Chapter Ind 51

DEFINITIONS AND STANDARDS

Ind 51.001 Fire-resistive construction. (1) A building is of fire-resistive construction if all the walls, partitions, piers, columns, floors, ceilings, roof and stairs are built of incombustible material, except as hereinafter provided, and if all metallic structural members are protected by an incombustible fire-resistive covering, all as specified in this order.

(2) All exterior and inner court walls shall be of not less than 4-hour fire-resistive construction, as specified in section Ind 51.05, except that non-load bearing exterior walls which face streets, alleys, outer or inner courts 20 feet or more in width may be constructed of incombustible panels of not less than 1-hour fire-resistive construction.

(a) Non-load bearing exterior walls which face streets, alleys, outer or inner courts 30 feet or more in width may be constructed of incombustible panels with no fire-resistive rating.

(3) Interior partitions shall be constructed of incombustible materials, except that dividing partitions in stores, offices, and similar places not exceeding 3,000 square feet in area, occupied by one tenant only, may be constructed of wood panels or similar light construction.

(a) Partitions entirely within apartments having a floor area of not more than 800 square feet shall be of 1-hour fire-resistive construction but such partitions may be constructed with wood studs as specified in section Ind 51.05. Doors in such partitions may be wood panel doors.

(4) Enclosures for elevator or dumb-waiter shafts, vent shafts, stair wells, waste paper chutes and other similar vertical shafts shall be of 2-hour fire-resistive construction as specified in section Ind 51.05, with all interior openings therein protected by fire-resistive doors or windows as specified in section Ind 51.09.

(5) Structural framework shall be of structural steel or reinforced concrete. All structural steel members, not including structural members for elevators and elevator enclosures shall be thoroughly fire-

protected with not less than 4-hour fire-resistive protection for columns, beams and girders and 3-hour fire-resistive protection for floors, for all buildings more than 8 stories or 85 feet in height; and with not less than 3-hour fire-resistive protection for columns, beams and girders and 2-hour fire-resistive protection for floors, for all buildings which are 8 stories or 85 feet or less in height. All such fire-resistive protection shall be as specified in section Ind 51.04.

(6) All reinforced concrete columns, beams and girders shall be thoroughly fire-protected with 4-hour fire-resistive protection, and all floors, joists and slabs shall be thoroughly fire-protected with not less than 3-hour fire-resistive protection for all buildings more than 8 stories or 85 feet in height; and with not less than 3-hour fire-resistive protection for columns, beams and girders and 2-hour fire-resistive protection for all floors, joists and slabs, for all buildings which are 8 stories or 85 feet or less in height. All such fire-resistive protection shall be as specified in section Ind 51.04.

(7) Floor construction shall consist of any approved floor system providing not less than 3-hour fire-resistive construction for all buildings more than 8 stories or 85 feet in height; and providing not less than 2-hour fire-resistive construction, for buildings which are 8 stories or 85 feet or less in height. All such fire-resistive protection shall be as specified in section Ind 51.06.

(8) Roofs shall be constructed as specified for floors, except that wood sheathing of not less than 2 inch nominal thickness may be used for buildings not more than 8 stories or 85 feet in height when all of such sheathing is more than 25 feet distant from any floor, balcony or gallery, or wood sheathing of not less than 1 inch nominal thickness may be used at any distance not exceeding 5 feet from a 2-hour fire-resistive attic floor, and when such sheathing is covered on the outside by a fire-retardent roof covering, except as provided under occupancy requirements.

(9) Stairs and stair platforms shall be constructed of reinforced concrete, iron or steel. Brick, concrete, marble, tile, terrazzo or other hard incombustible materials may be used for the finish of treads and risers.

(10) Doors and windows may be of wood except as otherwise specified under occupancy requirements and in sections Ind 51.17, Ind 51.19, Ind 51.20 and Ind 52.01.

(11) Projections from the building, including bays, oriels, and penthouses, together with other roof structures shall be constructed of incombustible material as specified in this order.

(12) Wood may be used for finished floors and also for trim, including picture molds, chair rails, wainscoting and baseboards, if spaces between wood sleepers and wood grounds are fire-stopped with incombustible materials.

(13) Acoustical materials may be used on ceilings and on walls from a level of 6 feet above the floor provided they are attached directly thereto, and all spaces between wood grounds are fire-stopped with incombustible materials.

History: 1-2-56; am. (2); (2)(a); (3); (3)(a); Register, June, 1956, No. 6, eff. 7-1-56.

Ind 51.01 Mill construction. (1) In a building of mill construction the structural frame shall consist of steel or iron which shall be fire-protected, of reinforced concrete, of masonry, or of heavy timbers, except that in buildings not exceeding one story in height the structural steel or iron may have the fire-protection omitted.

(2) Exterior and court walls shall be 2-hour fire-resistive construction as specified in section Ind 51.05, except that non-load bearing exterior walls which face streets, alleys, outer or inner courts 20 feet or more in width may be constructed of incombustible panels of not less than 1-hour fire-resistive construction.

(a) Non-load bearing exterior walls which face streets, alleys, outer or inner courts 30 feet or more in width may be constructed of incombustible panels with no fire-resistive rating.

(3) All wood columns in the structural frame shall be directly superimposed, one above the other, and shall be provided with steel or cast iron caps, unless the floor or roof beams and girders are carried on blocks securely fastened to the columns and with the loads transmitted to the columns by metal ring or similar type connectors, or by caps of otherwise suitable material. They shall not rest on wood bolsters or floor timbers. Wood bolsters may be used to support roof timbers. No wood column shall be less than 8 inches nominal in its least dimension, and no beam, girder or joist shall be less than 6 inches nominal in its least dimension nor less than 45 square inches in cross-sectional area. In no case shall masonry or reinforced concrete be supported on wood construction except tile or concrete floor finishes not more than 3 inches in thickness.

(4) For structural steel or iron members, the fire-protection shall be not less than 3-hour fire-resistive protection for columns and not less than 2-hour fire-resistive protection for beams, girders and floor systems, as specified in section Ind 51.04.

(5) All reinforcement in concrete columns shall be fire-protected with not less than 3-hour fire-resistive protection, and all joists, beams, girders, slabs and steel floors with not less than 2-hour fire-resistive protection outside of all steel reinforcing as specified in section Ind 51.04.

(6) Wood floor construction shall be of tongued and grooved, or splined lumber not less than 3 inches nominal thickness, with a top layer of flooring of one inch nominal thickness laid thereon, or of solid lumber placed on edge and securely spiked together to make a floor not less than 4 inches nominal thickness.

(7) Roof construction shall be as specified for floors, except that the minimum nominal thickness shall be 2 inches. Roof coverings shall be a fire-retardent roofing as specified in section Ind 51.07 and shall be required over all combustible roof construction.

(8) Enclosures for elevator or dumb-waiter shafts, vent shafts, stair wells, waste paper chutes, and other similar vertical shafts

shall be of 2-hour fire-resistive construction as specified in section Ind 51.05, with all interior openings therein protected by fire-resistive doors as specified in section Ind 51.09.

(9) Stair construction may be of wood in buildings not exceeding 3 stories in height. In buildings 4 or more stories in height all stairs and stair construction shall be as required for fire-resistive construction specified in section Ind 51.001.

(10) Doors and windows may be of wood except as otherwise specified under occupancy requirements in this code.

History: 1–2–56; am. (2); (2)(a); Register, June, 1956, No. 6, eff. 7–1–56.

Ind 51.02 Ordinary construction. (1) A building is of ordinary construction if all enclosing walls are constructed of incombustible material, and the roof has a fire-retardent covering as specified in section Ind 51.07.

(2) The structural framework shall be of steel, iron, reinforced concrete, masonry or wood. Fire-protection of steel, iron or wood structural members may be omitted, except that all members carrying masonry in buildings more than one story in height shall be fire-protected with not less than one-hour fire-protection, as specified in section Ind 51.04.

(3) Floors, roof and partitions may be of wood, but no joist, rafter or stud shall be less than 2 inches in nominal thickness. In all buildings the first story floor construction above a basement, if of metal or wood, shall be protected on the under side by one-hour fire-resistive construction, and in buildings of 4 stories or more in height the lower side of all metal or wood floor or roof construction shall be protected by a ceiling of one-hour fire-resistive construction as specified in section Ind 51.06, unless otherwise provided under occupancy requirements.

(4) Stairs may be of steel, iron, reinforced concrete, masonry or wood, with enclosures as specified under occupancy requirements.

(5) Bays, oriels and similar projections from the walls shall be constructed of incombustible materials as specified in this order. Penthouses and other roof structures shall be of not less than one-hour fire-resistive construction as specified in section Ind 51.06.

Ind 51.03 Frame construction. (1) A building is of frame construction if the structural parts and enclosing walls are of wood, or of wood in combination with other materials. If such enclosing walls are veneered, encased or faced with stone, brick, tile, concrete, plaster or metal, the building is also termed a frame building.

Ind 51.04 Fire-resistive standards; structural members. (1) MINIMUM THICKNESS IN INCHES FOR VARIOUS FIRE-RESISTING MATERIALS

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Struct. Steel Parts to be Protected	Fire-Resisting Material Used	Minimum Thickness of Material in Inches For the Following Fire-Resistive Periods			
		4 Hr.	3 Hr.	2 Hr.	1 Hr.
Steel or Cast Iron Columns: All Members of Primary Trusses or Primary Girders.	Concrete	2	2	1½	1
	Gunite	2	1½	1	¾
	Brick of Clay, Shale, Concrete or Sand Lime All Spaces Filled	3¾	3¾	2¼	2¼
	Clay Tile or Haydite or Waylite or Concrete Block or Gypsum Block or Poured Gypsum. All Spaces Filled. Metal Ties in Horizontal Joints.	2 Thicknesses 2 Inches Each	4	2	2
	Portland Cement Plaster on Metal Lath	----	----	1¾ with ½ air space	1
	Clay Tile, End Const. have less than 26% voids with all Spaces Filled and Metal Ties in Horizontal Joints	3¾	3¾	1¾ No Filling	1¾ No Filling
Webs and Flanges of Steel Beams and Secondary Girders	Concrete	2	2	1½	1
	Gunite	2	1½	1	¾
	Brick of Clay, Shale, Concrete or Sand Lime	2¼	2¼	2¼	2¼
	Clay Tile, Concrete Block, Gypsum Block or Poured Gypsum	2	2	2	2
	Metal Lath and Gypsum or Portland Cement Plaster	--------	--------	1½	1
Reinforcing Steel in Columns, Beams, Girders & Trusses	Concrete	1½	1½	1½	1
Reinforcing Steel in Reinforced Concrete Joists	Concrete	1¼	1¼	1	¾
Reinforcing Steel in Reinforced Concrete Slabs	Concrete	1	1	¾	¾
Reinforcing Steel in Reinforced Concrete Slabs	Gypsum	1	1	¾	¾

(2) CONCRETE. Concrete shall have a coarse aggregate of limestone, calcareous gravel, traprock, blast furnace slag, burnt clay, burnt shale or other coarse aggregates containing not more than 65% of siliceous material such as granite, sandstone, chert, flint or quartz.

(3) APPROVAL OF OTHER MATERALS. Other materials, assemblies and thicknesses of necessary strength and durability for the use intended and which have successfully performed under tests made by a recognized laboratory in accordance with the requirements of the "Standard Specifications for Fire Tests of Building Construction and Materials" (C19-33) of the American Society for Testing Materials, shall be accepted for specific ratings in addition to those prescribed in this section.

Ind 51.05 Fire-resistive standards; walls and partitions.

(1) Wall Construction	Minimum Thickness in Inches, Face to Face			
	4 Hr.	3 Hr.	2 Hr.	1 Hr.
Solid Brick, Load Bearing, Unplastered	8	8	8	8
Solid Brick, Non-Load Bearing, Unplastered	8	8	4	4
Solid Brick, Load Bearing, Plastered Two Sides	8	8	8	8
Solid Brick, Non-Load Bearing, Plastered Two Sides	8	8	4	4
Hollow Clay Tile, Load Bearing, Unplastered	12 4-Cell	12 3-Cell	8 3-Cell	8 2-Cell
Hollow Clay Tile, Non-Load Bearing, Unplastered	12 4-Cell	8 3-Cell	6 2-Cell	4 1-Cell
Hollow Clay Tile, Load Bearing, Plastered Two Sides	12 3-Cell	8 3-Cell	8 2-Cell	8 2-Cell
Hollow Clay Tile, Non-Load Bearing, Plastered Two Sides	12 3-Cell	8 3-Cell	4 1-Cell	3 1-Cell
Concrete Block, Load Bearing, Unplastered	12	12	8	8
Concrete Block, Non-Load Bearing, Unplastered	12	12	6	4
Concrete Block, Load Bearing, Plastered Two Sides	12	8	8	8
Concrete Block, Non-Load Bearing, Plastered Two Sides	12	8	4	3
Solid Plain Concrete, Load Bearing	8	8	8	6
Solid Plain Concrete, Non-Load Bearing	8	6	4	4
Solid Reinforced Concrete, Load Bearing	6	5	4	4
Solid Reinforced Concrete, Non-Load Bearing	6	5	4	3
Solid Gypsum Block, Non-Load Bearing, Unplastered	6	6	3	3
Solid Gypsum Block, Non-Load Bearing, Plastered Two Sides	6	4	3	3
Hollow Gypsum Block, Non-Load Bearing, Unplastered	8	8	4	4
Hollow Gypsum Block, Non-Load Bearing, Plastered Two Sides	8	8	4	4
Solid Cement or Gypsum Plaster on Metal Base, Non-Load Bearing	----	----	2	2
Hollow Partitions, Lath and plaster shall have a minimum thickness of 5/8 inch. Lath may be of metal or 3/8 inch perforated gypsum. If constructed of wood studs, they shall be fire-stopped.	----	----	----	5

(2) Other materials, assemblies and thicknesses of necessary strength and durability for the use intended and which have successfully performed under tests made by a recognized laboratory in accordance with the requirements of the "Standard Specifications for Fire Tests of Building Construction and Materials" (C19-33) of the American Society for Testing Materials, shall be accepted for specific ratings in addition to those prescribed in this section.

(3) Thicknesses as established in this section shall be construed as establishing minimum requirements for fire-resistance and shall not

preclude the application of other requirements of this code where considerations of strength, durability or stability require greater thicknesses.

(4) Where plaster is required in this order it shall have a minimum thickness of ½ inch except that for hollow partitions the thickness shall be not less than ⅝ inch. Either Portland cement or gypsum plaster may be used.

Ind 51.06 Fire-resistive floor construction. (1) Fire-resistive floor construction shall be accepted for the following respective degrees of fire-resistive protection when constructed as specified in this section. They shall be constructed entirely of incombustible materials.

(2) FOUR-HOUR CONSTRUCTION. Four-hour fire-resistive floor construction shall consist of reinforced concrete, gypsum or solid masonry slabs or arches not less than 4 inches in thickness, or shall consist of hollow masonry slabs or arches not less than 4 inches in thickness with a top covering of not less than 2 inches of solid masonry, or shall consist of steel joists or steel floor construction protected with fire-resistive materials as tabulated in this section. Except in the case of steel joisted construction, all reinforcing, tie rods and supporting structural members in such floors shall be protected with not less than 4-hour fire-resistive construction as specified in section Ind 51.04.

(3) THREE-HOUR CONSTRUCTION. Three-hour fire-resistive floor construction shall consist of reinforced concrete, gypsum or solid masonry slabs or arches not less than 2½ inches in thickness, or shall consist of hollow masonry slabs or arches not less than 4 inches in thickness with a top covering of solid masonry not less than 1½ inches in thickness, or shall consist of steel joists or steel floor construction protected with fire-resistive materials as tabulated in this section. Except in the case of steel joisted construction all reinforcing, tie rods and supporting structural members in such floor construction shall be protected with not less than 3-hour fire-resistive construction as specified in section Ind 51.04.

(4) TWO-HOUR CONSTRUCTION. Two-hour fire-resistive floor construction shall consist of reinforced concrete, gypsum or solid masonry slabs or arches not less than 2½ inches in thickness, or shall consist of hollow masonry slabs or arches not less than 3 inches in thickness with a top covering of not less than one inch of solid masonry, or shall consist of steel joists or steel floor construction protected with fire-resistive materials as tabulated in this section. Except in the case of steel joisted construction all reinforcing, tie rods and supporting structural members in such floor construction shall be protected with not less than 2-hour fire-resistive construction as specified in section Ind 51.04.

(5) ONE-HOUR CONSTRUCTION. One-hour fire-resistive floor construction shall consist of reinforced concrete, gypsum or solid masonry slabs not less than 2½ inches in thickness, or shall consist of hollow masonry slabs or arches not less than 3 inches in thickness with all joints in such hollow unit construction thoroughly filled with cement or gypsum mortar, or shall consist of steel joists or steel floor construction protected with fire-resistive materials as tabulated in this section, or shall consist of wood joisted construction with a double

wood floor on top (the sub-floor not less than ¾ inch thick, and the total thickness of the two layers not less than 1¼ inches thick) and with a fire-resistive ceiling as tabulated in this section, securely fastened to or suspended from the under side of such joists, except that the metal lath and plaster ceiling shall not be required below the lowest floor joist over unusable space.

(6) Except in the case of steel joisted construction, all reinforcing, tie rods and supporting structural members shall be protected with not less than one-hour fire-resistive construction as specified in section Ind 51.04.

(7) MINIMUM PROTECTION FOR METAL AND WOOD JOISTS BASED ON TIME PERIODS FOR VARIOUS INSULATING MATERIALS

MINIMUM PROTECTION FOR METAL AND WOOD JOISTS BASED ON TIME PERIODS FOR VARIOUS INSULATING MATERIALS

Joists to be Protected	Insulating Material	Minimum thickness of material in inches for the following fire-resistive materials			
		4 Hr.	3 Hr.	2 Hr.	1 Hr.
Ceiling protection of steel joists, where incombustible slab not less than 2½ in. thick is placed above	Metal or wire lath and gypsum or Portland cement plaster, concrete, burned clay products or gypsum	2	1½	1	¾
	Gunite	1½	1	¾	¾
Ceiling protection of wood joists with double floor on top	Metal or wire lath and gypsum or Portland cement plaster. ¾ in. perforated gypsum lath, ½ in. gypsum plaster, joints reinforced with 3 in. wide strips of metal lath.				¾

(8) All flat ceilings where the ceiling protection for beams, girders or flat slabs is suspended to form a free air space between the member and the protection, the protection thickness may be ½ inch less than required in the tabulation contained in this section for flat ceiling protection, but no thickness shall be less than ¾ inch minimum protection of metal and wood joists.

(9) In any reinforced concrete floor construction which includes a metal lath and cement or gypsum plastered ceiling on the under side, not less than ¾ inch thick, the required slab thickness may be reduced ½ inch but in no case shall be less than 2½ inches thick.

Ind 51.07 Fire-retardent roof coverings. (1) Fire-retardent roof coverings have no time resistance ratings by governmental testing laboratories. The Underwriters' Laboratories in their "List of Inspected Fire Protection Equipment and Materials" classifies their degree of fire-resistance by the letters A, B and C. Class A roof coverings have the highest resistance and Class C the lowest.

(2) Roof coverings on buildings of fire-resistive and mill construction shall be not less than Class A, or equal, those on buildings of ordinary construction shall be not less than Class B, or equal, and those on frame buildings shall be not less than Class C, or equal.

(3) The industrial commission will accept roof coverings for different fire-resistance values as established by, and if installed according to, the requirements of the Underwriters' Laboratories.

Note: The Underwriters' Laboratories "List of Inspected Materials" is obtainable from the Fire Insurance Rating Bureaus and Fire Insurance Agencies.

(4) The industrial commission will approve, subject to the provisions of this section, any roof covering which has developed the required fire-resistance in tests as specified in the "Standard Specifications of Fire Tests of Building Construction and Materials" (A.S.T.M. Designation C19–33) when conducted by a nationally recognized testing laboratory.

Ind 51.08 Occupancy separations. (1) When a building is used for more than one occupancy purpose, each part of the building comprising a distinct occupancy division shall be separated from any other occupancy division as provided for under the occupancy requirements of this code.

(2) Occupancy separations shall be classed as "Absolute", "Special" and "Ordinary" and shall apply to both horizontal and vertical separations.

(a) An absolute occupancy separation shall have no openings therein and shall be of not less than 4-hour fire-resistive construction as specified in sections Ind 51.05 and Ind 51.06.

(b) A special occupancy separation shall be of not less than 3-hour fire-resistive construction as specified in sections Ind 51.05 and Ind 51.06. All openings in walls forming such separation shall be protected on each side thereof by self-closing fire-resistive doors as specified in section Ind 51.09, and such doors shall be kept normally closed. The total width of all openings in any such separating wall in any one story shall not exceed 25% of the length of the wall in that story and no single opening shall have an area greater than 120 square feet.

1. All openings in floors forming this type of separation shall be protected by vertical enclosures extending above and below such openings. The walls of such vertical enclosures shall be of not less than 2-hour fire-resistive construction as specified in section Ind 51.05 and all openings therein shall be protected on one side thereof by self-closing one-hour fire-resistive doors as specified in section Ind 51.09 and such doors shall be kept normally closed.

(c) An ordinary occupancy separation shall be of not less than one-hour fire-resistive construction as specified in sections Ind 51.05 and Ind 51.06. All openings in such separations shall be protected by self-closing fire-resistive doors as specified in section Ind 51.001 and such doors shall be kept normally closed.

Ind 51.09 Fire-resistive doors. (1) Fire-resistive doors have no time resistance rating established by governmental agencies. It will be the policy of the industrial commission to approve, subject to the provisions of this section, any door given a rating by the Underwriters' Laboratories in their "List of Fire Protection Equipment and Materials," listed as Class A, B, C, D and E having varying degrees of resistance, and suitable for various locations.

(2) Class A doors, or equal, shall be used for all openings in 3 and 4 hour fire-resistive walls. Class B doors, or equal, shall be used in openings in walls enclosing vertical shafts whenever fire-resistive doors are required. Doors for elevator shafts shall be of Class B type or equal. Class C doors, or equal, shall be used in openings in corridor partitions in fire-resistive buildings, except that wood doors of solid flush type, 1¾ inches thick may be used in such buildings which are less than 85 feet in height. Class D and E doors, or better, shall be used in outside wall openings where required for fire escapes.

Note: The Underwriters' Laboratories "List of Inspected Materials" is obtainable from the Fire Insurance Rating Bureaus and Fire Insurance Companies.

Ind 51.10 Fire resistive windows. (1) Windows shall be of a design approved by the industrial commission for the intended use as provided under occupancy classifications. The term "window" in this order shall include the frame, sash and all other parts of a complete assembly. Approved wired glass ¼ inch in thickness shall be used for glazing.

(2) Windows shall be limited to sizes for which effective fire-resistance has been demonstrated by actual fire test, and which in no case exceed 84 square feet in area and 12 feet in greatest dimension. Such windows may be combined in multiple assemblies when separated by approved metal mullions, which shall be considered non-bearing.

(3) Individual glass lights shall not exceed 720 square inches in area, and 54 inches in vertical and 48 inches in horizontal dimension.

Note: It will be the policy of the industrial commission to approve, subject to the provisions of this order, any window bearing the inspection manifest of the Underwriters' Laboratories for the situation of installation.

Ind 51.11 Glass block. (1) USE. Approved glass block may be used in non-load bearing panels in walls where ordinary glass will be permitted, unless specifically prohibited by occupancy requirements of this code.

(2) INSTALLATION. Glass block panels shall not exceed 144 square feet in unsupported area, with a maximum height of 20 feet and a maximum width of 20 feet. The horizontal and vertical mortar joints between each block shall be composed of one part of Portland cement, one part of lime and 4 parts of sand, or its equivalent.

(a) All panels over 6 feet in width shall be supported on each side by chases, not less than 1½ inches in depth, of metal or other incombustible material.

(b) Approved continuous metal bond ties shall be provided in each horizontal mortar joint for block of nominal 12 x 12 inch size and in at least every third joint for block of smaller dimension.

(c) Provision shall be made in all panels for expansion, using approved expansion material not less than ½ inch thick for heads and lintels and not less than ¼ inch thick for jambs.

Ind 51.12 Height of building. The height of a building is measured at the center line of its principal front, from the sidewalk grade (or, if setting back from the sidewalk, from the grade of the ground adjoining the building) to the highest part of the roof, if a flat roof, or to a point 2/3 of the height of the roof, if a gabled or hipped roof. If the grade of the lot or adjoining sidewalk in the rear or alongside

of the building falls below the grade at the front, the height shall be measured at the center of the lowest side.

Ind 51.13 Basement; first floor; number of stories. A basement is a story whose floorline is below grade at any entrance or exit and whose ceiling is not more than 5 feet above grade at any such entrance or exit. The first floor is the floor next above the basement, or the lowest floor if there is no basement. The number of stories of a building includes all stories except the basement.

Ind 51.14 Street; alley; court. (1) A street is any public thoroughfare 30 feet or more in width.

(2) An alley is any public thoroughfare less than 30 feet, but not less than 10 feet, in width.

(3) A court is an open, unoccupied space other than a street or alley and bounded on one or more sides by the walls of a building.

Ind 51.15 Standard exit. (1) Every door which serves as a required exit from a public passageway, stairway or building shall be a standard exit door unless exempted by the occupancy requirements of this code.

Note: For required exits see sections Ind 54.06, 55.10, 56.08, 57.09.

(2) Every standard exit door shall swing outward or toward the natural means of egress (except as below). It shall be level with the floor, and shall be so hung that, when open, it will not block any part of the required width of any other doorway, passageway, stairway or fire escape. No revolving door, and no sliding door except where it opens onto a stairway enclosure or serves as a horizontal exit, shall be considered as a standard exit door.

(3) A standard exit door shall have such fastenings or hardware that it can be opened from the inside without using a key, by pushing against a single bar or plate, or turning a single knob or handle; it shall not be locked, barred, or bolted at any time while the building is occupied.

(4) A standard exit doorway shall not be less than 6 feet 4 inches high by 3 feet 4 inches wide, except where especially provided under occupancy classifications and in section Ind 51.20. Where double doors are provided with or without mullions, the width of each single door may be reduced to 2 feet 6 inches.

(5) In every building which is used at night, a red exit light shall be placed over every emergency exit door and also over every exit door where other doors or openings may cause confusion.

(6) Doors, windows or other openings which are not exits but which give the appearance of exits shall be effectively guarded.

Ind 51.16 Stairways. (1) DEFINITION. By a stairway is meant one or more flights of steps and the necessary platforms connecting them to form a continuous passage from one level to another within a building or structure.

(2) WIDTH. Every required exit stairway, whether enclosed or not, shall be not less than 3 feet 8 inches wide of which not more than 4 inches on each side may be occupied by a handrail. Every platform shall be at least as wide as the stairway, measuring at right angles to the direction of travel. Every straight run platform shall measure

at least 3 feet in the direction of travel. Wherever a door opens onto a stairway, a platform shall be provided extending at least the full width of the door in the direction of travel. *Exception:*

(a) In apartment buildings not more than 2 stories in height and having not more than 2 apartments on a floor and in rooming houses, hospitals, hotels and similar buildings not more than 2 stories in height and having not more than 6 living or sleeping rooms on a floor, such stairways shall not be less than 3 feet wide.

(b) If other stairways are provided in addition to those required by this code, such additional stairways need not conform to the width requirements of this code.

(3) HANDRAILS. All stairways and steps of more than 3 risers shall have at least one handrail. Stairways and steps 5 feet or more in width, or open on both sides, shall have a handrail on each side. Where only one handrail is required it shall be placed on the left hand side as one mounts the stairs, and on the open side, if any.

(a) Stairways which are more than 8 feet wide shall be divided by center rails into widths not more than 8 feet nor less than 3 feet 8 inches. Rails shall be not less than 2 feet 6 inches vertically above the nose of treads or 3 feet 6 inches above the platform. Railings on open sides of stairways and platforms shall be provided with an intermediate member at mid-height, or with vertical members having a maximum spacing of 11 inches; or its equivalent in safety.

(b) Stairways on the outside of buildings and an integral part thereof, having more than 3 risers shall have a handrail at each side, and if the stairway is more than 50 feet wide, one or more intermediate handrails shall be provided.

(4) RISERS AND TREADS. All stairways and steps required as exits by this code shall have a uniform rise of not more than 7¾ inches and a uniform tread of not less than 9½ inches, measuring from tread to tread, and from riser to riser. No winders shall be used. There shall not be more than 18, nor less than 3 risers between platforms or between floor and platform and not more than 22 risers from floor to floor with no platform.

(a) Stairways and steps not required as exits by this code shall have a uniform rise of not more than 8 inches and a uniform tread of not less than 9 inches. If winders are used, the tread shall be at least 7 inches wide at a point one foot from the narrow end.

(b) For stairways to elevated walks, platforms and runways in places of employment see section Ind 1.17 of the general orders on safety issued by the industrial commission.

(c) The edges of all treads and the edges of all stairway landings shall be finished with a non-slippery surface not less than 3 inches in width.

History: 1–2–56; am (2); (2a); (2b); Register, June, 1956, No. 6, eff. 7–1–56.

Ind 51.17 Smokeproof stair tower. (1) A smokeproof stair tower shall be an enclosed stairway which is entirely cut off from the building and which is reached by means of open balconies or platforms. The stairways, landings, platforms and balconies shall be of incombustible material throughout. The enclosing walls shall be of not

less than 4-hour fire-resistive construction as specified in section Ind 51.05, and the floors and ceilings of not less than 2-hour fire-resistive construction as specified in section Ind 51.06.

(2) The doors leading from the buildings to the balconies and from the balconies to the stairways shall be fire-resistive doors as specified in section Ind 51.09, and all openings within 10 feet of any balcony shall be protected with fire-resistive windows as specified in section Ind 51.10, or fire-resistive doors.

(3) Each balcony shall be open on at least one side, with a railing not less than 3 feet high on all open sides.

Ind 51.18 Interior enclosed stairway. (1) An interior enclosed stairway shall be completely enclosed with walls of not less than 2-hour fire-resistive construction as specified in section Ind 51.05, except that in ordinary or frame buildings and in mill or fire-resistive buildings not more than 3 stories in height one-hour fire-resistive enclosures may be used. All doors opening into such enclosures shall be as specified in section Ind 51.09.

(2) The enclosure shall include at each floor level a portion of such floor which will be at least as wide as the stairway; and such enclosure shall also include the passageway of the first floor level (if any) leading from the stairway to an outside door, so as to afford uninterrupted passage from the uppermost floor to such outside door without leaving the enclosure.

(3) If windows are placed in any such enclosure they shall be fixed fire-resistive windows as specified in section Ind 51.10, except in outside walls.

Ind 51.19 Horizontal exit. (1) A horizontal exit shall consist of one or more openings through or around an exterior wall or occupancy separation, or of one or more bridges or balconies connecting 2 buildings or parts of buildings entirely separated by occupancy separations as described in section Ind 51.08.

(2) Openings used in connection with horizontal exits shall be protected by fire-resistive doors as specified in section Ind 51.09. If swinging doors are installed in pairs, they shall be arranged to swing in opposite directions; with direction of travel indicated by signs, except that where the travel is in one direction only, both doors shall swing in that direction. Such doors shall be kept continuously unlocked whenever the building is occupied and be normally closed or be self-closing and equipped with fusible links.

(3) Floors in horizontal exits shall have a slope of not more than one foot in 6.

(4) All doors and windows within 10 feet of any balcony or bridge shall be fire-resistive doors as specified in section Ind 51.09, or fire-resistive windows as specified in section Ind 51.10, except that if such doors or windows are in the same plane, this requirement shall apply only to those within 5 feet of the balcony or bridge.

(5) The floor on each side of a horizontal exit and all passageways leading thereto shall be kept clear and unobstructed at all times.

Ind 51.20 Fire escapes. (1) LOCATION. Every fire escape shall be so located as to lead directly to a street, alley, or open court connected with a street.

(a) Every fire escape shall be placed against a blank wall if possible. If such a location is not possible then every wall opening which is less than 6 feet distant horizontally from any tread or platform of the fire escape shall be protected by a fire-resistive door as specified in section Ind 51.09 or by a fire-resistive window as specified in section Ind 51.10.

(2) EXITS TO FIRE ESCAPES. Every fire escape shall be accessible from a public passageway or shall be directly accessible from each occupied room. Exits to fire escapes shall be standard exit doors as specified in section Ind 51.15, except that doors to "A" fire escapes may be not less than 2 feet 6 inches wide.

(3) DESIGN AND FABRICATION. Each part of every fire escape (except counterweights for balanced stairways) shall be designed and constructed to carry a live load of 100 pounds per square foot of horizontal area over the entire fire escape. Each part of every fire escape shall be designed and constructed in accordance with the requirements of section Ind 53.24, except that the unit stresses therein specified shall be reduced by one-fourth. The minimum sections and sizes specified below shall be increased whenever necessary so that under full load the allowable unit stresses will not be exceeded.

(a) No other material than wrought iron, soft steel or medium steel shall be used for any part of a fire escape, except for weights, separators and ornaments. No bar material less than ¼ inch thick shall be used in the construction of any fire escape, except for separators, ornaments, structural shapes over 3 inches and rigidly built up treads and platforms of approved design. In the fabrication of a fire escape, all connections or joints shall be made by riveting, bolting or welding in an approved manner. All bolts or rivets, except for ornamental work, shall be not less than ⅜ inch in diameter.

(4) PLATFORMS. Each platform on an "A" fire escape shall be at least 28 inches wide; each platform on a "B" fire escape shall be at least 3 feet 4 inches wide. Such widths shall be the clear distance between stringers, measuring at the narrowest point. Each platform shall extend at least 4 inches beyond the jambs of exit opening. The above minimum widths and lengths shall be increased, wherever necessary, so that no exit door or window will, when open, block any part of the required width of the fire escape. Every platform shall consist of either,

(a) Flat bars on edge, not less than 1 x ¼ inch; but not less than 1¼ x ¼ inch where bolts and separators are used; bars shall not be more than 1¼ inches center to center.

(b) ½ inch or ⅝ inch square bars with sharp edge up, not more than 1½ inches center to center.

(c) ⅝ inch round bars, not more than 1½ inches center to center.

(d) Platform and treads may be solid if covered by a roof.

(e) The platform frame shall consist of not less than 2 x ⅜ inch flat bars on edge or equivalent, provided the brackets are not more than 4 feet apart. If brackets are more than 4 feet apart, the frame shall be correspondingly stronger and stiffer. Every platform wider than 30 inches, if made of square or round bars, shall have a third frame bar through the center; if made of flat bars, the platform shall

have separators and bolts through the center. Frame bars shall not project more than ¼ inch above platform bars, except around the outside of platform.

(f) There shall be a platform at each story above the first, and intermediate platforms if floors are more than 18 feet apart vertically.

(g) Platforms shall not be more than 8 inches below the door sill.

(5) BRACKETS. Brackets for a 28 inch or 30 inch platform, when spaced not more than 4 feet apart, shall be made of not less than ⅞ inch square bars or 1½ x 1½ x ¼ inch angles; such bars or angles shall be larger if the platform is wider or if the brackets are farther apart. Each bracket shall be fastened at the top to the wall by a through bolt (at least ⅞ inch diameter), nut, and washer (at least 4 inch diameter). The slope of the lower bracket bar shall be not less than 30 degrees with the horizontal. The lower bar shall have a washer or shoulder to give sufficient bearing against the wall.

(a) The strength of the wall to which brackets are to be attached shall be carefully considered in determining the spacing, shape and inside connection of brackets, so that under full load the wall will not be unduly strained. Where it is necessary to install brackets adjacent to wall openings they shall be located at a suitable distance therefrom, or the wall shall be properly reinforced.

(6) STAIRWAYS. (a) Each stairway of an "A" fire escape shall be at least 24 inches wide between stringers; such stairway shall have a uniform rise of not more than 8 inches and a uniform run of not less than 8 inches.

(b) Each stairway of a "B" fire escape shall be at least 3 feet 4 inches wide between stringers; such stairway shall have a uniform rise of not more than 8 inches, and a uniform run of not less than 9 inches.

1. The rise is the vertical distance from the extreme edge of any step to the corresponding extreme edge of the next step. The run is the horizontal distance between the same points.

(c) Stairway stringers shall consist of either

1. A 5 inch channel or larger.
2. Two angles 2 x 2 x ¼ inch or larger.
3. Two flat bars 2 x ⅜ inch or larger.
4. One flat bar 6 x ¼ inch or larger.

5. If 2 angles or 2 flat bars are used, they shall be properly tied together by lattice bars, vertical as well as horizontal. If flat bars are used, every stairway of more than 10 risers shall have lateral bracing. The connection of stringers to platform, at top and bottom, shall be at least equal in strength to the stringers and shall safely carry the full live and dead loads. If stringers are carried by intermediate brackets, the stringers shall have a horizontal bearing on the brackets and shall be properly and securely connected thereto.

6. Treads shall consist of either flat or square bars, (not round), of the size and spacing specified for platforms. An "A" tread shall consist of at least 6 square bars, or 7 flat bars. A "B" tread shall consist of at least 7 square bars, or 8 flat bars. A "B" tread made of flat bars shall have separators and bolt through the center. A "B" tread made of square bars shall be trussed.

7. Treads and platforms may be solid if covered by a roof.

(7) BALANCED STAIRWAY. All "B" fire escapes, and all fire escapes on schools, theaters, and assembly halls, either shall reach to the ground or shall have a balanced stairway reaching to the ground. "A" fire escapes which are not on schools, theaters, or assembly halls, may terminate in a platform at least 3 feet long, located not more than 10 feet above the ground.

(a) Every balanced stairway shall conform to the requirements for other stairways except that the stringers and top rail may be lighter if they are properly trussed. The counterbalancing device shall be attached to both sides of the stairway equally, or a special attachment shall be used to prevent warping or twisting. The counterbalancing device shall operate gradually and easily as the live load is applied. Cable counterweights are not permitted.

(b) Treads for "A" balanced stairways may be made as follows: two 1¼ x 1¼ x ¼ inch angles at front and back; two 1¼ x ¼ inch bars between, lying flatwise; one inch space between bars. Treads for "B" balanced stairways may be made as follows: two 1½ x 1½ x ¼ inch angles at front and back; two 1½ x ¼ inch bars between, lying flatwise; one inch space between bars. All such treads shall be strongly fastened together with cross bars not more than 14 inches apart.

(8) RAILINGS. Railings shall be provided on all sides of platforms and stairways, and on both sides of balanced stairways. Either a railing or a handrail fastened to wall shall be provided on each side of all "B" fire escape stairways. Railings shall be at least 3 feet high, mesuring vertically from floor of platform or from nose of step.

(a) Every railing shall have posts, not more than 5 feet apart made of not less than 1½ x 1½ x ¼ inch angles or tees, or 1¼ inch pipe; top rail not less than 1¼ x 1¼ x ¼ inch angle or equivalent; center rail not less than 1¼ x $\frac{5}{16}$ flat bar or equivalent. All connections shall be such as to make the railing stiff; 2 bolts (⅜ inch or larger) shall be used at the foot of each post wherever possible, or at least one ½ inch bolt shall be used. Railings shall be continuous. No projections on the inside of the railing shall be permitted. Where a railing returns to the wall, it shall be fastened thereto with a through bolt (at least ⅝ inch diameter), nut, and washer; or (in reinforced concrete) with an approved insert; or the railing shall be made equally secure with a diagonal brace extending at least 3 feet horizontally and 3 feet vertically.

(b) All outside railings which are more than 60 feet above grade shall be at least 6 feet high, measuring vertically from floor of platform or from nose of step. Such railings shall be of special design approved by the industrial commission, having not less than 4 longitudinal rails, and vertical lattice bars not more than 8 inches apart, and proper stiffening braces or brackets.

(9) LADDER TO ROOF. Every fire escape which extends higher than the second floor shall be provided with a ladder leading from the upper platform to the roof, unless the fire escape stairway leads to the roof. The ladder shall have stringers not less than 1¼ inch pipe, or not less than 2 x ⅜ inch flat bars, at least 17 inches apart in the clear. The rungs shall be not less than ½ inch square or ⅝ inch round bars, 14 inches center to center. The stringers shall be securely tied together at intervals no greater than every fifth rung. The

stringers of each ladder shall extend not less than 4 feet above the roof coping and return to within 2 feet of the roof, with the top rung of the ladder level with the coping.

(10) OTHER TYPES OF FIRE ESCAPES. Sliding or chute fire escapes may be used, upon the approval of the industrial commission, in place of "A" or "B" fire escapes. Every sliding fire escape shall be provided with a ladder constructed as in section Ind 51.20 (9), extending from 5 feet above grade, to 4 feet above the roof coping.

Ind 51.21 Standpipes. (1) CLASSES OF SERVICE. Standpipe systems are designed for 2 classes of service: (a) for use by fire departments or others trained in handling heavy streams from 2½ inch hose, and (b) for use by occupants of a building on incipient fires. These are referred to in these orders as fire departments, and first aid standpipes, respectively. The features of each system may be combined in a single equipment, if served by an automatic water supply conforming to section Ind 51.21 (2) (g) or (h). All threads on hose and hose connections shall be interchangeable with those of the public fire department.

(2) FIRE DEPARTMENT STANDPIPES. (a) Shall be provided for all buildings exceeding 60 feet in height. Required standpipes shall be installed as construction progresses, to make them available to the fire department in the topmost floor constructed.

(b) Standpipes shall be sufficient in number so that any part of every floor area can be reached within 30 feet by a nozzle attached to 100 feet of hose connected to the standpipe. When 2 or more standpipes are required, they shall be cross connected at the bottom, and equipped with individual controlling valves located not higher than the first story.

(c) Standpipes shall be protected against mechanical and fire damage, with outlets in stairway enclosures; where stairways are not enclosed, outlets shall be at inside or outside of outside walls, within one foot of a fire tower, interior stairway or fire escape. Dry standpipes shall be accessible for inspection and not concealed.

(d) No required standpipe shall be less than 4 inches in diameter, and not less than 6 inches in diameter for buildings exceeding 75 feet in height. Material shall be steel or wrought iron pipe with approved fittings, designed for a working pressure of 100 pounds in excess of the static pressure due to elevation. An approved 2½ inch hose valve shall be located at each story, not over 5 feet above the floor level. An approved pressure reducing device shall be installed at hose valves where the pressure would otherwise be in excess of 50 pounds. Where a standpipe is not normally under pressure, hose valves shall be equipped with a tight fitting cap on a chain and having lugs for a spanner wrench.

(e) An approved siamese connection with a check valve in each inlet shall be installed on a 4 inch pipe connecting with each standpipe system and shall be marked "To Standpipe". The elevation of the connection shall be not over 3 feet above the sidewalk or ground. An automatic drip valve shall be installed where necessary to prevent freezing. In buildings with several standpipes, more than one siamese connection may be required.

(f) Fire department standpipes need not be equipped with attached hose.

(g) Automatic water supplies will not ordinarily be required, except as provided in section Ind 51.21 (2) (h), or where judged necessary by reason of the high combustibility or potential hazard of the occupancy. When required, they shall be designed to provide not less than 40 pounds flowing pressure at the top outlet, with volume for two fire streams. Any of the following supplies will be acceptable:

1. Connection to city water works system when providing required minimum volume and pressure.

2. Gravity tank of not less than 3500 gallons capacity, elevated 50 feet above the top story.

3. Pressure tank of 5250 gallons gross capacity (3500 gallons water capacity).

4. Automatic pump or pumps, with combined effective capacity of 500 gallons per minute.

(h) An automatic water supply from an approved fire pump shall be provided in buildings over 150 feet high, or in buildings over 10,000 square feet in area per floor and requiring a standpipe. The capacity of the pump shall be not less than 500 gallons per minute for a 4 inch standpipe, 750 gallons per minute for 2 interconnected 4 inch or single 6 inch standpipes, and 1,000 gallons per minute for larger systems.

(3) FIRST AID STANDPIPES. (a) Shall be provided as required in sections Ind 54.14, Ind 55.33, and Ind 57.21 of this code.

(b) Standpipes shall be sufficient in number so that any part of every floor area can be reached within 20 feet by a nozzle attached to not more than 75 feet of hose connected to a standpipe.

Note: Standpipe outlets should be located in occupied areas, and usually at interior columns in large area buildings. Asylums and places of detention may require special arrangements. It should be possible in all cases to direct the stream into all important enclosures, such as closets, etc.

(c) No required standpipe shall be less than 2 inches in diameter, and not less than 2½ inches in diameter for buildings 5 stories or more in height. Material shall be wrought iron or steel and pipe and fittings shall be of suitable weight for the pressure used. An approved 1½ inch hose valve shall be located in each story, not more than 5 feet above the floor level; valves of the gate type shall be equipped with a suitable open drip connection. An approved pressure-reducing device shall be installed at hose valves where pressure would otherwise be over 50 pounds.

(d) Not more than 75 feet of hose shall be attached to each outlet. Hose shall be of unlined linen construction, 1½ inches in diameter, with a ½ inch nozzle attached, and shall be located in approved cabinets or racks.

(e) Water supply shall be automatic, and be designed for 70 gallons per minute for 30 minutes with 25 pounds flowing pressure at the top outlet. Such supply may be from city connection, gravity tank, pressure tank or pump.

Note: Data on the design of standpipe systems can be found in the Standards of the National Board of Fire Underwriters for the Installation of Standpipe and Hose Systems. The industrial commission will ordinarily approve any installation which is approved by the Underwriters.

Ind 51.22 Fire extinguishers. (1) Where fire extinguishers are required, they shall be of a type approved by the industrial commission. All fire extinguishers shall be charged in accordance with the instructions of the manufacturer.

(2) Extinguishers shall be conspicuously located where they will always be readily accessible and so distributed as to be immediately available in event of fire. They shall be hung on hangers or set on brackets or shelves so that the top of the extinguisher is not more than 5 feet above the floor.

Note: The industrial commission will ordinarily approve any extinguisher which bears the Underwriters' label and which is of the size, and suitable, for the hazard for which it is intended. Consult the industrial commission for lists of approved extinguishers.

Ind 51.23 Automatic sprinklers. (1) Required automatic sprinkler systems shall be designed and constructed in conformity with good established practice. Only materials and devices approved by the industrial commission may be used. Reinstallation of used sprinkler heads is prohibited, and other secondhand devices may be installed by special permission only.

(2) Where an automatic sprinkler system is required throughout a building, supply shall be from a city water main, or from a gravity or pressure tank. If the city water supply is inadequate in either pressure or volume, a tank of not less than 5000 gallons capacity shall be provided. The bottom of a gravity tank shall be not less than 35 feet above the under side of the roof.

(3) Where automatic sprinklers are required in a basement only, the supply shall be from a city water main. Where there is no city water supply, such basement sprinklers need not be installed; but at such time as a city supply becomes available, such required basement sprinklers shall be installed.

(4) Every basement sprinkler system shall also include sprinklers in all shafts (except elevator shafts) leading to the story above.

(5) Every sprinkler system shall have a suitable audible alarm and an approved siamese connection marked "To Automatic Sprinklers", and otherwise conforming to section Ind 51.21 (2) (e).

Note: It will be the policy of the industrial commission to approve equipment conforming to standards of the National Board of Fire Underwriters for Sprinkler Equipment, also materials and devices currently listed by the Underwriters' Laboratories. The commission reserves the right to order a sprinkler system in any building, regardless of height or number of persons, if the occupancy is especially hazardous.

Ind 51.24 Fire alarm systems. (1) Interior fire alarm systems required under sections Ind 54.16, Ind 56.19 and Ind 57.22 shall be designed and constructed in conformity with the following requirements:

(2) All such alarm systems shall consist of operating stations on each floor of the building, including the basement, with bells, horns, or other approved sounding devices which are effective throughout the building. The system shall be so arranged that the operation of any one station will actuate all alarm devices connected to the system except in the case of a presignal system. Fire alarms shall be readily distinguishable from any other signaling devices used in the building. A system designed for fire alarm and paging service may be used if the design is such that fire alarm signals will have precedence over all others.

(3) Every fire alarm system shall be electrically operated except as provided in section Ind 56.19 and shall be operated on closed circuit current under constant electrical supervision, so arranged that upon a circuit opening and remaining open, or in case of a ground or short circuit in the ungrounded conductor, audible trouble signals will be given instantly.

(4) In buildings more than 3 stories in height, coded fire alarm systems shall be provided, and the systems shall be so arranged that the code transmitted shall indicate the location and the story of the structure in which the signal originated. *Exception:*

(a) In apartment buildings less than 6 stories in height and having less than 5,000 square feet area per floor, non-coded, electrically supervised, continuous ringing fire alarm systems will be accepted.

(5) Operating stations shall be prominently located in an accessible position at all required exit doors and required exit stairways. Operating stations shall be of an approved type and shall be conspicuously identified. All such operating stations shall be of a type, which after being operated, will indicate that an alarm has been sent therefrom until reset by an authorized means. (Operating stations having a "Break Glass" panel will be acceptable. On coded systems having a device to permanently record the transmission of an alarm, "Open Door" type stations may be used.) The fire alarm operating stations shall be mounted approximately 5 feet above the finished floor as measured from the floor to the center of the box.

(6) All such alarm systems shall be tested at least once a week and a record of such tests shall be kept.

(7) Existing fire alarm systems that are effective in operation will be accepted if approved by the industrial commission.

Note: The following sections are taken from the Wisconsin state electrical code.

(8) The energy for operation of fire alarm systems shall be taken from sources suited to the design of the system. Primary batteries shall not be used.

(9) A 3-wire 110–220 volt service will be accepted for supervised systems, providing the operating current is secured from one ungrounded conductor and the neutral or grounded conductor and the current for operation of trouble signal or signals is secured from the other ungrounded conductor and the neutral or grounded conductor.

(10) Electrical wiring in connection with fire alarm systems shall be installed in rigid metal conduit, flexible metal conduit, electrical metallic tubing or surface metal raceway. Armored cable (metal) may be used where it can be fished in hollow spaces of walls or partitions in apartments or rooming houses not over 3 stories in height. Where the wiring is subject to excessive moisture or severe mechanical injury, rigid metal conduit shall be used. The smallest size conductor to be used in any fire alarm system in a building over 3 stories in height shall be #14 AWG or #16 AWG for buildings not over 3 stories in height. The wires shall be provided with insulation suitable for use on circuits not exceeding 600 volts. Fire alarm systems shall be connected to the line side of the service switch or to the emergency bus, where available, through an approved fire alarm cutout or equivalent.