ARTICLE 11. FIRE RESISTIVE CONSTRUCTION

Sub-Article 1. Fire Resistive Materials

GROUP 1
Classification and Use of Fire Resistive Materials

(10.1.1). §C26-571.0 Classification and Use of Fire Resistive Materials.-

a. Fire resistive materials shall be classified on a time and temperature basis and used in accordance with the requirements of this title and the rules of the board.

b. The requirements of this article are intended to provide adequate protection against fire and do not limit any requirements of other sections of this title providing for stronger construction in order to provide safe load carrying capacity.

GROUP 2
Fire Resistive Construction Details

(10.1.2). §C26-572.0 General.-

a. Fire resistive units of burnt clay or shale, sandlime, concrete or gypsum shall be laid up in cement mortar, cement-lime mortar or gypsum mortar for gypsum units.

b. Units shall be solidly bedded, and shall be thoroughly bonded by broken joints in alternate courses, or by approved metal ties.

c. Structures of reinforced concrete meeting the requirements of sections C26-1455.0 through C26-1564.0, in respect to the reinforced concrete and of section C26-239.0, in respect to other parts shall be considered as Class 1, fireproof structures.

d. Poured in place concrete or gypsum fire resistive materials shall be reinforced for protective purposes with a sufficient amount of metal bars or mesh to insure the integrity of the construction.

e. Plaster used in fire resistive construction shall consist of gypsum or cement mortar, or other equally fire resistive material.

(10.1.2.1). §C26-573.0 Spaces Exterior to Structures.-

a. Any space within the grade story in a structure may be considered as outside the structure provided such space is cut off from the structure on all sides adjacent thereto by walls having a fire resistive rating of at least four hours, and access to such space is from the outside only.

b. Any area of a grade story of a structure without exterior walls and cut off from the remainder of the structure by partitions or walls having a fire resistive rating of at least four hours may be considered as outside of the structure.

c. These provisions do not permit the erection of any structure in a manner inconsistent with the provisions of article four of this title.

GROUP 3
Tests for Fire Resistive Materials

(10.1.3). §C26-574.0 Tests for Fire Resistive Materials.-Other materials, appliances or methods of construction for fire resistive purposes not specifically provided for in this title shall, on written application to the superintendent, be tested in accordance with the rules of the board and if found to comply with the requirements of this title, they shall be approved by the superintendent.

GROUP 4

Thicknesses and Fire Resistive Ratings for Protection of Structural Steel

(10.1.4). §C26-575.0 General.-Unless otherwise determined by test in accordance with the rules of the board, the thicknesses of fire resistive materials in the following table, exclusive of air spaces when used for the protection of structural steel members, shall be assumed to have the following fire resistive ratings. It shall be unlawful to reduce such thicknesses for the embedment of pipes, conduits, or wires or for any other purpose.

Inches of:	1 hour	2 hours	3 hours	4 hours
Brick (burned clay or shale)	2 1/4	2 1/4	3 3/4	3 3/4
Brick (sand lime)	2 1/4	2 1/4	3 3/4	3 3/4
Concrete brick, block or tile, except cinder concrete units	2 1/4	2 1/4	3 3/4	3 3/4
Hollow or solid cinder concrete block and tile having a compressive strength of at least seven hundred pounds per square inch of gross area	1 1/2	2	2	2 1/2
Solid gypsum block, provided that to obtain the four-hour rating such blocks shall be plastered with at least one-half inch of gypsum plaster	1	1 1/2	2	2
Gypsum poured in place and reinforced	1	1 1/2	1 1/2	2
Hollow or solid burned clay tile or combinations of tile and concrete	1 1/2	2	2	2 1/2
Metal lath and gypsum plaster	7/8	1 1/2	2	2 1/2
Cement concrete, Grade I	1	1 1/2	2	2
Cement concrete, Grade II	1 1/2	2	3	4
Cement concrete, Grade II, with wire mesh	1 1/2	2	2	3
Hollow gypsum block, provided that to obtain the four-hour rating such blocks shall be plastered with at least one-half inch of gypsum plaster on outer side	3	3	3	3
Metal lath and Vermiculite-gypsum plaster provided that to obtain a four-hour rating for columns a backfill of loose Vermiculite shall be employed. For the 3 and 2-hour ratings for floors, the thickness may be 3/4". Note: Thickness shown includes finish coat of plaster	3/4	7/8	1	1

(10.1.4.1). §C26-576.0 Anchors, Bonds and Ties.-

a. Metal anchors, bonds or caging shall be used with solid gypsum block and cement concrete. For gypsum block protections for all periods, and for other block or tile protections for periods of over two hours, metal anchors in the horizontal joints shall be used.

b. Hollow gypsum shall be anchored with "U" straps placed between the blocks and running into the hollow spaces. For Grade I or Grade II concrete, or poured gypsum, the tie shall consist of wire mesh complying with section C26-578.0, or the equivalent in metal ties or spirally wound wire.

(10.1.4.2). §C26-577.0 Plaster Equivalents.-One-half of an inch of unsanded gypsum plaster shall be equivalent to three-quarters of an inch of sanded gypsum or cement plaster. Plaster protections more than one inch in thickness shall have an additional layer of metal lath imbedded

three-quarters of an inch or less from the outer surface and securely tied to the protected member. The thickness of the plaster shall be the minimum thickness of plaster measured from the face of the lath or of the masonry.

(10.1.4.3). §C26-578.0 Wire Mesh.-Wire mesh for tying concrete protections shall weigh at least one and one-half pounds per square yard and shalt be of a type approved by the board.

GROUP 5
Fire Tests

(10.1.5.1). §C26-579.0 Time-Temperature Curve.-The conduct of all fire tests of materials and construction shall be controlled by the standard time-temperature curve shown in figure 1. The points on the curve which determine its character are:

1,000°F.....at 5 minutes
1,300°F.....at 10 minutes
1,550°F.....at 30 minutes
1,700°F.....at 1 hour
1,850°F.....at 2 hours
2,000°F.....at 4 hours
2,300°F.....at 8 hours

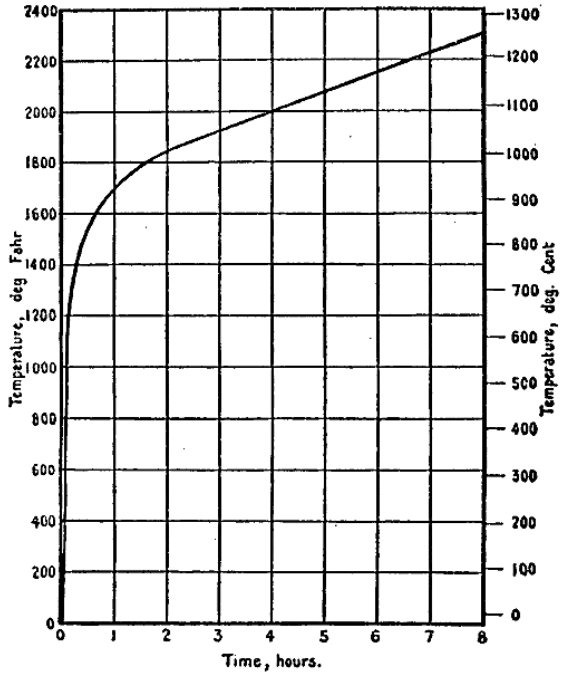

FIG. 1.-Time Temperature Curve.

(10.1.5.2.). §C26-580.0 Determination of Furnace Temperatures.-

a. The temperature fixed by the curve shown in figure 1 of section C26-579.0, shall be deemed to be the average temperature obtained from the readings of at least three thermo-couples symmetrically disposed and distributed to show the temperature near all parts of the sample. All thermo-couples shall project at least twelve inches into the furnace chamber.

b. The temperatures shall be read at intervals of five minutes or less during the first hour, and thereafter the intervals may be increased to a maximum of ten minutes.

c. The accuracy of the furnace control shall be such that the area under the time-temperature curve, obtained by averaging the results from the pyrometer readings, is within seven and one-half percent of the corresponding area under the standard time-temperature curve shown in figure 1 of section C26-579.0, for fire tests of one hour or less duration, and within five percent for tests exceeding one hour in duration.

(10.1.5.3). §C26-581.0 Determination of Temperatures on Unexposed Surfaces.-

a. Temperatures on unexposed surfaces shall be measured with thermo-couples or thermometers placed under oven dry asbestos fire felt pads six inches square, four-tenths of an inch thick, and weighing between one and one and four-tenths pounds per square foot. The wire leads of the thermo-couple or the stem of the thermometer shall have an immersion under the pad and be in contact with the unexposed surface for at least three and one-half inches. The hot junction of the thermo-couple or the bulb of the thermometer shall be placed approximately under the center of the pad. The pad shall be held firmly against the surface, and shall fit closely about the thermocouples or thermometer stems. Thermometers shall be of the partial-immersion type, with a length of stem, between the end of the bulb and the immersion mark, of three inches. The wires for the thermo-couple in the length covered by the pad shall not be heavier than No. 19 steel wire gage (0.041 inch) and shall be electrically insulated with heat and moisture resistive coatings.

b. The temperature readings shall be taken at five or more points on the surface, one of which shall be approximately at the center of such surface and four approximately at the centers of the quarter sections. If additional points are used, they shall be symmetrically disposed about the center, with no location nearer than one and one-half times the thickness of the construction, or nearer than twelve inches in the edges. It shall be unlawful to use points located opposite or on top of beams, girders, pilasters or other structural members.

c. Temperature readings shall be taken at intervals of fifteen minutes or less until a reading exceeding two hundred twelve degrees Fahrenheit has been obtained at any one point. Thereafter at the discretion of the superintendent, the, readings may be taken more frequently but the intervals need not be less than five minutes.

d. Where the conditions of acceptance place a limitation on the rise of temperature of the unexposed surface, the temperature end point of the fire endurance period shall be determined by the average of the measurements taken at individual points, except that if a temperature rise of thirty percent in excess of the specified limit occurs at any one of these points, the remainder shall be ignored and the fire endurance period judged as ended.

(10.1.5.4). §C26-582.0 Report of Results of Fire Tests.-Results shall be reported in accordance with the performance in the tests prescribed in this title. Such results shall be expressed in time periods of resistance.

GROUP 6
Fire Test Structures

(10.1.6). §C26-583.0 Fire Test Structures.-

a. Fire test structures may be located at any place where all the necessary facilities for properly conducting the test may be provided.

b. Entire freedom is left to each applicant in the design of his test structure and the nature and use of fuel, provided the test requirements are met.

GROUP 7
Fire Test Samples

(10.1.7). §C26-584.0 Fire Test Samples.-The fire test sample shall be truly representative of the construction for which classification is desired, and shall be built under conditions representative of actual practice. Test samples of shop-made units shall be selected at the place of manufacture by the superintendent or his representative. When test samples are constructed in place, all workmanship shall be inspected and all materials used in the test samples shall be selected by the superintendent or his representative. The physical properties of the materials or ingredients used in the test sample shall be determined and recorded.

GROUP 8
Fire Endurance Test

(10.1.8). §C26-585.0 Fire Endurance Test.-The fire endurance test on the sample with its applied load, if any, shall be continued until failure occurs, or until it has withstood the test conditions for a period equal to that specified in the condition of acceptance for the given type of construction.

GROUP 9
Hose Stream Test

(10.1.9). §C26-586.0 Hose Stream Test.-

a. Immediately following the expiration of the fire endurance test, the sample shall be subjected to the impact, erosive and cooling effects of a fire hose stream directed first at the middle and then at all parts of the exposed surface. Changes in direction shall be made slowly. The stream shall be delivered through a one and one-eighth inch standard taper, smooth bore nozzle. The water pressure and duration of application shall be as specified in the following table:

Parts of Structure	Resistance Period	Water Pressure at Nozzle, Pounds per Square Inch	Duration of Application, Minutes per One Hundred Square Feet of Exposed Area
Floors and roofs	Less than 1 hour	30	1
	1 hour to less than 2 hours	30	1 1/2
	2 hours to less than 4 hours	45	2 1/2
	4 hours and over	45	5
Walls and partitions	Less than 1 hour	30	1
	1 hour to less than 2 hours	30	1 1/2
	2 hours to less than 4 hours	30	2 1/2
	4 hours and over	45	5

b. The nozzle orifice shall be twenty feet from the center of the exposed surface of the· test sample if the nozzle is so located that when directed at the center its axis is normal to the surface of the test sample. If the nozzle is otherwise located, its distance from the center shall be less than twenty feet by an amount equal to one foot for each ten degrees of deviation from the normal.

GROUP 10
Time of Testing

(10.1.10). §C26-587.0 Time of Testing.-

a. The material or construction shall not be tested until a large proportion of its final strength has been attained, and, if it contains free water, until the excess thereof has been given off. Test samples may be dried artificially.

b. The maximum length of time intervening between construction of the sample and the test shall be thirty days, unless an extension of time is granted by the superintendent.

GROUP 11
Fire Tests of Floors and Roofs

(10.1.11.1). §C26-588.0 Size of Floor and Roof Samples.-The area exposed to fire shall be at least one hundred eighty square feet with each dimension at least twelve feet. Beams or girders, if forming part of the construction under test, shall lie within the combustion chamber and have a clearance of at least eight inches from the walls of such chamber.

(10.1.11.2). §C26-589.0 Loading of Floor and Roof Samples.-During the fire endurance and hose stream test, the construction shall support a uniformly distributed load equal to the design live load, as determined by either the use of accepted engineering formula or by the load test described in section C26-626.0.

(10.1.11.3). §C26-590.0 Conditions of Acceptance for Floor and Roof Construction.-Tests shall be regarded as unsuccessful unless the following conditions have been met:

1. The construction shall have sustained the applied load during the fire endurance test without passage of either flame, or gases hot enough to ignite dry cotton waste, for a period equal to that for which classification is desired.

2. The construction shall have sustained the applied load during the fire and hose stream tests, without passage of either flame, or gases hot enough to ignite dry cotton waste, or of the hose stream. After cooling, but within seventy-two hours after completion of these tests, the construction shall sustain a total superimposed load equal to twice the design live load, and if the top finish is omitted from the test sample, an additional load of thirty-five pounds per square foot uniformly distributed, without deflecting at the center of the span more than one-quarter inch per foot of clear span in either case.

3. Transmission of heat through the construction during the fire endurance test shall have been such as to raise the average temperature on the unexposed surface of the floor or roof two hundred fifty degrees Fahrenheit or less above the initial temperature of such surface.

GROUP 12
Fire Tests of Fire Walls, Fire Partitions and Fireproof Partitions

(10.1.12.1). §C26-591.0 Size of Fire Wall, Fire Partition and Fireproof Partition Samples.- The area of samples of fire walls, fire partitions and fireproof partitions exposed to fire shall be at least one hundred square feet; and each dimension shall be at least nine feet.

(10.1.12.2). §C26-592.0 Conditions of Acceptance of Fire Wall, Fire Partition and Fireproof Partition Construction.-Tests of samples of fire walls, fire partitions and fireproof partitions shall be regarded as unsuccessful unless the following conditions have been met:

1. The wall or partition shall have withstood the fire endurance test without passage of either flame, or gases hot enough to ignite dry cotton waste, or the emission of any considerable

volume of smoke or noxious fumes, for a period equal to that for which classification is desired.

2. Fire walls and fire partitions shall have withstood the hose stream test without passage of the stream.

3. Transmission of heat through the wall or partition during the fire endurance test shall have been such as to raise the average temperature on its unexposed surface two hundred fifty degrees Fahrenheit or less above the initial temperature of such surface.

GROUP 13
Fire Tests for Column and Beam Protection

(10.1.13.1). §C26-593.0 Size of Fire Test Samples for Columns.-Test samples of column protection shall consist of a ten-inch square steel column of "H" section approximately nine feet long and encased in the material of which the insulating properties are to be determined. If the insulation contemplates the use of air spaces between the steel and the insulator, the ends of the test sample shall be thoroughly fire-stopped.

(10.1.13.2). §C26-594.0 Position for Testing Column Protection.-Samples of column protection shall be tested in a vertical position.

(10.1.13.3). §C26-595.0 Determination of Temperatures for Column Protection.-

a. The furnace temperature in tests of column protection shall be deemed to be the average temperature obtained from the reading of at least three thermo-couples, one through the center of the roof and one through each side wall at the upper third point.

b. The temperature beneath the insulating material shall be deemed to be the average temperature obtained from the readings of at least five thermo-couples located at the upper tri-point of the sample and so disposed as to indicate the temperature at the center of the web, the centers of both flanges and of two directly opposite flange edges.

(10.1.13.4). §C26-596.0 Size of Fire Test Samples for Beams.-Test samples for beams shall consist of a steel "I" beam not less than twelve inches nor more than fifteen inches at least twelve feet long located in the ceiling of the furnace, encased in the material of which the insulating properties are to be determined. If the insulation contemplates the use of air spaces between the steel and the insulator, the ends of the test sample shall be thoroughly fire-stopped.

(10.1.13.5). §C26-597.0 Position for Testing Beam Protection.-Samples of beam protection shall be tested in a horizontal position.

(10.1.13.6). §C26-598.0 Determination of Temperatures for Beam Protection.-

a. The furnace temperature in tests of beam protection shall be deemed to be the average temperature obtained from the reading of at least four symmetrically disposed thermo-couples projecting through the furnace roof and located within one foot of the sample.

b. The temperature beneath the insulation shall be deemed to be the average temperature obtained from the reading of at least six thermo-couples located as indicated in figure 2.

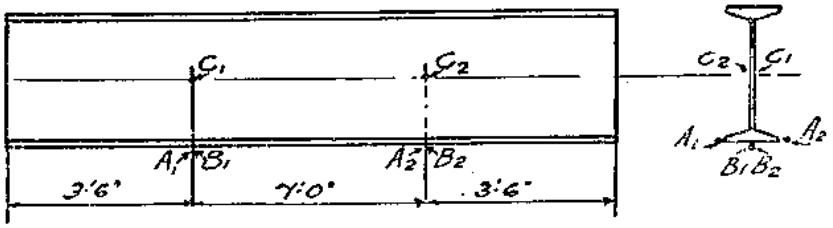

Fig. 2. Location of Thermo-Couples for Beam Tests.

(10.1.13.7). §C26-599.0 Conditions of Acceptance for Column and Beam Protection.-Tests shall be regarded as unsuccessful unless the following conditions have been met:

1. The transmission of heat through the insulation during the test shall not raise the average temperature of the steel to more than one thousand degrees Fahrenheit nor more than 1,200 degrees Fahrenheit on any of the measured points.

2. The insulation shall function within the temperature range of its use without breaking, spalling or buckling so as seriously to expose the steel to the fire.

GROUP 14

Fire Tests of Short Span Fire Resistive Ceilings for the Protection of Structural Steel

(10.1.14.1). §C26-600.0 Size of Fire Test Samples of Short Span Fire Resistive Ceilings.- Unless tested in accordance with section C26-604.0, the area of short span fire resistive ceilings for the protection of structural steel exposed to the furnace shall be at least five square feet with neither dimensions less than two feet.

(10.1.14.2). §C26-601.0 Position for Testing Short Span Fire Resistive Ceilings.-The specimen shall be tested in a horizontal position with the fire applied to the under side.

(10.1.14.3). §C26-602.0 Determination of Temperatures for Short Span Fire Resistive Ceiling Tests.-

a. The furnace temperature shall be deemed to be the average of at least two symmetrically disposed thermo-couples projecting at least twelve inches into the furnace through the test sample and located at least one foot apart.

b. The temperature of the unexposed surface shall be measured by one or more thermo-couples. If a single thermo-couple is used it shall be located at the center of the sample. If two or more are used they shall be symmetrically disposed. The thermo-couples on the unexposed surface shall be insulated and covered in accordance with section C26-581.0.

(10.1.14.4). §C26-603.0 Conditions of Acceptance for Short Span Fire Resistive Ceilings.-

a. The test shall be regarded as unsuccessful unless the following conditions are met:

1. The sample shall have withstood the fire endurance test, for a period equal to that for which classification is desired, without developing openings capable of passing any considerable volume of flame or hot gases.

2. Transmission of heat through the test sample during the fire endurance test shall have been such as to raise the temperature of the unexposed surface eight hundred degrees Fahrenheit or less.

b. The superintendent may also require a full size test according to section C26-604.0, if a test of a short span ceiling construction leaves any doubt as to the adequacy of such construction.

GROUP 15

Fire Tests of Long Span Fire Resistive Ceiling Construction

(10.1.15). §C26-604.0 Fire Tests of Long Span Fire Resistive Ceiling Construction.-The classification of fire resistive ceilings having spans exceeding thirty inches shall be determined in accordance with sections C26-588.0 through C26-590.0. The test sample shall consist of a complete assembly of a panel of the ceiling and of that type of floor construction in connection with which it is to be used.

GROUP 16
Fire Tests of Roof Coverings

(10.1.16). § C26-605.0 General.-Roof coverings shall be subjected to a brand test.

(10.1.16.1). §C26-606.0 Test Samples of Roof Coverings.-Test samples shall consist of complete assemblies of roof deck and covering. The deck construction shall be of that type on which the covering is to be applied in practice. The test sample shall have an area of at least twelve square feet, with a least dimension of three feet.

(10.1.16.2). §C26-607.0 Brand Test for Roof Coverings.-

a. The brand shall consist of thirty-six pieces of kiln-dry spruce three-eighths by three-eighths by six inches placed in three tiers of twelve pieces each.

b. The brand shall be ignited and when burning freely shall be set in place on the surface of the test sample, with a horizontal current of air from a twelve-inch fan directed against it. The fan shall be set five feet from the brand and shall produce an air velocity of six miles per hour two feet from such fan.

(10.1.16.3). §C26-608.0 Conditions of Acceptance for Roof Coverings.-Tests shall be regarded as unsuccessful unless the following conditions have been met:

1. The brand shall have been entirely consumed without spread of fire more than one foot beyond the area directly exposed to the brand and without the ignition of the deck construction.
2. All flame shall die out in less than five minutes after the brand is consumed.

GROUP 17
Alternative Test Method

(10.1.17). §C26-609.0 Alternative Test Method.-As an alternative method of testing, the standard fire test specifications of the A.S.T.M., E 119-47, may be used so far as applicable when made by a laboratory of recognized national reputation, except that the maximum temperature tolerance permitted shall be seven and one-half percent.

GROUP 18
Fire Tests of Opening Protective Assemblies

(10.1.18). §C26-610.0 Fire Tests of Opening Protective Assemblies.-

a. Tests of the fire resistive qualities of opening protective assemblies shall be made upon complete full size samples of the device, but in any case the sample need not exceed twelve by nine feet, constructed and installed in all essentials as in actual service and subjected to a fire on one side continuously for the periods stated below in accordance with the standard time-temperature curve. Tests of opening protective assemblies of a given size may be accepted as covering assemblies of smaller sizes, or of larger sizes not exceeding the area of the sample by more than twenty-five percent.

b. Opening protective assemblies tested to establish a fire resistive rating in excess of three-quarters of an hour shall be subjected to a hose stream test. Opening protective assemblies other than fire windows and fire shutters tested to establish a three-quarters of an hour rating need not be subjected to a hose stream test. The hose stream test shall be conducted in accordance with the standard fire test specifications of the A.S.T.M., D., C19-26 T.

c. The duration of the fire test shall be for:

door assemblies for	fire walls	3 hours,
	fire partitions	1 1/2 hours,
	fireproof partitions	3/4 hour;
fire window and fire shutter assemblies		3/4 hour.

d. When two protective door assemblies, both previously accepted as entitled to a one and one-half hour fire resistive rating, are installed on two sides of the same opening, such combined assembly shall be accepted as having a three-hour fire resistive rating.

e. Tests of protective door assemblies shall be considered unsuccessful unless the assemblies prevent the passage of smoke or flames in considerable volume under neutral furnace pressure at the mid-point of the door, and withstand the pressure of the hose stream when required. Tests on all protective door assemblies to be used in required fireproof partitions and in corridors used as means of egress as required by articles seven and thirteen of this title, shall be considered unsuccessful when the average rise in temperature measured at the middle of the unexposed surface of the assembly and at the mid-points of the upper and lower half of the assembly exceeds six hundred fifty degrees Fahrenheit in half an hour, but no such temperature readings shall be taken directly over glass panels.

f. Tests of fire windows and fire shutters to be successful shall meet the requirements for doors as to structural strength and passage of flame, but no restriction shall be made as to the amount of heat transmitted through the windows or shutters; furthermore small portions of glass dislodged by application of the stream of water shall not be considered as structural weakness.

Sub-Article 2. Protection of Structural Steel and Iron Members

(10.2.1). §C26-611.0 Protection of Columns.-Iron or steel columns shall be protected by material or assemblies having a fire resistive rating of four hours for Class 1, fire-proof structures, and of three hours for Class 2, fire-protected structures, except that interior columns in Class 2, fire-protected structures, for residence purposes need have only two-hour protection.

(10.2.2). §C26-612.0 Protection of Lugs, Brackets and Wind Bracing.-Where a column is solidly encased with fire resistive material, the extreme outer ledge of lugs, brackets, wind bracing, or other supporting parts may extend to within one inch of the outer surface of the protection.

(10.2.3). §C26-613.0 Protection of Fire Resistive Covering.-Where the fire resistive covering on columns is exposed to injury from moving vehicles or the handling of merchandise it shall be jacketed to a height of five feet from the floor with an adequate protective covering.

(10.2.4). §C26-614.0 Protection of Wall Girders and Other Steel Supporting Masonry.-Wall girders and other steel supporting masonry in Class 1, fireproof structures, and Class 2, fire-protected structures, shall be protected by materials or assemblies having a fire resistive rating of three hours.

(10.2.5). §C26-615.0 Protection of Joists, Beams and Girders.-

a. Joists, beams and girders supporting floor or roof construction in class 1, fireproof structures, shall be individually encased with materials or assemblies having a three-hour fire resistive rating, except that in areas of twenty-five hundred square feet or less joists, beams and girders may be protected by a ceiling with a three-hour fire resistive rating provided such areas are completely fire-stopped.

b. Joists, beams and girders supporting floor and roof construction in class 2, fire-protected structures, shall be individually encased with materials or assemblies having a one and one-

half hour fire resistive rating, except that in areas of twenty-five hundred square feet or less joists, beams and girders may be protected by a ceiling with a one and one-half hour fire resistive rating provided such areas are completely fire-stopped.

c. Fire-stopping as required in this section shall be done with materials, or assemblies having the same fire resistive rating as the fireproofing; or joists, beams, or girders with solid webs may be substituted for such materials or assemblies. At fire-stops, where a space occurs between the bottom of the joist, beam or girder and the ceiling, such space shall be filled with material similar to that used for the fireproofing.

(10.2.6). §C26-616.0 Protection of Lintels.-Iron or steel lintels over openings more than four feet wide in walls shall be protected as required for beams unless the lintel is supported from a fireproof member above; provided that when the span of any such opening is six feet or less and such opening is spanned by an adequate masonry arch above the lintel, the protective covering may be omitted.

(10.2.7). §C26-617.0 Use of Stone Lintels Restricted.-It shall be unlawful to use stone lintels unless such lintels are supplemented on the inside of the wall with iron or steel lintels or with suitable masonry arches carrying the masonry backing, or by other methods approved by the superintendent.

(10.2.8). §C26-618.0 Protection of Trusses.-

a. Trusses in Class 1, fireproof structures, and Class 2, fire-protected structures, shall be entirely protected by materials or assemblies having fire resistive ratings of three hours and one and one-half hours respectively. In one-story structures the protective covering may be omitted from members of trusses, including beams and subpurlins. In multi-story structures such covering may be omitted when such members support only roof loads, access passageways, or ventilating equipment, and have a clear height of at least twenty feet below the lower chords of the trusses.

b. The protective covering may be omitted from roof truss members, including beams and subpurlins, if a continuous ceiling, having a fire resistive rating or three hours is provided below the lower chords of the trusses, and the space above the ceiling is completely enclosed and fire-stopped and contains no passageways or apparatus of any kind. Access to the enclosed roof space shall be permitted by an access door having a fire resistive rating of at least one hour, and having maximum dimensions of three feet by three feet.

c. In an auditorium with fixed seats having metal frames, the fireproofing may be omitted from structural steel roof trusses with their adjoining steel framing, when the clear height below the lower chords of the trusses is less than twenty feet and when such members support only roof loads, access passageways or ventilating equipment provided a wire lath and plaster ceiling of one-hour fire resistive rating placed at least three inches clear of any steel surface separates such steel completely from such auditorium spaces.

Sub-Article 3. Fire Resistive Floors and Roofs

(10.3.1). §C26-619.0 Form and Fire Resistive Ratings of Floor and Roof Construction.-

a. Floor and roof construction between supporting beams in Class 1, fireproof structures, shall consist of arches or slabs of incombustible material or assemblies and shall either by itself or in combination with its protective ceiling have a fire resistive rating of at least three hours, except as specifically provided otherwise. Nothing in this section shall prevent the application of cork or fibre insulation board or other combustible insulation material applied directly to the fire resistive floor or roof construction in cement, provided that in case of floor

construction such insulation is covered by at least one and one-half inch thicknesses of Portland cement concrete or other equally fire resistive material of equal thickness. Similar floor and roof construction in Class 2, fire-protected structures, shall either by itself or in combination with its protective ceiling have a fire resistive rating of at least one and one-half hours, except as otherwise specifically provided.

b. Where the fire protective covering is omitted from roof trusses as provided in section C26-618.0, blocks of book tile, gypsum, concrete or other equivalent fire resistive materials may be used for horizontal or sloping roofs directly above such trusses, provided the necessary strength requirements are met.

c. A floor or roof construction in which the structural members are not individually encased in fire resistive materials or assemblies shall be fire-stopped as provided in section C26-615.0.

(10.3.2.1). §C26-620.0 Concrete Floor and Roof Construction.-

a. Materials for Concrete Floor and Roof Construction.-Unless designed in accordance with the provisions of sections C26-1455.0 through C26-1564.0, concrete floor and roof construction shall consist of a mixture of one part of cement by volume two parts of sand by volume, and a maximum of five parts of coarse aggregate measured separately by volume and reinforced with steel as provided in subdivision d of section C26-620.0. Cinder aggregate shall be clean and well burned, containing a maximum of thirty-five percent by weight of unconsumed carbon and one and one-half percent by weight of sulphur. Other aggregates shall conform to section C26-1467.0.

(10.3.2.2). b. Reinforcement of Concrete Floor and Roof Construction.-Reinforcement shall consist of steel fabric, rods, or other suitable shapes. The reinforcement shall be at least fifteen hundredths percent for continuous steel fabric for A-432 and A-16 special grade bars or at least twenty-five hundredths percent for other forms of steel reinforcement, the percentage to be based on the sectional area of the slab above the center of reinforcement. The center of the reinforcement shall be at least one inch above the bottom of the slab, but all parts of the reinforcement shall be at least three-quarters of an inch from the bottom of the slab.

(10.3.2.3). c. Thickness of Concrete Floor and Roof Construction.-

1. Unless designed in accordance with the provisions of sections C26-468.0 through C26-509.0, the minimum thickness of concrete floor and roof construction shall be determined by the following formula, in which

t = total thickness in inches

L = clear span in feet between steel flanges

w = gross uniform load in pounds per square foot:

$$t = \frac{L}{2} + \frac{w - 75}{200}$$

The total thickness shall be at least four inches except in the following cases:

(a) Special forms of construction which have passed the three-hour fire test specified in sections C26-588.0 through C26-590.0.

(b) In Class 2, fire-protected structures, floor construction, except the floor construction above the cellar or basement, and roof construction may be used consisting of two inches or more of reinforced concrete or gypsum top slab, or two inches or more of stone or cinder concrete poured over rib lath secured to the top of steel beams or steel joists, and at least a seven-eighths-inch gypsum or cement plaster

ceiling on metal lath; or any other material or assembly having a fire resistive rating of at least one and one-half hours.

2. Four-inch slabs may be used for spans of eight feet or less provided the gross floor load is two hundred pounds per square foot or less.

(10.3.2.4). d. Strength of Concrete Floor and Roof Construction.-

1. Unless designed in accordance with sections C26-1455.0 through C26-1564.0, the safe carrying capacity of concrete floor and roof construction shall be determined by the following formula, in which

w = gross uniform floor load in pounds per square foot

A_s = cross-sectional area of reinforcement in square inches per foot of width of slab

L = clear span in feet between steel flanges and shall not exceed ten feet in any case, and when the gross floor load exceeds two hundred pounds per square foot shall not exceed eight feet

C = the following coefficient, for steel having an ultimate strength of at least fifty-five thousand pounds per square inch:

(a) For Cinder Concrete

(1) Twenty thousand when reinforcement is continuous

(2) Fourteen thousand when reinforcement is hooked or attached to one or both supports

(b) For Stone Concrete

(1) Fifteen thousand when reinforcement is hooked or attached to one or both supports

(2) Twenty-three thousand when reinforcement is continuous:

$$w = \frac{3CA_s}{L^2}$$

2. When this formula is used the reinforcement shall be hooked or attached to one or both supports or be continuous, and the slab shall be stone or cinder binder concrete at least four inches in thickness.

3. The concrete in such floor and roof construction shall have an ultimate compressive strength of at least seven hundred pounds per square inch at the end of twenty-eight days. For such concrete, the safe fibre stress may be taken as two hundred pounds per square inch, the bond fifty pounds per square inch and n, as defined in section C26-1472.0, shall equal thirty; and the strength may be figured by approved engineering methods.

4. If steel of an ultimate strength in excess of fifty-five thousand pounds per square inch is used, the above coefficient may be increased in the ratio of the ultimate strength to fifty-five thousand, but at most thirty percent, provided a certificate of the manufacturer, certifying to the minimum strength of the wire fabric actually to be used, is submitted before erection.

§C26-620.1 Cellar Floors and Garage Floors.-The cellar floor and garage floor or any floor resting directly on the ground shall be constructed of stone concrete or cinder concrete at least four inches thick, but in no instance shall the mix be more than eight parts aggregate to one part cement except that for garage floors on ground in other than private dwellings, a bituminous plant mix wearing surface not less than two inches thick when compressed and laid on a stabilized base course four inches in thickness after compression may be used. The wearing surface shall be of asphaltic concrete mixture type 1 and shall comply with the specifications in section 3.01 of the standard highway specifications for assessable improvements adopted by the Board of Estimate of the City of New York on May 24, 1945. The base course of one and one-

half inch (1 1/2") and three-eighths inch (3/8") aggregate shall comply with the provisions set forth in section 4.02 class 2 for asphalt macadam pavement defined in standard highway specifications for assessable improvements adopted by the Board of Estimate of the City of New York on May 24, 1945.

§C26-620.2 Floors Constructed With Glass.-Where glass has been placed in a floor so that it forms a structural part of the floor and is carried upon structural supports framed about the glass, it shall be removed and shall be replaced by solid closed flooring constructed the same as the adjoining flooring. This section shall not apply to vault lights in sidewalks, yard or court pavements and similar exterior locations. The provisions of this section shall apply to all existing installations of glass in floors.

(10.3.3). §C26-621.0 Gypsum Floor and Roof Construction.-Gypsum floor and roof construction may be either of reinforced poured gypsum or precast units and may be either of the suspension type or of the slab and ceiling type with the slabs constructed of such thickness as to support the imposed loads, provided the floor or roof construction complies with the requirements of section C26-019.0.

(10.3.4.1). §C26-622.0 Hollow Tile Arches.-

a. Material for Hollow Tile Arches. Hollow blocks of burnt clay or shale used in hollow tile arches for fire resistive construction shall be medium or hard and of uniform density. The shells and webs shall be at least five-eighths of an inch thick. The maximum spacing of interior vertical and horizontal webs shall be four inches. The blocks shall be at least two cells deep, and shall be laid in cement mortar and be properly keyed.

(10.3.4.2). b. Depth of Flat Arches.-The depth of flat arches of burnt clay or shale hollow blocks shall be at least one and one-half inches for each foot of span inclusive of the portion of the block extending below the under side of the beam and such arches shall be at least six inches thick.

(10.3.5). §C26-623.0 Brick Arches.-

a. Brick arches shall be built of common or hollow brick solidly bonded. Such arches shall be segmental in form with a minimum thickness of four inches for spans of five feet or less and of eight inches for spans exceeding five feet, unless such spans are suitably reinforced.

b. The rise of such arches shall be at least one inch per foot of span and the joints shall be filled with cement.

(10.3.6). §C26.-624.0 Rise of Segmental Arches.-

a. Segmental arches for floor and roof construction shall have a rise of at least one inch per foot of span.

b. The minimum thickness of this type of arch shall be six inches.

(10.3.7). §C26-625.0 Special Roof Construction.-For mansards and dormers having a slope of more than thirty degrees from the horizontal, blocks of book tile, gypsum, concrete or other fibre resistive materials may be used subject to the load test specified in section C26-626.0, provided they have a fire resistive rating of at least one hour.

(10.3.8). §C26-626.0 Load Tests for Floor and Roof Construction.-When the strength of any floor or roof construction cannot be determined by the methods prescribed in this section, or by the application of accepted engineering formulae, the safe uniformly distributed carrying capacity shall be taken as a fraction of the total load causing failure in a full-sized test sample, when applied along two lines each distant one-third of the span from the supports. Each fraction shall be one-quarter when the specimens are tested as simple spans and one-sixth when tested as continuous spans.

(10.3.9). §C26-627.0 Span of Floor and Roof Construction.-Unless designed in accordance with section C26-1455 through C26-1564.0, the maximum clear span for floor and roof slabs or arches between supporting beams shall be eight feet, except as otherwise permitted by subdivision "d" of section C26-620.0.

(10.3.10). §C26-628.0 Openings in Floors and Roofs.-Suitable metal framing or reinforcement shall be provided in fire resistive floor and roof construction around any opening having an area in excess of two square feet. When openings are provided for pipes and conduits, the unoccupied space shall be filled with approved incombustible material for the full depth of the slab, unless close fitting individual sleeves, solidly embedded in the construction, are used; or the opening is enclosed as a shaft and constructed in compliance with section C26-638.0.

(10.3.11). §C26-629.0 Tie Rods.-The supporting beams in fire resistive floors and roofs shall be tied together by steel tie rods of proper size, spacing and location; provided that when floor filling is in the form of reinforced slabs and the reinforcement is continuous over the supports or securely attached to the supports, tie rods may be omitted.

(10.3.12). §C26-630.0 Top Filling.-In Class 1, fireproof structures, the space between the floor slab and the finished floor shall be filled with concrete consisting of one part of cement to a maximum of ten parts of cinders or with other incombustible material approved by the superintendent.

Sub-Article 4. Fire Walls and Partitions

GROUP 1
Fire Walls

(10.4.1.1). §C26-631.0 Materials and Thicknesses for Fire Walls.-

a. Fire walls shall be constructed of the following materials and minimum thicknesses, exclusive of any required plaster:

1. Solid brick, solid structural units, or plain concrete eight inches thick.
2. Solid reinforced concrete six inches thick.
3. Solid cinder concrete blocks eight inches thick.
4. Solid cinder concrete blocks six inches thick, plastered on both sides.
5. Hollow clay tile twelve inches thick, two units, three cells in wall thickness.
6. Hollow clay tile eight inches thick, three cells in wall thickness plastered on both sides.
7. Hollow concrete blocks (one piece) twelve inches thick, webs and shells of which are at least one and one-half inches thick and at least two cells in wall thickness.
8. Hollow concrete blocks (one piece) eight inches thick, plastered on both sides, shells of which are at least one and one-half inches thick.

b. Fire walls of other materials or forms of construction shall have a fire resistive rating of four hours.

(10.4.1.2). §26-632.0 Construction of Fire Walls.-

a. Fire walls shall be constructed with solid joints of cement or cement-lime mortar. Where plaster is required, unsanded gypsum shall be at least one-half of an inch thick, and sanded gypsum or cement plaster, three-quarters of an inch thick.

b. In a Class 2, fire-protected structure, or a Class 3, non-fireproof structure, a fire wall shall be continuous from its foundation three feet above the roof surface, except as provided in the following paragraph, and except that in residence structures of these two classes, fire walls may be carried only to the top of the roof boards in Class 2, fire-protected structures, and in

Class 3, non-fireproof structures, provided the junction between the roof and the fire wall is thoroughly grouted with cement mortar and fire-stopped.

c. Fire walls may be offset from floor to floor in any structure provided the entire offset is of fire resistive construction having a fire resistive rating of four hours.

d. Combustible structural members built into a solid fire wall shall be separated from each other and from the outside of the wall by at least four inches of solid masonry.

e. When combustible members project into hollow fire walls the hollow space shall be filled solidly with incombustible, fire resistive materials for the full thickness of the wall and for four inches or more above, below and between the members.

f. Fire walls of masonry used as party or bearing walls shall conform in thickness and material to the requirements for such walls as specified in sections C26-412.0 through C26-467.0.

g. The application of cork or fibre insulation board may be permitted if cemented or attached directly to the face of the wall laid up with no intervening air spaces and protected as required by the rules of the board.

GROUP 2
Fire Partitions

(10.4.2.1). §C26-633.0 Materials for Fire Partitions.-

a. Fire partitions shall be constructed of the following materials and minimum thicknesses, exclusive of any required plaster:

1. Solid brick, solid structural units or plain concrete, eight inches thick.
2. Solid reinforced concrete, five inches thick.
3. Solid cinder concrete blocks, six inches thick.
4. Hollow clay tile, two cells in wall thickness, six inches thick, plastered on the room side.
5. Hollow concrete block, eight inches thick, provided calcareous, burnt clay or cinder aggregates are used and the shells are at least one and one-half inches thick if unplastered, and at least one and one-quarter inches thick if plastered.
6. Hollow gypsum block, three inches thick, plastered on both sides.
7. Hollow gypsum block, six inches and two cells in wall thickness, plastered on one side.
8. Clay tile, glazed or unglazed, six inches thick, cored not in excess of twenty-five percent and laid two units in wall thickness.
9. Solid gypsum block, three inches thick.

b. Where combustible insulation board is permitted, it shall be applied directly to the face of the partition by cement or other approved method, but in no case shall it be built into the required partition construction.

c. Fire partitions or other materials or forms of construction shall have a fire resistive rating of three hours.

(10.4.2.2). §C26-634.0 Construction of Fire Partitions.-

a. The maximum unsupported height of a fire partition shall be thirty times its total thickness unless suitably anchored and reinforced or constructed in accordance with the requirements for walls as specified in sections C26-412.0 through C26-467.0. Intermediate support for fire partitions shall be of construction having a fire resistive rating of three hours. Fire partitions

may be offset from floor to floor in any structure provided the entire offset is of fireproof construction having a fire resistive rating of three hours.

b. Combustible structural members built into a fire partition wall shall be separated from each other and from the outside of the wall by at least four inches of solid masonry.

c. Where combustible insulating boards are permitted on a fireproof partition, they shall be cemented or directly attached to the face of the partition and may not be built into the required construction.

d. Fire partitions shall be constructed and plastered, if plastering is required, as prescribed for fire walls in section C26-632.0.

(10.4.2.3). §C26-635.0 Fire Resistive Stairway Enclosures.-

a. Fire resistive stairway enclosures constructed of the following materials and minimum thicknesses, exclusive of any required plaster, may be used in Class 1, fireproof structures, exclusively for school purposes, and in Class 2, fire-protected structures:

1. Solid brick, or solid structural units, eight inches thick.
2. Solid concrete, plain or reinforced, four inches thick.
3. Solid cinder concrete blocks, four inches thick; plastered on both sides, three inches thick.
4. Solid gypsum (poured or block), three inches thick.
5. Hollow clay tile, two cells in wall thickness, four inches thick, plastered on both sides; or six-inch partition tile, two cells in wall thickness, plastered on one side.
6. Hollow concrete block, eight inches thick, four inches thick, plastered on both sides.
7. Hollow gypsum block, three inches thick, plastered on both sides.

b. Fire resistive stairway enclosures of other materials or forms of construction shall have a fire resistive rating of at least two hours.

GROUP 3
Fireproof Partitions

(10.4.3.1). §C26-636.0 Materials for Fireproof Partitions.-

a. Fireproof partitions shall be constructed of the following materials and minimum thicknesses, exclusive of any required plaster:

1. Solid or hollow brick or solid structural units, four inches thick.
2. Solid gypsum (poured or block), two inches thick.
3. Solid cinder concrete (poured or block), three inches thick.
4. Solid walls of cement mortar or concrete, two and one-half inches thick, reinforced in two directions with at least one-eighth of one percent of steel in each direction.
5. Solid walls at least two inches thick of gypsum plaster or two and one-half inches thick of cement plaster, supported by incombustible studding and metal lath or mesh meeting the requirements of section C26-460.0.
6. Hollow clay tile, three inches thick, plastered on both sides.
7. Hollow gypsum blocks, three inches thick.
8. Hollow concrete blocks, three inches thick, plastered on both sides.
9. Hollow partitions at least three inches thick of long length gypsum lath, at least one-half of an inch thick on both sides of incombustible studding, plastered on both sides with three-fourths of an inch of gypsum plaster, sanded one part gypsum to one part sand for the scratch coat and one part gypsum to two parts of sand for the brown coat both by weight.

10. Hollow partitions of metal lath or mesh or welded wire ribbed lath and plaster on incombustible studding, complying with the requirements of section C26-460.0, with three-quarters of an inch of cement or gypsum plaster on each side. When paperbacked lath is used, the paper shall be flame-proof.

11. Hollow walls, at least three inches thick, of gypsum board at least one-half inch thick, on both sides of incombustible studding spaced not over sixteen inches on centers and covered on both sides with one-eighth inch thick hard asbestos cement composition sheets, with all joints covered with two-inch wide batten strips made of the same material as sheets or of approved type metal strips.

12. Clay tile, glazed or unglazed, four inches thick, with outside shells not less than three-quarters of an inch in thickness plastered on one side.

13. Solid walls not less than two inches thick of vermiculite-gypsum plaster on metal or gypsum lath.

14. Solid walls not less than two inches thick of perlite-gypsum plaster on metal or gypsum lath.

b. In non-fireproof structures, wood stud fire retarding partitions may be used as fireproof partitions with a maximum stud spacing of sixteen inches on centers and metal lath or mesh weighing at least three and four-tenths pounds per square yard fastened to the studding at maximum intervals of six inches vertically and plastered on both sides with gypsum, vermiculite-gypsum, perlite-gypsum or cement plaster to at least three-quarters inch grounds or three-eighths inch perforated gypsum lath on both sides, plastered with one-half inch of sanded gypsum plaster or vermiculite gypsum plaster or perlite-gypsum plaster or one-half inch plaster board on both sides covered with hard asbestos cement composition sheets at least one-eighth of an inch in thickness with all joints covered with two-inch batten strips of the same material or with approved metal battens or two layers of one-half inch gypsum wallboard. Grounds for chair rails, baseboards and similar appurtenances, if used in such partitions shall be of metal covered wood or of incombustible material. Continuous vertical spaces in such walls shall be fire-stopped as required in section C26-683.0 through C26-688.0.

c. Fire proof partitions of other materials or forms of construction shall have a fire-resistive rating of one hour.

(10.4.3.2). §C26-637.0 Construction of Fireproof Partitions.-

a. Fireproof partitions in Class 1, fireproof structures, and Class 2, fire-protected structures, shall be carried at each tier of a structure on incombustible supports and unless suitably anchored or reinforced the maximum unsupported height shall be thirty times the total thickness.

b. Where plaster is required, unsanded gypsum plaster shall be at least one-half inch thick but the total thickness of plaster shall be at least three-quarters of an inch, or sanded gypsum or cement plaster three-quarter-inch thick.

c. The thickness of the material and construction of fireproof partitions of masonry as given are the minimum for fire resistive purposes and shall be increased as required to comply with sections C26-412.0 through C26-467.0.

(10.4.3.3). §C26-637.1 Fireproof Partitions on Floors Used for Manufacturing.-

a. Wherever the floor of a frame or non-fireproof building exceeding 2 stories in height has a dimension of one hundred fifty feet or more in length or width, and all or a part of the floor is used for a garment factory as detailed in section C19-161.0 or a factory engaged in the

processing of combustible fabrics with flammable oil as also defined in section C19-161.0 a partition having a fire resistive rating of at least one hour shall be provided to separate the floor area. The floor area shall be so separated that no area shall extend in length or width for more than one hundred ten feet. Openings in such partitions shall be provided with fireproof self-closing doors or automatic fire doors. Such doors shall have a rating of at least one hour. The provisions of this section shall apply to existing buildings so occupied.

b. Exception. Subdivision a of this section shall not apply where the floor area used for manufacturing is entirely protected with an approved sprinkler system.

Sub-Article 5. Shaft Enclosures

(10.5.1). §C26-638.0 Protection of Closed Shafts.-

a. A series of floor openings, consisting of two or more openings in successive floors or a floor and a roof, shall be deemed to be a shaft and shall be enclosed.

b. Such shafts shall be constructed of materials or assemblies having the following fire resistive ratings:

1. Three hours when in:
   (a) Class 1, fireproof structures, or
   (b) Class 2, fire protected structures, exceeding fifty feet in height.
2. Two hours when in:
   (a) Class 2, fire protected structures, not exceeding fifty feet in height, or
   (b) Class 3, non-fireproof structures, except in residence structures not to exceed three stories and basement in height and other structures not exceeding four stories or forty feet in height, or
   (c) Class 6, heavy timber construction structures, except as provided in sections C26-640.0 and C26-646.0 of this code.
3. One hour when in class 3, non-fireproof residence structures, not exceeding three stories and basement in height or other non-fireproof structures not exceeding four stories or forty feet in height.

(10.5.2). §C26-639.0 Protection of Elevator Shafts in Existing Non-Fireproof Public Structures-Shafts for elevators, escalators or similar hoisting devices in Class 3, or Class 4, public structures, built before January first, nineteen hundred thirty-eight, as defined in subdivision a of section C26-235.0, which are not already enclosed with fire resistive materials, shall be enclosed as provided in section C26-638.0, except as otherwise provided in section C26-647.0.

(10.5.3). §C26-640.0 Protection of Vent Shafts in Non-Fireproof Residence Structures.-In non-fireproof residence structures, occupied by one or two families, vent shafts shall be supported on and be constructed of materials having a fire resistive rating of one hour and shall extend at least three feet above the roof and be covered by a ventilating skylight of metal and glass.

(10.5.4.). §C26-641.0 Enclosures at the Top of Shafts.-

a. Except in one- and two-family residence structures, shafts extending into the top story, except those stair shafts where the stairs do not continue to the roof, shall be carried through and at least two feet above the roof. Every shaft extending above the roof, except open shafts and elevator shafts, shall be enclosed at the top with a roof of materials having a fire resistive rating of one hour and a metal skylight covering at least three-quarters of the area of the shaft in the top story, except that skylights over stair shafts shall have an area not less than one-

tenth the area of the shaft in the top story, but shall be not less than fifteen square feet in area. The required skylight may be replaced by a window or windows of equivalent area in the side of the shaft, provided that the sills of such windows are at least two feet above the roof and the windows do not face within ten feet of a property line, except that such windows may be installed within ten feet of a street. Any shaft terminating below the top story of a structure and those stair shafts not required to extend through the roof shall have the top enclosed with materials having the same fire resistive rating as required for the shaft enclosure.

b. In those structures not of class 1 or class 2 construction, other than private dwellings, all shafts including stair shafts, extending into the top story shall be carried through and at least three feet above the roof and the sills of windows used in place of skylights shall be at least three feet above the roof.

c. The provisions of this section shall not apply to stair shafts in multiple dwellings.

d. In all buildings which come under the exit provisions of the labor law, a skylight having an area of not less than fifteen square feet shall be provided over all stairs which extend into the top story. The walls of the enclosure below the skylight shall extend at least two feet above the roof. Such skylights may be replaced by windows as provided in paragraph a of this section. The provisions of this paragraph d shall apply to all existing buildings to which the exit provisions of the labor law are applicable.

(10.5.5). §C26-642.0 Enclosure of the Bottom of Shafts.-The bottom of shafts, in buildings other than one or two-family residence structures, which do not extend to the ground, except vent shafts, shall be enclosed with materials having a fire resistive rating of three hours.

(10.5.6). §C26-643.0 Enclosures for Hoisting Machinery.-Any compartment, containing machinery, which communicates with a shaft enclosure shall have its enclosing walls constructed of materials or assemblies having at least the same fire resistive rating as the shaft enclosure with which it communicates.

(10.5.7). §C26-644.0 Numbers of Elevators in a Shaft.-When a bank of elevators is provided, three or less elevators may be placed in a common shaftway.

(10.5.8). §C26-645.0 Enclosure of Open Shafts.-Open shafts shall be enclosed with materials having a fire resistive rating as required for exterior walls, or with any other form of construction having a fire resistive rating of three hours and possessing proper weatherproof qualities.

(10.5.9.). §C26-646.0 Shafts.-Shafts not exceeding nine square feet in area. All shafts erected in any building, except class 1 fireproof structures, other than those occupied as schools and residence structures not exceeding six stories in height, which have a cross-sectional area of nine square feet or less, shall have at least a one-hour fire resistive rating if such shafts extend not more than three stories or forty feet above the basement or cellar, and shall have at least a two-hour fire resistive rating if such shafts extend more than three stories or forty feet but not more than six stories or seventy-five feet above the basement or cellar, except that any part of such shafts which extend into the cellar or basement shall be protected by materials or assemblies, having a fire resistive rating of at least three hours.

(10.5.10.1). §C26-647.0 Existing Hoistways.-

a. Gates and Trapdoors-Any existing hoistway, elevator or wellhole not enclosed previous to January first, nineteen hundred thirty-eight, as provided in this title and not provided with fireproof doors, shall have the openings thereof through and upon each floor of any building provided with and protected by substantial guards or gates and with such good and sufficient trapdoors as may be directed and approved by the superintendent. When, in the opinion of

the superintendent, automatic trap-doors are required to the floor openings of any unenclosed elevator, the same shall be constructed so as to form a substantial floor surface when closed, and so arranged as to open and close by the action of the elevator in its passage either ascending or descending.

(10.5.10.2). b. Enforcement of Section.-Except as otherwise provided by law, the superintendent shall have power and authority to require the openings of hoistways, elevators and wellholes in buildings to be enclosed or secured by trapdoors, guards or gates and railings.

(10.5.10.3). c. Guards, Gates and Trapdoors to Be Closed When Not in Use.-All guards or gates required by this section shall be kept closed at all times, except when in actual use, and the trapdoors shall be closed at the close of the business of each day by the occupant or occupants of the building having the use or control of such trapdoors.

Sub-Article 6. General Protectives

(10.6). §C26-648.0 Opening Protectives.-Opening protective assemblies required under this title shall be constructed as provided in this article.

Sub-Article 7. Protection of Exterior Openings

(10.7.1). §C26-649.0 Protection of Exterior Openings Required.-Every opening in the exterior walls of public and business structures more than forty feet high which opening is thirty feet or less in a direct line, but in a different plane, from any frame structure or from any opening in any other structure, or which opening is less than fifty feet in a vertical direction above a non-fireproof roof of an adjoining structure within a distance of thirty feet of the wall in which the opening is located, shall be equipped with an opening protective having a fire resistive rating of three-quarters of an hour, except that plate glass one-quarter of an inch thick may be used on the street fronts of such structures regardless of the separation from other structures. All windows shall be of automatic type or fixed sash type and all doors shall be self-closing.

(10.7.2). §C26-650.0 Materials for Exterior Window Frames and Sash.-When the height of a structure exceeds one hundred fifty feet, all exterior window frames and sash shall be of incombustible materials throughout the full height of the structure.

(10.7.3). §C26-651.0 Protection of Openings in Walls of Garages and Similar Structures.-In structures to be used as garages, except as may be otherwise provided in the multiple dwelling law, including driveways and trucking spaces, motor vehicle repair shops or oil selling stations, all openings in exterior walls, except in the first story on street fronts, shall have automatic or self-closing doors with a fire resistive rating of one and one-half hours, or fixed or automatic fire windows or shutters. Oil selling stations five hundred square feet in area or less and any other structure whose exterior wall openings are so located that their protection is not required under the provisions of section C26-649.0 are excepted from the provisions of this section. In the discretion of the superintendent, private garages housing five cars or less used exclusively for non-commercial purposes may be exempted from the requirements of this section.

(10.7.4). §C26-652.0 Protection of Openings in Vestibules, Balconies or Bridges, or Adjacent Thereto.-

a. Openings in vestibules, balconies or bridges that serve as horizontal exits, except as may be otherwise provided in the multiple dwelling law shall have self-closing doors having a fire resistive rating of three-quarters of an hour, or fixed or automatic fire windows or shutters.

b. Window openings, where permitted, under and within thirty feet of or adjacent to such vestibules, balconies or bridges shall be protected by fixed or automatic fire windows or automatic fire shutters.

(10.7.5). §C26-653.0·Protection of Openings in Exterior Stairs, Fire Towers and Fire Escapes.-Door and window openings where permitted on exterior stairs, fire towers and fire escapes, or under or adjacent to exterior stairs or fire escapes, shall be protected by self-closing fire doors, or fixed or automatic fire windows or automatic fire shutters. Doors, windows and shutters in openings serving as means of egress to exterior stairs, fire towers and fire escapes shall be arranged so as to leave clear every exit.

(10.7.6). §C26-654.0 Protection of Openings in Smoke Houses.-At all openings, smoke houses shall have self-closing doors having a fire resistive rating of one and one-half hours, or fixed or self-closing fire windows.

(10.7.7). §C26-655.0 Protection of Open Shafts.-In open shafts having a cross-sectional area at any point of thirty-six square feet or less, openings shall be equipped with protective assemblies having a fire resistive rating of at least three-quarters of an hour, except that this provision shall be inapplicable to such openings in shafts of private dwelling structures when such openings are three feet or more distant from any other structure.

(10.7.8). §C26-656.0 Fire Shutters to Open Readily.-When fire shutters are used in exterior openings, at least one row in every three vertical rows of shutters on front window openings shall be arranged to open readily from the outside. Distinguishing marks shall be provided on these shutters as may be required by the superintendent.

(10.7.9). §C26-657.0 Vertical Separation of Windows.-

a. In business structures over forty feet high, exterior openings above the second story which are located vertically above one another shall have a space of at least three feet between the top of one opening and the bottom of the one next above. Such space shall be enclosed with materials having a fire resistive rating as required for exterior walls, or of any other form of construction having a fire resistive rating of three hours.

b. A maximum of one-third of the height of such enclosing materials may be replaced by wire glass in fixed metal sashes and trim, or other assemblies having equivalent fire resistive properties.

c. When there is a required horizontal exit through a fire partition no opening in such partition, whether or not a required means of egress, shall exceed four feet in width and seven feet six inches in height. Each such opening shall be equipped with a self-closing protective assembly having a fire-resistive rating or one and one-half hours.

(10.7.10). §C26-658.0 Closing of Protective Assemblies.-Protective assemblies on exterior openings, unless provided with approved automatic closing devices operative from either side, shall be closed except when required to be open. At the close of business each day, such assemblies shall be closed by the occupant or occupants of the structure having the use or control of such assemblies.

(10.7.11). §C26-659.0 Protection of Openings in Lot Line Walls.-All openings in walls erected on the lot lines shall be protected by fixed, self-closing or automatic-closing assemblies having a fire resistive rating of at least three-quarters of all hour.

Sub-Article 8. Protection of Wall and Partition Openings

(10.8.1). §C26-660.0 Protection of Openings in Fire Walls.-

a. When there is no required horizontal exit through a fire wall, the maximum opening in such fire wall shall be eighty square feet, except that such openings when intended for the passage of motor trucks may be a maximum of one hundred forty square feet.

b. When there is a required horizontal exit through a fire wall, no opening in such wall, whether or not a required means of exit, shall exceed four feet in width and seven feet six inches in height.

c. The total width of all openings through a fire wall on any level shall be less than twenty-five percent of the length of such wall and the minimum distance between such openings when not used as horizontal exits, shall be three feet, unless special permission is secured from the superintendent.

d. Each opening in a fire wall shall. be equipped with an automatic or self-closing protective assembly having a fire resistive rating of one and one-half hours on each side of the opening, except that where there is a horizontal exit through a fire wall, all openings through such wall shall be equipped with an automatic protective assembly on one side normally held open by means of automatic attachments designed to close the door in the event of a fire, and a self-closing protective assembly on the other side, each having a fire resistive rating of one and one-half hours. Where there is no horizontal exit through any part of a fire wall and conditions are such that placing a door on each side of the opening would result in severe hardship, a door having a three-hour fire resistive rating may be accepted on one side of the opening by the superintendent, provided that automatic attachments are installed on each side of the opening in the fire wall in such manner that they will be actuated and will cause the door to close in the event of a fire on either side of the wall and provided no undue fire hazard exists. Overhead doors or shutters shall not be used for the protection of openings used as required means of egress.

e. All horizontal and vertical sliding doors and such swinging doors as are mounted on the face of the wall when used for the protection of openings in fire walls shall overlap the side and top of the opening at least four inches.

In buildings where the floor construction adjacent to the opening, including the wearing surface, is of incombustible material, and abuts the wall, or is extended through the opening, no special sill construction shall be required. Where the floor construction is not of incombustible material, sills constructed of steel angles bolted through the wall and extending at least six inches beyond each side of the opening and at least four inches out from the face of wall having a thickness of not less than three-eighths of an inch, with the space between the angles on each side of the wall filled with portland cement concrete, shall be used. Other sill construction having equivalent resistance to the transmission of fire through the opening may be used where permitted by the superintendent.

Swinging doors closing into a rabbeted frame when used for the protection of openings in fire walls shall be installed with their frames as approved by the board.

Masonry at all wall openings shall be plumb and true and doors shall close snugly.

Bolts supporting sliding or rolling door tracks shall pass through the fire wall. Bolts supporting sliding or rolling door hangers shall pass through the door. Bolts supporting tracks shall be so located that a bolt shall be under each door hanger when the door is in the closed position.

Where stock or other material is piled close to a sliding door a substantial frame work shall be built at least two inches from the outside face of the door in such manner as to prevent the door being held open by material resting against it.

(10.8.2). §C26-661.0 Protection of Openings in Fire Partitions.-

a. The only openings permitted in fire partitions except openings for ventilating ducts shall be those required for doors, and there shall be but one such door opening unless the provision of additional openings would not exceed in total width twenty-five percent of the length of the wall, and the minimum distance between openings, when not used as horizontal exits shall be three feet, unless special permission is secured from the superintendent. The maximum area for such a door opening shall be eighty square feet, except that such openings for the passage of motor trucks may be a maximum of one hundred forty square feet, and each such opening shall be equipped with an automatic or self-closing protective assembly having a fire resistive rating of one and one-half hours.

b. When there is a required horizontal exit through a fire partition no opening in such partition, whether or not a required means of egress shall exceed four feet in width and seven feet six inches in height. Each such opening shall be equipped with a self-closing protective assembly having a fire resistive rating of one and one-half hours.

c. Openings not exceeding fifty square inches in area may be permitted in fire partitions when required for the passage of ventilating ducts; provided such ducts convey air for ventilation or air conditioning by means of forced circulation except that openings for ventilating ducts not exceeding 48 inches in greatest dimension may be provided when such openings are protected by fire dampers conforming to the rules of the department and the ducts are constructed according to the standards of the National Board of Fire Underwriters for ducts passing through fire walls as contained in National Board of Fire Underwriters pamphlet No. 90 of August 1952. The ventilating or air conditioning system shall be provided with an effective means of detecting and controlling the spread of smoke in the system by stopping the fans of the system automatically. Devices used for detecting and controlling smoke shall be approved by the board and their installation and location shall be according to the rules of the board, or in the absence of such rules, according to the rules of the department. The smoke detecting and controlling equipment shall be maintained in operating condition at all times. Openings shall be provided with automatic fire dampers and shall not be less than three feet apart.

(10.8.3). §C26-662.0 Protection of Openings in Fireproof Partitions.-

a. The only openings permitted in fireproof partitions enclosing public hallways leading to required exits shall be those required for doors, except that openings from ventilating ducts shall be permitted if such openings are protected by automatic fire dampers conforming to the rules of the department, but the requirements of this section shall not apply to structures used exclusively as schools in which regular supervised fire drills are held.

b. Each such door opening shall be equipped with a self-closing protective assembly having a fire resistive rating of at least three-quarters of an hour except that when in the opinion of the superintendent there is no undue hazard present, he may permit in each such otherwise approved three-quarter hour rating door one or more wired glass panels of at least one-quarter inch thickness and total area of not more than seven hundred twenty square inches and where necessary for ventilation, he may permit a limited area of metal louvres but, in no case, shall this apply to door openings to required stair enclosures or to doors in horizontal exits.

c. Door openings five feet six inches or less in width, in partitions enclosing public hallways other than for stairs, elevators and horizontal exits, may be provided with self-closing doors of structural glass or other incombustible material when protected by automatic or self-closing fire door assemblies having a fire resistive rating of at least three quarters of an hour and an approved automatic sprinkler head on the room side and adjacent to such opening. Information window openings three square feet or less in area, whether or not provided with glazed assemblies, may be provided in such partitions when protected by automatic or self-closing fire door assemblies having a fire resistive rating of at least three quarters of an hour. In addition thereto an approved automatic sprinkler head shall be provided for the information window on the room side and adjacent to such opening. The minimum distance between any such openings described shall be four feet.

(10.8.4.1). §C26-663.0 Protection of Openings in Interior Shafts.-

a. Protection of Openings in Vent Shafts.-Openings into vent shafts, except non-fireproof vent shafts, shall be equipped with protective assemblies having a fire resistive rating of one hour.

(10.8.4.2). b. Protection of Openings in Elevator Shafts.-Door openings into elevator shafts shall be equipped with protective assemblies having a fire resistive rating of one and one-half hours, except that where the elevator shaft opens into a vestibule constructed of materials or assemblies having a fire resistive rating of at least three hours and in which openings are protected by assemblies having a fire resistive rating of at least three-quarters of all hour, the openings into the elevator shaft shall be protected by assemblies having a fire resistive rating of at least three-quarters of all hour. It shall be unlawful to provide openings into such shafts other than window openings to the outer air and openings to elevator machinery rooms.

(10.8.4.3). c. Protection of Openings in Dumbwaiter Shafts,-Openings into dumbwaiter shafts shall be equipped with protective assemblies, having a fire resistive rating of three-quarters of all hour. When such protective assemblies are not equipped with locks and contacts as required by section C26-1139.0 they shall also be self-closing.

(10.8.4.4). d. Protection of Openings in Other Shafts.-Openings in shafts otherwise unprovided for in section C26-663.0, shall be equipped with self-closing protective assemblies having a fire resistive rating of one and one-half hours, except· that where such a shaft opens into a vestibule constructed of materials of assemblies having a fire resistive rating of at least three hours and in which openings are protected by assemblies having a fire resistive rating of at least three-quarters of an hour, the openings into the shaft shall be protected by assemblies having a fire resistive rating of at least three-quarters of an hour.

(10.8.5). §C26-664.0 Protection of Openings in Cellar Partitions in Non-Fireproof Structures.-In non-fireproof structures, except structures occupied exclusively for residence purposes by one or two families, openings in partitions in any story more than half below the curb, shall have self-closing protective assemblies having a fire resistive rating of one and one-half hours, or fixed or self-closing windows having a fire resistive rating of three-quarters of an hour.

(10.8.5.1) §C26-664.1 Protection of Lobbies and Stair Passageways Having Ventilating Systems.-Openings from ventilating ducts into the passageway. lobby or corridor, leading from the stairs to the street or other exterior exits, may be provided. Each such opening shall not exceed three square feet in area and the distance between any two openings shall not be less than three feet. Such openings shall be provided with automatic fire shutters conforming to the rules of the department. Ventilating systems employing recirculation of air which open upon lobbies,

passageways or corridors leading from the stairs to the street or other exterior exits except ventilating systems which do not ventilate any other parts of the building, shall be provided with an effective means of detecting and controlling the spread of smoke in the system by stopping the fans of the ventilating system. Devices used for detecting and controlling smoke shall be approved by the board, and their installation and location shall be according to the rules of the board, or in the absence of such rules, according to the rules of the department. The smoke detecting and controlling equipment shall be maintained in operating condition at all times. Ducts opening on a lobby or stair passageway shall be enclosed in material having the same fire resistive rating as the stair enclosure for a distance of at least ten feet from the stair enclosure or to a partition having at least a one hour fire resistive rating, with a fusible link damper provided where the duct passes through such partition. The thickness and fire resistive rating of the material used to enclose the ducts shall be the same as that required for the protection of structural steel as specified in section C26-575.0 and as contained in the rules and approvals of the board. No openings shall be permitted in the fireproofing material enclosing the ducts within such distance. Branches entering the duct within this distance shall also be covered with material having a fire resistive rating the same as that required for the stair enclosures and as specified for the ducts opening on the passageway or lobby.

(10.8.6). §C26-665.0 Separation of Attached or Built-in Garages.-

a. Where private garages are attached to, or form a part of a story within a residential structure of Class 3 non-fireproof construction, or Class 4, wood frame construction, walls, ceilings and floors enclosing such garages shall be separated from the remainder of the structure by assemblies having at least a one-hour fire resistive rating and all openings between the garage and the remainder of the structure shall be provided with self-closing or automatic protective assemblies having a fire resistive rating of three-quarters of an hour, except as may be otherwise provided in the multiple dwelling law. Where living quarters are located above such a garage, the egress facilities from such living quarters shall not pass through the garage.

b. Car ports shall be exempt from the requirements of this section.

Sub-Article 9. Interior Finish and Subdividing Partitions

(10.9.1). §C26-666.0 Restrictions on Use of Wood.-Wood or other combustible material may be used in the construction or interior finish of Class 1, fireproof structures, and Class 2, fire-protected structures, only as provided in this title.

(10.9.2). §C26-667.0 Permitted Uses of Wood or Other Combustible Materials in Class 1, Fireproof Structures, and Class 2, Fire-Protected Structures.-Wood and other combustible materials may be used in Class 1, fireproof structures, and Class 2, fire-protected structures, as follows:

(10.9.2.1). 1. Stair Enclosures.-Within stair enclosures, wood may be used only for handrails and as permitted by subdivision a of section C26-273.0 for escalators, whether or not such escalators are used as required means of egress; and for door assemblies as permitted in paragraph six of section C26-667.0.

(10.9.2.2). 2. Floor sleepers. bucks, nailing blocks, and grounds. Floor sleepers, bucks, nailing blocks and grounds, if only the nailing surface is exposed, may be of wood. When floor sleepers of combustible material are used, the space between the floor construction and the wood flooring shall be filled with incombustible material, except that in Class 2, fire-protected structures, combustible floor sleepers may be used without filling in such space

provided such floors are constructed in accordance with the provisions of section C26-615.0, b.

(10.9.2.3). 3. Interior Trim.-Wood flooring, interior doors and sash with their frames, trim and casings, and other interior wood and other approved combustible trim when backed solidly with fire resistive material may be used as provided in sections C26-721.0 through C26-723.0, and elsewhere than in stair enclosures, public hallways and passageways in Class 1, fireproof structures, one hundred fifty feet or less in height, and Class 2, fire-protected structures, but structures used exclusively as schools in which regular supervised fire drills are held shall be exempt from the restrictions of this section.

(10.9.2.4). 4. Wearing Surfaces.-

(a) Wearing surfaces one-half of an inch or less in thickness made of cork or rubber composition, linoleum, asphalt composition tile, or similar material having the same fire resistive qualities, when cemented to the upper surface of an approved type of fire resistive floor construction, may be used elsewhere than in stair enclosures.

Where wood flooring is permitted such wearing surfaces may be cemented directly to the wood floor.

(b) Untreated wood finish flooring seven-eighths of an inch or less in aggregate thickness, when cemented or attached directly to the surface of an approved type of fire resistive floor construction, may be used elsewhere than in stair enclosures and corridors. In structures exceeding one hundred fifty feet in height a wood subflooring may be used to support such combustible finish flooring or such wearing surface as is permitted in the preceding paragraph, provided such sub-flooring and the sleepers supporting it shall be treated to render them fire resistive in accordance with the rules of the board.

(c) Untreated combustible insulation board in a single layer not to exceed one-half of an inch in thickness, when cemented or attached directly to the surface of an approved type of fire resistive floor construction, may be used elsewhere than in stair enclosures and corridors when covered by an incombustible wearing surface in accordance with the rules of the board.

(d) The use of asphalt tile shall be permitted for surfacing stairways in structures used exclusively as schools in which regular supervised fire drills are held.

(10.9.2.5). 5. Subdividing Partitions.-Subdividing partitions shall be made of incombustible material, or wood or other approved combustible material treated to render it fire resistive, except that in spaces without combustible occupancies requiring a permit from the fire commissioner, partitions made of a single thickness of wood or wood and glass may be used in Class 1, fireproof structures, one hundred fifty feet or less in height, and Class 2, fire-protected structures, to subdivide rooms or spaces five thousand square feet or less in area, except as provided in section C26-636.0, if separated from adjoining rooms or spaces, corridors, elevator and stair enclosures by fireproof partitions or walls made of incombustible material having a fire resistive rating of at least one hour.

(10.9.2.6). 6. Use of Treated Wood for Fire Protection.-

(a) Wood flooring treated in accordance with the rules of the board to render it fire resistive may be used elsewhere than in stairhalls and corridors.

(b) Wood window sash, frames and trim treated in accordance with the rules of the board to render them fire resistive may be used elsewhere than in stairhalls and corridors, except for exterior windows where otherwise provided in section C26-650.0.

(c) Wood treated in accordance with the rules of the board to render it fire resistive may be used for other interior trim elsewhere than in stairhalls or in corridors.

(d) Wooden doors with their frames and trim treated or protected in accordance with the rules of the board to render them fire resistive may be used in any location if they comply with the requirements of section C26-610.0 for such location.

(10.9.2.7). 7. Freestanding Moulding and Veneers.-

(a) Untreated wood may be used, except in stairhalls and required exit corridors, for freestanding mouldings have a cross-sectional area of two square inches or less and for face veneers, one-eighth of an inch or less in total or aggregate thickness, glued to treated cores or backing.

(b) Untreated wood veneers one-twentieth of an inch or less in thickness when mounted directly upon incombustible material may be used without restriction as to location.

(10.9.2.8). 8. Special Spaces.-Untreated wood trim in a single space on each floor of a structure over one hundred fifty feet high, provided such space is eight hundred square feet or less in area and is separated from the other parts of such floor by fireproof partitions.

(10.9.2.9). 9. Elevator Cabs.-Untreated wood trim may be used in elevator car enclosures in accordance with section C26-975.0.

Sub-Article 10. Use of Wired Glass in Doors

(10.10). §C26-668.0 Use of Wired Glass in Doors.-

a. Doors for openings in fire walls shall be constructed without any glass.

b. Doors for openings in fire partitions may be constructed with glass provided they meet the fire resistive requirements for such doors, except that in structures used exclusively as schools, hospitals, museums and libraries, vision panels having a maximum total area of four square feet per door and divided into panes with a maximum area of one square foot per pane may be used.

c. Doors for openings in fireproof partitions may be constructed with a total maximum exposed area of wired glass of seven hundred twenty square inches.

d. Doors for openings in stair enclosures, except doors for openings of fire tower enclosures, may be constructed with vision panels having a total maximum exposed area of wired glass of one hundred square inches and a maximum dimension of twelve inches. Such vision panels shall be glazed with two thicknesses of wired glass, with an air space between.

e. All wired glass shall be at least one-quarter of an inch thick, enclosing a layer of wire fabric reinforcement. Such reinforcement shall have a maximum mesh of seven-eighths of an inch and the size of the wire shall be at least No. 25 steel wire gage, or shall be of equivalent fire resistive qualities. Such wired glass shall be set at least five-eighths of an inch into the frame.

Sub-Article 11. Fire Resistive Ceilings

(10.11). §C26-669.0 Fire-resistive Ceilings.-

a. This section shall be inapplicable to private dwellings; except that in private dwellings, the ceilings immediately above and for at least two feet beyond all sides of any heating furnace or heating boiler shall be covered with galvanized sheet metal of not less than No. 16 U.S. gauge or with metal or gypsum lath and plaster, or two layers of three-eighths inch gypsum wallboard.

b. In class 3, non-fireproof structures, the ceilings of all stories below grade and over the lowest story, if such story is partially below the curb or surrounding ground level, shall be covered with metal lath and plaster, gypsum lath and plaster, gypsum wallboard and sheet metal one-half inch gypsum wallboard and one-eighth-inch thick hard asbestos cement composition sheets with joints covered with two-inch wide battens of the same material or approved metal strips, metal lath and vermiculite-gypsum plaster, metal lath and perlite-gypsum plaster, gypsum lath and perlite-gypsum plaster, or gypsum lath and vermiculite-gypsum plaster, or two layers of one-half inch gypsum wallboard separated by a twenty gauge, one-inch wire mesh, or other material having a fire-resistive rating of one hour. In class 3, non-fireproof structures erected before January 1, 1938, in which the classification by occupancy is thereafter changed to business, cellar ceilings, if not at such time of fireproof construction, shall be of materials or assemblies, having fire-resistive rating of at least one hour. Such a ceiling, however, shall not be required if the floor construction immediately above this lower story is of incombustible material having a fire-resistive rating of at least three hours.

c. The ceilings of motion picture theaters, or other structures for public assemblage, not required to be fireproof, as well as all rooms, entrances or exits used in connection therewith, shall have ceilings of five-eighths of an inch of unsanded gypsum plaster or vermiculite-gypsum plaster or perlite-gypsum plaster, or seven-eighths of an inch cement or sanded gypsum plaster on metal lath, measured from the face of the lath, or three-eighths inch perforated gypsum lath plastered with one-half inch of vermiculite-gypsum plaster or perlite-gypsum plaster, or three-eighths inch perforated gypsum lath with all joints covered with three-inch wide strips of metal lath and plastered with one-half inch of sanded gypsum plaster or two layers of one-half inch gypsum wallboard separated by a twenty gauge, one-inch wire mesh, or any form of construction having a fire-resistive rating of one hour as required by the rules of the board.

Sub-Article. 12 Roof Structures and Roofing

(10.12.1). §C26-670.0 Materials Required for Roof Structures and Roofing.-All construction, other than water tanks, placed, after January first, nineteen hundred thirty-eight, above the roof of any part of any structure within the fire limits or of any structure more than forty feet in height outside of the fire limits, shall be incombustible materials, except when otherwise specifically provided for in this title.

(10.12.2). §C26-671.0 Bulkheads.-

a. The walls of any bulkhead erected after January first, nineteen hundred thirty-eight, on the roof of a fireproof structure shall be constructed of incombustible material having a fire resistive rating of one hour and shall be covered on the outside with material meeting the requirements of subdivision a of section C26-680.0, unless such bulkhead is constructed in accordance with sections C26-412.0 through C26-467.0.

b. The walls of any bulkhead erected after January first, nineteen hundred thirty-eight, on the roof of any non-fireproof structure may be of wood stud partition construction having a one-hour fire resistive rating and shall be covered on the outside with material meeting the requirements of subdivision a of section C26-680.0.

(10.12.3). §C26-672.0 Penthouses.-The exterior walls of penthouses (except panel walls) shall be constructed of incombustible materials or assemblies of materials having a fire resistive rating of at least two hours in class 1 and class 2 structures, and one hour in class 3 and class 6

structures and shall be covered on the outside with material meeting the requirements of subdivision a of section C26-680.0, unless such walls are constructed in accordance with sections C26-412.0 through C26-467.0. When the exterior walls of penthouses are constructed in the form of panel walls, they shall comply with the requirements of section C26-446.0. Roofs of such structures shall be constructed of incombustible materials or assemblies of materials having a fire resistive rating of at least one hour.

(10.12.4). §C26-673.0 Doors and Windows.-Doors, door frames and windows in bulkheads or penthouses, except where otherwise specifically provided for, shall be constructed as other doors, door frames and windows similarly located in the structure.

(10.12.5). §C26-674.0 Greenhouses and Conservatories.-Greenhouses or conservatories may be erected on the roof of any structure provided only incombustible materials are used in their construction, and the floors of such structures are constructed as required for the other floors of the structure.

(10.12.6). §C26-675.0 Dormers.-Dormers erected after January first, nineteen hundred thirty-eight, shall be constructed in the same manner as the roof on which they are placed. The sides and top shall be covered with material meeting the requirements of section C26-605.0.

(10.12.7.1). §C26-676.0 Skylights.-

a. Construction of Skylights.-The frame and sash of all skylights shall be constructed of metal, except that in structures in which corrosive fumes are present, wood frame and sash may be permitted in the discretion of the superintendent. The frames and other parts of the skylights shall be securely anchored to the supporting structure.

(10.12.7.2). b. Glazing of Skylights.-Skylights placed over shafts, including stairways, shall be glazed with plain glass three-sixteenths of an inch or less in thickness. The maximum area of any pane of glass used in such skylights shall be seven hundred twenty square inches. Skylights over places other than shafts shall be glazed with wired glass.

(10.12.7.3). c. Protection of Skylights.-Skylights in which plain glass is used shall be protected by wire screens placed between four and ten inches above the glazed portion of the skylight at all points. Such screen shall be of No. 12 steel wire gage, or heavier, wire; such screen shall have a mesh of between three-quarters of an inch and one inch; and such screen shall extend beyond the glazing on all sides of distance at least the height of the screen above the glazing. When any such skylight is located over any passageway, stairway, elevator or any occupied room a similar screen shall also be placed below the skylight.

(10.12.8). §C26-677.0 Scuttles.-Unless provided with some other means of access to the roof, every structure over fifteen feet high, except roofs with a pitch greater than twenty degrees from the horizontal, shall have a scuttle in the roof with a substantial ladder leading to such scuttle. Scuttles shall be covered on the top and edges with sheet metal or other approved incombustible material. Scuttle openings shall be at least two by three feet in size.

(10.12.9.1). §C26-678.0 Tanks.-

a. Support of Tanks.-Tanks of more than five hundred gallons capacity placed after January first, nineteen hundred thirty-eight, in or on any structure shall be supported on masonry, reinforced concrete or steel construction.

(10.12.9.2). b. Emergency Outlets for Tanks.-Every tank shall have in the bottom or on the side near the bottom, a pipe outlet, at least two inches in diameter, fitted with a suitable valve for discharging the contents in an emergency.

(10.12.9.3). c. Location of Tanks.-It shall be unlawful to locate a tank over or near a line of stairs or an elevator shaft unless there is a solid roof or floor underneath the tank.

(10.12.9.4). d. Tank Covers.-Unenclosed roof tanks shall have covers sloping at an angle of thirty degrees or more.

(10.12.9.5). e. Tank Hoops.-When hoops are used in the construction of tanks, such hoops shall be of metal round in section.

(10.12.10). §C26-679.0 Cooling Towers.-Cooling towers erected after January first, nineteen hundred thirty-eight, above any roof shall be of incombustible material, except the drip bars, which may be of wood.

(10.12.11.1). §C26-680 Roofing.-

a. Materials for Roofing.-

1. Roofing placed on any structure shall meet the requirements of section C26-605.0, except as provided in section C26-539.0, and subdivision b of section C26-680.0.

2. The use of cork or fibre board as roof insulation is lawful provided such cork or fibre board is covered with an approved type of fire resistive roof covering applied directly thereto.

(10.12.11.2). b. Repairs to Roofing.-Any roof covering, existing on January first, nineteen hundred thirty-eight, of other than fire resistive material meeting the requirements of section C26-605.0, may be repaired with the same kind of material to an extent of twenty-five percent of its area ill anyone year.

(10.12.11.3). c. Replacement of Roofing.-All roof covering of other than approved fire retarding material shall be replaced on or before January first, nineteen hundred forty-seven with approved material, except as provided in section C26-539.0.

(10.12.11.4). d. Planking.-When wood planking or sheathing is used in roof construction, such planking or sheathing shall not extend across any lot line or party wall.

(10.12.12). §C26-681.0 Slanting Roofs.-

a. Every mansard or other slanting roof having a pitch of more than thirty degrees placed on any non-fireproof structure over forty feet high shall be constructed in accordance with the provisions of sections C26-625.0 and C26-626.0.

b. Every mansard or other slanting roof having a pitch thirty degrees or less placed on any non-fireproof structure may be constructed of the same materials as the roof construction of the structure, provided the face and back of the mansard or slanting roof is covered with roofing material meeting the requirements of section C26-605.0.

(10.12.13.1). §C26-682.0 Cornices, Gutters and Half-Timbering Decoration.-

a. Construction of Cornices, Gutters and Half-Timbering Decoration.-Cornices and gutters, including those on show windows, placed or replaced after January first, nineteen hundred thirty-eight, on the exterior of any structure except structures of frame construction, shall be of incombustible materials, except that wood half-timbering and other wood decorative treatment may be used on the face of masonry construction in structures of Class 3 and Class 6 construction that are less than forty-five feet in height. Such cornices and gutters shall be secured to the wall with metal brackets and anchors with a maximum spacing of four feet and extending at least four inches into the walls at the top and bottom.

(10.12.13.2). b. Repairs to Cornices, Gutters and Wood Decorative Treatment.-Any wood cornice or gutter, existing on January first, nineteen hundred thirty-eight, on other than frame structures, may be repaired with the same kind of material to the extent of fifty percent of its length in anyone year.

Sub-Article 13. Fire-Stopping

(10.13.1). §C26-683.0 Fire-Stopping Required.-Structures, whether fireproof or non-fireproofed, shall have all concealed draft openings fire-stopped with incombustible material to form an effectual fire barrier between stories, and between the upper story and the roof space.

(10.13.2). §C26-684.0 Fire-Stopping of Openings for Pipes, Belts and Shafting.-

a. Openings around exposed pipes, belts or power shafting shall be filled with incombustible material, or shall be closed off by close fitted metal caps at the ceiling and floor line or on each side of the wall. For non-fireproof construction, metal sleeves shall be provided in addition to the caps.

b. Openings for belts shall be provided with approved slotted doors or otherwise closed off. It shall be unlawful to pass belts through fire walls or fire partitions.

(10.13.3). §C26-685.0. Fire-stopping of furred walls, partitions and concealed roof spaces.- Walls, including masonry walls, furred with combustible material, and studbearing partitions, shall be fire-stopped with incombustible material at floors, ceilings and roofs. The fire-stopping shall extend from the ceiling to the under side of the flooring or roofing. Concealed roof spaces in class 3, non-fireproof structures, shall be cut off into areas of three thousand square feet or less by fire-stops. The space between any combustible wainscoting or panelling and the face of the wall or partition directly in back of such wainscoting shall be plastered or filled in solid with approved incombustible materials in a manner approved by the department. In class 3 structures, occupied for business purposes, where there are concealed roof spaces above such business occupancies, partitions separating the premises of one occupant from another shall be extended to the under side of the flooring or roofing. Such partitions shall be constructed of material approved for a one hour fire resistive rating.

(10.13.4). §C26-686.0 Fire-Stopping of Stairs.-Stairs, except in one- and two-family residence structures, shall be fire-stopped between wooden stair carriages by headers at top and bottom. It shall be unlawful to locate closets beneath stairs, except in Class 1, fireproof structures, unless such closets are entirely lined with incombustible material. The under side of stairs of combustible material shall be covered with metal lath and plaster to a total thickness of three-quarters of an inch measured from the back of the lath, or with plaster board and a minimum of one-half of an inch of unsanded gypsum plaster, or one-half thick plaster board covered with one-eighth-inch thick hard asbestos cement composition boards with joints covered with a two-inch batten strip of the same material or approved metal strips, except where such stairs are enclosed by a partition of lawful construction as provided in article seven of this title.

(10.13.5). §C26-687.0 Fire-Stopping of Exterior Cornices.-On rows of frame structures, continuous exterior cornices built of wood or having wood frames, shall be fire-stopped at maximum intervals of twenty feet; if such cornices are non-continuous, they shall be built with closed ends and separated at least four inches.

(10.13.6). §C26-688.0 Materials for Fire-Stopping.-Fire-stopping shall be done with any of the following materials: brick, concrete, gypsum, asbestos, metal lath and cement or gypsum plaster, mineral wool, rock wool, or other approved materials.

Sub-Article 14 Fire Resistive Scaffolding and Construction Lumber

(10.14). §C26-689.0 Fire Resistive Scaffolding and Construction Lumber.-The board may make rules concerning the use of combustible materials for scaffolding and the use, during construction, of lumber treated to render it fire resistive.

Sub-Article 15. Fire Resistive Construction of Hospitals

(10.15) §C26-689.1 Enclosure of Rooms in Hospitals.-

a. Regardless of requirements contained elsewhere in this chapter for the enclosure of public hallways or for the protection of openings on public hallways, patients' rooms or patients' wards and other rooms used directly in connection with and in the same section of the same floor with patients' rooms or patients' wards, in a recognized hospital, may be constructed with partitions of incombustible material without fire resistive rating. The lowest level of glazed openings where permitted, shall be at least forty-two inches above the surface of the floor. Nurses' stations not exceeding three hundred square feet in area, waiting spaces, lounges and recreation spaces provided for patients and visitors where such spaces do not exceed four hundred square feet in area, spaces used for the storage of not more than four litters and not exceeding one hundred square feet in area, and spaces used solely for public telephones, may be constructed without enclosures, or may be enclosed with metal and glass partitions or other enclosures of incombustible material. All other rooms and spaces not specifically excepted in this section, including storage closets, slop-sink closets and spaces in which medical supplies other than in nurses' stations and linens are stored, shall be enclosed as required by other provisions of this code.

b. Where a fire resistive rating of at least one hour is not required for the enclosure of rooms or spaces by the provisions of the preceding sub-division a of this section, doors may be omitted from openings to such rooms or spaces, whether or not such opening is on a public hallway, except that openings to patients' rooms or patients' wards shall be provided with doors but such doors shall not be required to be self-closing. Where doors are provided for such spaces they may be constructed of solid or veneered hardwood at least one and three-fourths inches in thickness throughout, except for glazed openings, or such doors shall be constructed of incombustible material or such doors may be constructed with an incombustible core except that stiles, rails and lock blocks not more than 5” wide of hardwood shall be permitted, covered with a wood veneering not more than one-tenth of an inch in thickness. Glazed openings shall be at least forty-two inches above the floor surface.