Material Used in Buildings
ASTM	D374	1973	Tests for Thickness of Solid Electrical Insulation
ASTM	D635	1972	Test for Flammability of Self-Supporting Plastics
ASTM	D1929	1968	Test for Ignition Properties of Plastics
ASTM	D2843	1970	Standard Method of Test for Measuring the Density of Smoke from the Burning of Decomposition of Plastics
ASTM	E84	1970	Method of Test for Surface Burning Characteristics of Building Materials