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Chapter Ind 51

DEFINITIONS AND STANDARDS

Ind 51.01 Definitions. (1) ACCESSORY ROOM. Any room or enclosed floor space used for eating, cooking, bathrooms, water closet compartments, laundries, pantries, foyers, hallways, and other similar floor spaces. Rooms designated as recreation, study, den, family room, office, etc., in addition to habitable rooms, are considered accessory rooms.

(1a) AIR CONDITIONING. The process of treating air to control simultaneously its temperature, humidity, cleanliness and distribution to meet the requirements of the conditioned space.

(2) ALLEY. Any legally established public thoroughfare less than 30 feet in width but not less than 10 feet in width whether designated by name or number.

(3) APPROVED. Approval granted by the department under the regulations stated in this code.

(4) AREA (GROSS). The maximum horizontal projected area within the perimeter of the outside surface of walls or supports of the building or structure. Exterior cantilever open balconies are not included.

(5) AREA (NET). The occupied or usable floor area in a building but not including space occupied by columns, walls, partitions, mechanical shafts or ducts.

(5a) AREAWAY. Exterior area whose grade is below the grade (at building) and having at least one side consisting of the exterior wall of a building.

(6) ATTIC. The space not used for human occupancy located between the ceiling of uppermost story and the roof.

*See Appendix A for further explanatory material.

(7) AUTOMATIC. Automatic as applied to a fire protective device, is one which functions without human intervention and is actuated as a result of the predetermined temperature rise, rate of rise of temperature, combustion products or smoke density such as an automatic sprinkler system, automatic fire door, automatic fire shutter, or automatic fire vent.

(7a) AUTOMATIC FIRE SPRINKLER SYSTEM. An automatic fire sprinkler system is an integrated system of underground and overhead piping designed in accordance with fire protection engineering standards. The system includes a suitable water supply, such as a gravity tank, fire pump, reservoir or pressure tank or connection beginning at the building side of an approved check valve or approved backflow preventing device located at or near the property line where the pipe or piping system provides water used exclusively for fire protection and related appurtenances and to standpipes connected to automatic sprinkler systems. The portion of the sprinkler system above ground is a network of specially sized or hydraulically designed piping installed in a building, structure or area, generally overhead, and to which sprinklers are connected in a systematic pattern. The system includes a controlling valve and a device for actuating an alarm when the system is in operation. The system is usually activated by heat from a fire and discharges water over the fire area.

(8) BALCONY (EXTERIOR). An elevated platform attached to a building and enclosed on one or more sides by railings.

(9) BALCONY (INTERIOR). An open intermediate level or stepped floor. Also see "Stories, Number of."

(10) BASEMENT. A basement floor is that level below the first or ground floor level with its entire floor below exit discharge grade.

(11) BEARING WALL. See "Wall (bearing)."

(12) BUILDING.* A structure for support, shelter or enclosure of persons or property.

(13) BUILDING HEIGHT. See "Height (building)."

(14) BUTTRESS. A structural projection which is an integral part of a wall, primarily to provide resistance to lateral forces.

(15) CAVITY WALL. See "Wall (cavity)."

(16) CEILING PROTECTION. The fire protection membrane suspended beneath the floor or ceiling construction which, when included with the construction, develops the fire-resistive rating for the overall assembly.

(17) CLOSING DEVICE (FIRE DOOR). A closing device is one which will close the door and be adequate to latch and/or hold hinged or sliding door in a closed position.

*See Appendix A for further explanatory material.

(a) *Automatic.* An automatic closing device is one which functions without human intervention and is actuated as a result of the predetermined temperature rise, rate of rise of temperature, combustion products or smoke density.

(b) *Self-closing.* A self-closing device is one which will maintain the door in a closed position.

(18) COMBUSTIBLE CONSTRUCTION. An assembly such as a wall, floor or roof having components of combustible material.

(19) COMBUSTIBLE MATERIAL. All materials not classified as "noncombustible" are considered combustible. This property of a material does not relate to its ability to structurally perform under fire exposure. The degree of combustibility is not defined by standard fire test procedures.

(20) CONCRETE. See "Types of Concrete," section Ind 51.045 (1) (a).

(21) CONSTRUCTION. Includes all labor and materials used in the framing or assembling of component parts in the erection, installation, enlargement, alteration, repair, moving, conversion, razing, demolition or removal of any appliance, device, building, structure or equipment.

(22) CORRIDOR. An enclosed passageway in a building for public ingress and egress to and from dwelling units, rooms or other areas and leading to a lobby, foyer or exit discharge.

(22a) CORRIDOR (REQUIRED EXIT). A fire-rated enclosure beginning at the end point of maximum allowable exit distance and continuing to the exit discharge door.

Note: See line 20 of Table 51.03-A.

(23) COURT (EXIT). An exterior court providing a pathway for public egress from an exit to a public thoroughfare.

(24) COURT (INNER). An open air shaft or court surrounded on all sides by walls.

(25) COURT (INNER LOT LINE). A court bounded on 3 sides by walls and on the remaining side by a lot line or property line.

(26) COURT (OUTER). A court bounded on 3 sides with walls and on the remaining side by a street, alley or other open space not less than 15 feet wide.

(27) COURT (OUTER LOT LINE). A court with one side on a lot line or property line and opening to a street or open space not less than 15 feet wide.

(28) CURTAIN WALL. See "Wall (curtain)."

(29) DEPARTMENT. Means the department of industry, labor and human relations.

(30) DIVISION WALL. See "Wall (division)."

*See Appendix A for further explanatory material.

(31) DUCT. Any pipe, flue, or tunnel used to convey air, gases and entrained materials. An underground duct is any part of a duct that is below the surface of the ground.

(32) DUCT FURNACE. See "Furnace (duct)."

(33) ELEVATOR. See Wis. Adm. Code, chapter Ind 4.

(34) EQUIPMENT. Self-contained systems and apparatus attached to or built into the building and used for mechanical or electrical processing, comfort, safety, sanitation, communication or transportation within a building.

(35) EXHAUST VENTILATING SYSTEM. See "Ventilating System (exhaust)."

(36) EXISTING. A building, structure, or equipment completed or in the course of construction or use or occupied prior to the effective date of applicable rules of this code.

(37) EXIT COURT. See "Court (exit)."

(38) EXIT DISCHARGE GRADE. See "Grade (exit discharge)."

(39) EXIT (VERTICAL). See "Vertical Exit."

(40) EXTERIOR BALCONY. See "Balcony (exterior)."

(41) EXTERIOR WALL. See "Wall (exterior)."

(41a) FACTORY. A factory is any premises wherein labor is used in manufacturing, making or altering or adapting articles for the purpose of trade or gain.

(42) FAMILY.* Means 2 or more individuals who are related to each other by blood, marriage, adoption or legal guardianship. For purposes of this code a group of not more than 4 persons not necessarily related by blood or marriage, living together in a single living unit will be considered equivalent to a single family.

(42a) FARM OPERATION. The farm operation is the planting and cultivating of the soil and growing of farm products substantially all of which have been planted or produced on the farm premises.

Note: The farm operation, according to section 102.04 (3), Wis. Stats., includes: the management, conserving, improving and maintaining of the premises, tools, equipment, improvements and the exchange of labor or services with other farmers; the processing, drying, packing, packaging, freezing, grading, storing, delivery to storage, carrying to market or to a carrier for transportation to market and distributing directly to the consumer; the clearing of such premises and the salvaging of timber and the management and use of wood lots thereon but does not include logging, lumbering and wood-cutting operations unless the operations are conducted as an accessory to other farm operations.

(42b) FARM PREMISES. The farm premises is defined to be the area which is planted and cultivated. The farm premises does not include greenhouses, structures or other areas unless used principally for the production of food or farm products.

*See Appendix A for further explanatory material.

(42c) FARM PRODUCTS. Farm products are defined as agricultural, horticultural and arboricultural crops. Animals considered within the definition of agricultural include livestock, bees, poultry, fur-bearing animals, and wildlife or aquatic life.

(42d) FARMING. Farming means the operation of a farm premises owned or rented by the operator.

(43) FIRE DOOR. A door so constructed as to give protection against the passage of fire.

(44) FIRE DOOR ASSEMBLY. The assembly of fire door and its accessories, including all hardware, frames, closing devices and their anchors, so constructed as to give protection against the passage of fire.

(45) FIRE DOOR CLOSING DEVICE. See "Closing Device (fire door)."

(46) FIRE RESISTANCE AND FIRE-RESISTIVE MATERIAL. Having the property to withstand fire or give protection from it. As applied to elements of building, it is characterized by the ability to confine a fire or to continue to perform a given structural function, or both.

(47) FIRE-RESISTIVE CLASSIFICATION. Fire-resistive classification is the time in hours during which a material or assembly continues to exhibit fire resistance under conditions of tests and performance as specified in ASTM E-119, ASTM E-152 and ASTM E-163.

(48) FIRE-RESISTIVE PROTECTION. An insulating material applied directly, attached to, or suspended from a structural assembly, to maintain the structural integrity of a member or system for the specified time rating.

(49) FIRE-RESISTIVE PROTECTION, DIRECTLY APPLIED. A coating material applied directly to the structural element for the purpose of fire protection.

(50) FIRE-RESISTIVE RATING. Refer to fire-resistive classification.

(51) FIRE-RETARDANT ROOF COVERINGS. Roof coverings shall be classified on the basis of protection provided against fire originating outside the building or structure on which they have been installed.

(a) Class A roof coverings are those which are effective against severe fire exposures (meeting the 3 methods for fire tests of class A roof coverings [ASTM Standard E-108] and possess no flying brand hazard.

(b) Class B roof coverings are those which are effective against moderate fire exposures (meeting the 3 methods for fire tests of class B roof coverings [ASTM Standard E-108]) and possess no flying brand hazard.

(c) Class C roof coverings are those which are effective against light fire exposures (meeting the 3 methods for fire tests of class C roof

*See Appendix A for further explanatory material.

coverings [ASTM Standard E-108]) and possess no flying brand hazard.

(52) FIRE RETARDANT—TREATED WOOD. Fire-retardant wood includes lumber or plywood that has been treated with a fire-retardant chemical to provide classifications (flame-spread [FSC] and fuel contributed [FCC]) of 25 or less by ASTM method E-84, shows no progressive combustion during 30 minutes of fire exposure by this method, and is so labeled. Fire-retardant wood for decorative and interior finish purposes provides reduced flame-spread classification (FSC) by ASTM method E-84 as specified by the code for materials used in the particular applications.

(53) FIRE WINDOW ASSEMBLY. A fire window includes glass, frame, hardware and anchors constructed and glazed to give protection against the passage of flame.

(54) FIRST FLOOR. The first floor is the primary floor used in determining the number of stories of a building.

(55) FLAME-SPREAD CLASSIFICATION. Flame-spread classification (FSC) is a comparative rating of the measure of flame-spread on a surface of a material or assembly as determined under conditions of tests and performance as specified in ASTM E-84.

(56) FLAME-SPREAD RATING. Refer to flame-spread classification.

(56a) FLOOR. The bottom or lower part of an enclosed space including any portions raised or depressed by not more than 3 feet from the designated principal level where the raised or depressed portion is treated architecturally as a part of the same principal level.

(57) FLOOR AREA. See "Area (net)."

(57a) FLOOR LEVEL. The upper surface of a floor treated architecturally as the designated principal floor at a given elevation.

(58) FOYER. An enclosed space and passageway into which aisles, corridors, stairways, or elevators may exit and from which the public has access to exits.

(59) FRONT YARD. See "Yard (front)."

(60) FUEL CONTRIBUTED CLASSIFICATION. Fuel contributed classification (FCC) is a comparative measure of the fuel contribution of a material or an assembly in the flame-spread test per ASTM E-84.

(61) FURNACE. A completely self-contained direct-fired, automatically controlled, vented appliance for heating air by transfer of heat of combustion through metal to the air and designed to supply heated air through ducts to spaces remote from the appliance location.

(62) FURNACE (DUCT). A suspended direct-fired heating appliance normally installed in air ducts. Air circulation is provided by a blower not furnished as part of the appliance.

*See Appendix A for further explanatory material.

(63) GRADE (AT BUILDING). Elevation of surface of paved or unpaved ground adjacent to wall of a building.

(64) GRADE (EXIT DISCHARGE). The elevation of finished exterior surface of paved or unpaved ground at any exit discharge doorsill.

(65) GRAVITY EXHAUST VENTILATION. See "Ventilation (gravity exhaust)."

(66) GROSS AREA. See "Area (gross)."

(67) GROUND FLOOR. A ground floor is that level of a building on a sloping or multilevel site which has its floor line at or not more than 3 feet above exit discharge grade for at least one-half of the required exit discharges.

(67a) HABITABLE ROOM.* Any room or enclosed floor space arranged for living and/or sleeping purposes.

(68) HAZARDOUS PIPING. See "Piping (hazardous)."

(69) HEATING SYSTEM. Any combination of building construction, machinery, devices or equipment, so proportioned, arranged, installed, operated, and maintained as to produce and deliver in place the required amount and character of heating service.

(70) HEIGHT (BUILDING). Height of a building is measured from the average of the exit discharge grade elevation of all required first story exits to the top of a level roof or to a point ½ of the distance between the intersection of the exterior wall surface (extended) with the roof surface, and the highest part of the roof but not to include penthouses.

Note: For exceptions to penthouses see definition "Stories, Number of."

(71) HOLLOW BONDED WALL. See "Wall (hollow bonded)."

(72) INNER COURT. See "Court (inner)."

(73) INNER LOT LINE COURT. See "Court (inner lot line)."

(74) INTAKE (OUTSIDE AIR). See "Outside Air Intake."

(75) INTERIOR BALCONY. See "Balcony (interior)."

(76) JACKETED STOVE. See "Stove (jacketed)."

(76a) LIVING UNIT. Any enclosed floor space consisting of one or more habitable rooms (with or without accessory rooms) used by a person(s) or family.

(77) LOBBY. An enclosed space into which aisles, corridors, stairways, elevators or foyer may exit and provides access to exits.

(78) LOT LINE. A legally established line dividing one lot, plot of land or parcel of land from an adjoining lot or plot of land or parcel of land.

*See Appendix A for further explanatory material.

(79) MAJOR APPARATUS. Central air-handling equipment supplying more than one occupancy or rooms and heat-producing equipment generating heat for the heating and ventilating system.

(80) MASONRY. A construction composed of separate units such as brick, block, hollow tile, stone or approved similar units or a combination thereof, laid up or built unit by unit and bonded by approved manner.

(81) MECHANICAL VENTILATION. See "Ventilation (mechanical)."

(82) MEZZANINE OR MEZZANINE FLOOR. An intermediate floor, either open or enclosed. Also see "Sories, Number of."

(83) NET AREA. See "Area (net)."

(84) NONBEARING WALL. Refer to "Wall (exterior)" or "Partition."

(85) NONCOMBUSTIBLE CONSTRUCTION. An assembly such as a wall, floor or roof having components of noncombustible material.

(86) NONCOMBUSTIBLE MATERIAL. A noncombustible material is one which, in the form in which it is used, meets one of the requirements (a), (b) or (c) listed below. Materials used adjacent to or in contact with heat-producing appliances, warm air ducts, plenums and chimneys shall be classified as noncombustible only on the basis of requirement (a). Noncombustible does not apply to the flame-spread characteristics of interior finish or trim materials. No material shall be classed as noncombustible building construction material which is subject to increase in combustibility or flame-spread classification (FSC) beyond the limits herein established through the effects of age, moisture or other atmospheric conditions.

Note: The federal trade commission does not consider ASTM E-84 as an accurate indicator of the performance of cellular plastics used in building construction under actual fire conditions, and that it is only valid as a measurement of the performance of such materials under specific, controlled test conditions. The 25 flame-spread rating is not intended to reflect hazards presented by such products under actual fire conditions. The federal trade commission considers that under actual fire conditions, such products, if allowed to remain exposed or unprotected, will under some circumstances produce rapid flame spread, quick flashover, toxic or flammable gases, dense smoke and intense and immediate heat and may present a serious fire hazard.

(a) Materials which pass the test procedure of ASTM E-136 for defining noncombustibility of elementary materials when exposed to a furnace temperature of 1,382° F. for a minimum period of 5 minutes, and do not cause a temperature rise of the surface or interior thermocouples in excess of 54° F. above the furnace air temperature at the beginning of the test and which do not flame after an exposure of 30 seconds.

(b) Materials having a structural base of noncombustible material as defined in paragraph (a), with a surfacing not more than ⅛ inch thick which has a flame-spread classification (FSC) not greater than 50 when tested in accordance with the method of test for surface burning characteristics of building materials (ASTM E-84).

*See Appendix A for further explanatory material.

(c) Materials other than defined in paragraphs (a) and (b), having a flame-spread classification (FSC) not greater than 25 without evidence of continued progressive combustion, and of such composition that surfaces that would be exposed by cutting through the material in any way would not have a flame-spread classification (FSC) greater than 25 when tested in accordance with the method of test for surface burning characteristics of building materials (ASTM E-84).

(87) OCCUPANCY OR USE. The purpose for which a building, structure, equipment, materials, or premises, or part thereof, is used or intended to be used as regulated in this code.

(88) OCCUPIED. Refers to any room or enclosure used by one or more persons for other than incidental maintenance.

(89) OPEN SPACES. Front (setback), rear and side yards, exit courts, outer courts, and outer lot line courts on the same property with a building as regulated by this code.

(90) OUTDOOR OPENINGS. May be doors, windows or skylights located in outside walls or roof and can be opened to provide natural ventilation to the occupied space.

(91) OUTER COURT. See "Court (outer)."

(92) OUTER LOT LINE COURT. See "Court (outer lot line)."

(93) OUTLET (SUPPLY OPENING). An opening, the sole purpose of which is to deliver air into any space to provide heating, ventilating or air conditioning.

(94) OUTSIDE AIR. Air that is taken from outside the building and is free from contamination of any kind in proportions detrimental to the health or comfort of the persons exposed to it.

(95) OUTSIDE AIR INTAKE. Includes the ducts and outdoor openings through which outside air is admitted to a ventilating, air conditioning or heating system.

(96) PANEL WALL. See "Wall (panel)."

(97) PARTITION. An interior nonbearing vertical element serving to enclose or divide an area, room or space.

(98) PARTY WALL. See "Wall (party)."

(99) PENTHOUSE. An enclosed or partially enclosed structure extending above the main roof of a building or structure and/or enclosing a stairway, tank, elevator, machinery, mechanical equipment or other apparatus and not used for human occupancy.

(100) PIER. An isolated column of masonry or concrete. A section of bearing wall not bonded on the sides into adjoining masonry shall be considered to be a pier when its horizontal dimension measured at right angles to the thickness does not exceed 4 times the thickness.

*See Appendix A for further explanatory material.

(101) PILASTER. A projection of masonry for the purpose of bearing concentrated loads, or to compensate for reduction of wall section by chases, openings or recesses, or for the purpose of stiffening the wall against lateral forces. (See also "Buttress.")

(102) PIPING (HAZARDOUS). Any service piping conveying oxygen, flammable liquids, flammable gases or toxic gases.

(102a) PLACE OF EMPLOYMENT. The term "place of employment" includes every place, whether indoors or out or underground and the premises appurtenant thereto where either temporarily or permanently any industry, trade or business is carried on, or where any process or operation, directly or indirectly related to any industry, trade or business, is carried on, and where any person is, directly or indirectly, employed by another for direct or indirect gain or profit, but does not include any place where persons are employed in (a) private domestic service which does not involve the use of mechanical power or (b) farming.

(103) PORCH. An unenclosed exterior structure at or near grade attached or adjacent to the exterior wall or any building, and having a roof and floor. (See also "Terrace" and "Balcony.")

(104) PROPERTY LINE. A legally established line dividing one lot, plot of land or parcel of land under one ownership from an adjoining lot or plot of land or parcel of land under another ownership.

(104a) PUBLIC BUILDING. The term "public building" means and includes any structure, including exterior parts of such building, such as a porch, exterior platform or steps providing means of ingress or egress, used in whole or in part as a place of resort, assemblage, lodging, trade, traffic, occupancy, or use by the public or by 3 or more tenants.

(105) PUBLIC THOROUGHFARE. Any legally established street or alley as defined herein.

(105a) REMODELING. To remodel and/or alter means to change any building or structure which affects the structural strength, fire hazard, internal circulation, or exits of the existing building or structure. This definition does not apply to maintenance, reroofing, or alterations to the heating and ventilating or electrical systems.

(106) REQUIRED. A term for mandatory use under the provisions of this code.

(106a) REQUIRED EXIT CORRIDOR. See "Corridor (Required Exit)."

(107) RESTRAINED SUPPORT. A flexural member where the supports and/or the adjacent construction provides complete or partial restraint against rotation of the ends of the member and/or partial restraint against horizontal displacement when subject to a gravity load and/or temperature change.

(108) RETAINING WALL. See "Wall (retaining)."

*See Appendix A for further explanatory material.

(109) RETURN (OR EXHAUST OPENING). Any opening, the sole purpose of which is to remove air from any space being heated, ventilated or air conditioned.

(110) ROADWAY. That portion of a public thoroughfare devoted to vehicular traffic, or that part included between curbs.

(111) ROOF. The structural cover of a building with a slope range bearing from horizontal to a maximum of 60 degrees to the horizontal.

(112) ROOF COVERING. Refers to the covering applied over the roof construction for the purpose of weather or fire resistance.

(113) ROOF COVERINGS (FIRE-RETARDANT). See "Fire-Retardant Roof Coverings."

(114) ROOM. A space within a building completely enclosed with walls, partitions, floor and ceiling, except for openings for light, ventilation, ingress and egress.

(115) SETBACK.* Refers to the open space between the property line or public thoroughfare and the nearest part of the building. Unenclosed terraces, slabs, or stoops without roofs or walls may project into this open space or setback.

(116) SHAFT. A vertical opening in a building extending through one or more stories and/or roof, other than an inner court.

(117) SHALL. A term for mandatory use under the provisions of this code.

(118) SIGNS. A structure that is intended, designed, or used for advertising, display, identification, announcements, or related purposes; this includes signs, screens, billboards, and other advertising devices of any type.

(119) SIMPLE SUPPORT. A flexural member where the supports and/or the adjacent construction allows free rotation of the ends of the member and horizontal displacement when subject to a gravity load and/or a temperature change.

(120) SPACE HEATER (GRAVITY OR CIRCULATING TYPE). A vented, self-contained free standing or wall recessed heating appliance using liquid or gas fuels. (Also see definition for "Stove (jacketed).")

(120a) STEP(S). Step(s) is a unit(s) consisting of one riser of not more than 7¾ inches and one tread of not less than 9½ inches, alone or in a series.

(121) STORIES, NUMBER OF.* The number of stories of a multistory building includes all stories except the basement(s), ground floor(s), attic or interior balcony(ies) and/or mezzanine floor(s). Also see Ind 51.02 (14).

(122) STORY. The space in a building between the surfaces of any floor and the floor next above or below, or roof next above, or any

*See Appendix A for further explanatory material.

space not defined as basement, ground floor, mezzanine, balcony, penthouse or attic. (Also see "Stories, Number of.")

(123) STOVE (JACKETED). A vented, self-contained free standing, non-recessed heating appliance using solid, liquid or gas fuels. The effective heating is dependent on a gravity flow of air circulation over the heat exchanger. (Also see definition for "Space Heater.")

(124) STREET. Any legally established public thoroughfare 30 feet or more in width whether designated or not by name or number such as avenue, boulevard, circle, court, drive, lane, place, road or way. All-weather hard-surfaced areas 30 feet or more in width and extending at least 50% of the length of that side of building and accessible to fire-fighting equipment will be acceptable in lieu of streets.

(125) STRUCTURE. A structure is an assembly of materials forming a construction for occupancy or use meeting the definition of place of employment or public building.

Note: Structures include, among others, buildings, stadiums, tents, reviewing stands, observation towers, radio and television towers, water tanks, piers, wharves, shelters, canopies, and display signs.

(126) SUPPORT (RESTRAINED). See "Restrained Support."

(127) SUPPORT (SIMPLE). See "Simple Support."

(128) TEMPERED AIR. Air transferred from heated area of building.

(129) TEMPERED OUTSIDE AIR. Outside air heated before distribution.

(130) TERRACE. An unenclosed exterior structure at or near grade having a paved, floored, or planted platform area adjacent to an entrance or to the exterior walls for a building or structure and having no roof.

(131) TREATED WOOD (FIRE-RETARDANT). See "Fire Retardant-Treated Wood."

(132) UNIT HEATER (HIGH STATIC PRESSURE TYPE). A direct-fired suspended or floor standing, self-contained, automatically controlled and vented, heating appliance having an integral means for circulation of air against 0.2 inch or greater static pressure.

(133) UNIT HEATER (LOW STATIC TYPE). A direct-fired suspended, self-contained automatically controlled, vented heating appliance, having integral means for circulation of air by means of a propellor fan or fans.

(134) VENEERED WALL. See "Wall (veneered)."

(135) VENTILATING SYSTEM (EXHAUST). Any combination of building construction, machinery, devices or equipment, designed and operated to remove harmful gases, dusts, fumes or vitiated air, from the breathing zone of employes and frequenters.

(136) VENTILATION. The process of supplying or removing air by natural or mechanical means, to or from any space.

*See Appendix A for further explanatory material.

(137) VENTILATION (GRAVITY EXHAUST). A process of removing air by natural means, the effectiveness depending on atmospheric condition, such as difference in relative density, difference in temperature or wind motion.

(138) VENTILATION (MECHANICAL). The process of supplying or removing air by power-driven fans or blowers.

(139) VERTICAL EXIT. A means of egress used for ascension or descension between 2 or more floors, or other levels, and shall include approved exterior stairways, automatic (moving) stairways, fire escapes, ramps, stairways, and smokeproof stair towers.

(139a) VOLUME (TOTAL). The "total volume" (cube or cubage) of a building is the actual cubic space enclosed within the outer surfaces of the outside or enclosing walls and contained between the outer surfaces of the roof and 6 inches below the finished surfaces of the lower floors. The volume of structures without enclosing walls (free-standing canopies, column-supported roofed shelters, etc.) will be computed by projecting imaginary vertical planes at the outer surface of the exterior columns and using such planes as the enclosing walls.

Note: The definition of total volume requires the cube of dormers, penthouses, vaults, pits, enclosed porches and other enclosed appendages to be included as a part of the cube of the building. It does not include the cube of courts or light shafts, open at the top, or the cube of outside steps, cornices, parapets, or open porches or loggias.

(140) WALL. A structural element which is vertical or within 30 degrees of vertical, serving to enclose space, form a division, or support superimposed weight.

(141) WALL (BEARING). Any wall which supports a load in addition to its own weight.

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

(143) WALL (CURTAIN). An exterior nonbearing wall.

(144) WALL (DIVISION).*

(a) *Building division.* A wall used for separation between 2 buildings on the same property identical in construction to a party wall.

(b) *Fire division.* A wall extending from the lowest floor level to or through the roof to restrict the spread of fire.

(145) WALL (EXTERIOR). Any outer enclosing wall of a building or structure.

(146) WALL (FRAMING). Wall framing shall include columns, studs, beams, girders, lintels and girts.

(147) WALL (HOLLOW BONDED). Wall built of masonry units with or without any air space within the wall, and in which the facing and backing of the wall are bonded together with masonry units.

*See Appendix A for further explanatory material.

(148) WALL (NONBEARING EXTERIOR). Wall which supports no vertical load other than its own weight.

(148a) WALL (NONBEARING INTERIOR). See "Partition."

(149) WALL (PANEL). An exterior nonbearing wall in skeleton construction.

(150) WALL (PARAPET). That part of a wall entirely above the roof line.

(151) WALL (PARTY).* Walls used for separation between 2 buildings on the property line between adjoining properties.

(152) WALL (RETAINING). Wall used to resist laterally imposed pressures.

(153) WALL (VENEERED). Wall having facing which is attached to the backing but not so bonded as to exert common action under load.

(153a) WAREHOUSE. A warehouse is a place adapted to the reception and storage of goods and merchandise.

(154) YARD (FRONT). An open, unoccupied space unobstructed to the sky, extending across the full width of a lot, or plot of land between the street line and the base of a front building wall. Unenclosed terraces, slabs or stoops without roofs or walls may project into this open space.

History: Cr. Register, June, 1972, No. 198, eff. 1-1-73; renum. (1) to be (1a), r. and recr. (10), (54), (67) and (121), cr. (1), (5a), (22a), (56a), (57a), (67a), (76a), (106a) and (148a), Register, September, 1973, No. 213, eff. 10-1-73; cr. (102a), (104a) and (105a), Register, December, 1974, No. 228, eff. 1-1-75; cr. (7a), (41a), (139a) and (153a) and am. (125), Register, December, 1976, No. 252, eff. 1-1-77; cr. (42a), (42b), (42c), (42d), and (120a), am. (139a), Register, December, 1977, No. 264, eff. 1-1-78.

Standards for Classes of Construction

Ind 51.015 Scope. This section covers minimum standards for common types of building designs currently being constructed. This section does not specifically include classification for uncommon building designs such as shells, domes, space frames, inflatable and similar types of designs. The standards contained herein shall be used as a guide for such uncommon building designs to achieve the degree of safety intended by these standards.

History: Cr. Register, June, 1972, No. 198, eff. 1-1-73; renum. Register, September, 1973, No. 213, eff. 10-1-73.

Ind 51.02 General requirements. (1) The fire-resistive ratings shown in "Classes of Construction" table 51.03-A are to satisfy the structural integrity end point for the time specified. For heat transmission end point requirements see subsection Ind 51.042 (5).

(2) Substitution of a building element fire-resistive rating will be permitted in any class of construction providing it is equal to or better than the required fire-resistive rating as specified in table 51.03-A.

*See Appendix A for further explanatory material.

(a) Construction requiring the use of noncombustible material shall not be replaced by combustible construction regardless of fire-resistive rating unless mentioned specifically under classes of construction standards.

(b) Noncombustible construction may be substituted for combustible construction provided the fire-resistive rating indicated in table 51.03-A is equal to or better than that noted for combustible construction.

(c) Fire-retardant treated wood exposed to high humidity or accelerated weathering shall be pressure impregnated and so identified. Subsequent to treatment, lumber 2 inches or less in thickness shall be dried to a moisture content of 19% or less, and plywood to a moisture content of 15% or less.

Note: The department will accept fire-retardant treated lumber and plywood which meet the standards of the American Wood Preservers Association, "Fire-Retardant Treatment by Pressure Processes," and ASTM D 2898, "Standard Methods of Test for Durability of Fire-Retardant Treatment of Wood."

(3) FLOOR FRAMING. (a) All floor framing shall satisfy the requirements of Table 51.03-A, whether floor system is considered part of a story or not, unless more restrictive requirements are noted under the occupancy chapters of this code.

(4) Exterior wall construction:

(a) All exterior walls which are in contact with the soil shall be of masonry or concrete.

(b) Exposed exterior walls between the first floor structural system and grade shall be of masonry or concrete except as follows:

1. Walls may be constructed of material other than masonry or concrete providing the following conditions are satisfied:

a. The construction shall meet the requirements of table 51.03-A for specified class of construction.

b. Any portion of exposed wall above grade and below the first floor structural system, when other than masonry or concrete, shall be counted as a story, and is also considered when determining height of wall.

(5) INTERIOR WALL CONSTRUCTION. (a) Openings in partitions and interior bearing walls shall be protected if such walls serve as required building division, fire division or fire separation walls.

1. Openings shall be protected by approved fire door or fire window assemblies as specified in section Ind 51.047 and 51.048, or fire damper or fire curtain door assemblies as specified in section Ind 64.42.

Note: Openings in walls other than those specified above need not be protected except to satisfy structural integrity end point for the time specified.

(6) Roof coverings, skylights and skydomes:

*See Appendix A for further explanatory material.

(a) There shall be no restriction in use of glass or other noncombustible material when satisfying minimum requirements for roof coverings.

(b) Where combustible plastic is used in roof openings it shall not exceed an area greater than 20% of the roof area except as permitted under occupancy sections.

1. No individual dome or group of domes or skylights shall exceed 100 square feet.

a. Domes or groups of domes or skylights shall be separated from each other by at least 8 feet laterally and 10 feet along the slope of the roof.

(7) Building locations:

(a) When the distance between buildings located on the same property is less than 10 feet, the following shall apply:

1. Where the combined gross area for these buildings is less than that allowable for one building the exterior wall shall satisfy minimum requirements listed for class of construction in table 51.03-A.

a. Buildings classified as wood frame under subsections Ind 51.03 (7) or (8) shall have exterior walls with a fire-resistive rating of not less than that required for these buildings when satisfying the 10 feet to 30 feet distance to property line shown in table 51.03-A.

2. Where the combined gross area for these buildings is greater than that allowable for one building, one of the opposing walls shall be not less than a 4-hour fire-resistive rated fire division wall or building division wall, whichever applies. Where buildings are of different classes of construction, the lesser allowable gross area shall apply.

(8) Interior balcony or mezzanine. Interior balconies or mezzanine floors shall have fire-resistive ratings as required for the story in which it is located.

(9) No pipes, wires, cables, ducts or other service equipment shall be imbedded lengthwise in the required fire-resistive protection of any structural member except as allowed in approved fire rated assemblies.

(10) Exposed exterior structural columns and framing. The required fire-resistive hourly rating may be omitted on noncombustible columns and framing when the building does not exceed 2 stories and the fire separation to the center of a street, or to the property line or buildings on the same property, is greater than 30 feet.

(11) Stairways, elevators and vertical shafts which serve 3 or more floor levels shall be enclosed with fire-resistive rated construction equal to or better than requirements specified in Table 51.03-A, except as exempted below:

(a) In buildings with 3 floor levels, the stairways in the upper 2 levels may be left open provided all stairways leading to the lowest

*See Appendix A for further explanatory material.

level are separated from the upper levels with fire-resistive rated construction as specified in Table 51.03-A or better.

(b) Conditions specified in sections Ind 55.09 (1) (a) and (b) as applied to a place of worship are acceptable.

(c) A building having 3 or more floor levels may have an open interior stairway or floor opening connecting any 2 adjacent floors providing:

1. The floors above and below said openings serve to cut off the openings at these floor levels.

a. The fire-resistive ratings of floors shall satisfy those specified in Table 51.03-A, but in no case shall the rating be less than one-hour combustible or noncombustible, whichever applies.

2. The open stairway between 2 floors is in addition to the required stairways and exit passageways specified in the occupancy chapters of this code.

3. The openings are not prohibited by the occupancy chapters of this code.

(12) PARAPET WALLS. (a) Parapet walls shall be provided on exterior walls closer than 10 feet to a property line or to other buildings on the same property except as exempted under Ind 51.02 (12) (a) 4, Wis. Adm. Code. Parapet walls shall satisfy the following requirements:

1. Parapets shall not be less than 2 feet in height.

2. The minimum thickness of masonry parapets shall be 8 inches.

3. Parapets shall have fire-resistive ratings as specified for exterior walls in Table 51.03-A.

4. Parapets are not required on exterior walls which front streets and alleys or where exterior walls connect with roofs of noncombustible construction.

(b) All parapet walls shall be properly coped with noncombustible weatherproof material.

(13) FIRE DIVISION WALLS. Fire division walls shall have not less than a 4-hour fire-resistive rating as specified in section Ind 51.04 and shall comply with one of the following conditions:

(a) The wall shall extend 3 feet above the roof.

(b) The wall shall connect and make tight contact with roof decks of at least 2-hour fire-resistive noncombustible construction on both sides of the wall.

(c) The wall shall connect and make tight contact with roofs of noncombustible construction on both sides of the walls, and the roofs shall be noncontinuous at the wall.

*See Appendix A for further explanatory material.

(14) DETERMINATION OF NUMBER OF STORIES.* For purposes of establishing the maximum allowable stories in the various classes of construction stated in section Ind 51.03, the number of stories shall be determined on the following basis:

(a) The first floor shall be determined first and this level shall satisfy the following conditions:

1. Is the lowest floor having one or more required exits for that floor and for any floor (s) above or below.

a. If condition stated in 1. is not satisfied, the highest floor level shall be considered the first floor.

2. The elevation of the first floor shall be at or not more than 6 feet above an exit discharge grade.

3. The door sill of all required exit discharges from the first floor shall be at or not more than 3 feet above exit discharge grade.

(b) An interior balcony or mezzanine floor which exceeds 25,000 square feet or one third (⅓), whichever is least, of the net area enclosed within exterior walls and/or fire division walls shall be counted as a story.

(c) Penthouse (s) with a total area that exceeds 50% of the total roof area shall be counted as a story (ies).

(d) Construction according to section Ind 51.02 (4) (b) 1. b. shall also be counted as a story (ies).

(e) Total number of stories shall include the first floor plus all stories above and those stories determined by sections Ind 51.02 (14) (b), (c) and (d).

1. Floor levels satisfying the definition of basement (s), ground floor (s), attic, interior balcony (ies) and/or mezzanine floor (s), unless otherwise stated, shall not be counted as a story (ies).

(15) DECORATIVE COMBUSTIBLE MATERIALS. Decorative combustible materials may be applied to all required noncombustible exterior surfaces of "0" hourly rated construction or better, up to a limit of 10% of the surface area within any 100 lineal feet of the building.

(18) ACCESS TO ATTIC AND ROOF. (a) *Attic.* Unless otherwise approved by the department, each individual attic compartment in all buildings must have access from the inside. The access opening shall be at least 20 by 30 inches and located above the stair landing in buildings of more than one story, or located in an accessible location in one-story buildings.

(b) *Roof.* Unless otherwise approved by the department, all buildings, or sections of buildings, of more than one story shall have a means of access to the main roof from the inside by a permanent ladder, or stairway, leading thereto from the uppermost floor. The roof opening shall be at least 20 by 30 inches. Access to the roof need not be provided if the roof has a slope greater than 6 in 12.

*See Appendix A for further explanatory material.

(19) ATTIC COMPARTMENTALIZATION. Attics of combustible construction, other than those above suspended ceilings, shall be divided into areas not greater than 3,200 square feet by firestopping as specified in section Ind 56.63 (1) (c).

History: Cr. Register, June, 1972, No. 198, eff. 1-1-73; r. (9) and (10), renum. (3) to be (4), (4), (5), (6), (7), (8) to be (6), (7), (8), (9), (10), am. (2) (a) cr. (3), (5), (11), (12), (13) and (14), Register, September, 1973, No. 213, eff. 10-1-73; am. (14) (d), Register, February, 1974, No. 218, eff. 3-1-74; r. and recr. (12) (a); am. (13) (c), Register, May, 1974, No. 221, eff. 6-1-74; cr. (11) (c) and (15), Register, July, 1974, No. 223, eff. 8-1-74; cr. (16) and (17), Register, December, 1974, No. 228, eff. 1-1-75; am. (5) (a) 1 and (14) (e) 1, cr. (18), Register, December, 1975, No. 240, eff. 1-1-76; am. (16) (b), Register, July, 1976, No. 247, eff. 8-1-76; cr. (2) (c), Register, December, 1976, No. 252, eff. 1-1-77; am. (15) and cr. (19), Register, December, 1977, No. 264, eff. 1-1-78; r. (16) and (17), Register, May, 1978, No. 269, eff. 7-1-78.

*See Appendix A for further explanatory material.

CLASSES OF CONSTRUCTION TABLE 51.03-A FIRE RESIST

	BUILDING ELEMENT	MODIFYING CONDITIONS			FIRE RESISTIVE TYPE A	FIRE RESISTIVE TYPE B
		NUMBER OF STORIES	SEE NOTES (f)(g) BLDG SETBACK DIS. TO P/L OR TO OTHER BLDG ON SAME PROP.	BEARING OR NON-BEARING	NO. 1	NO. 2
1.	INTERIOR SUPPORTS (COLUMNS, PIERS, FRAME LEGS, POSTS)	OVER 8 STORIES OR MORE THAN 85' IN HEIGHT			NC-4	NP
2.		8 STORIES OR 85' IN HEIGHT OR LESS			NC-3	NC-2
3.	FLOOR FRAMING (BEAMS, GIRDERS, JOISTS, SLABS, DECK)	MORE THAN 2 STORIES			NC-3	NC-2
4.		2 STORIES OR LESS			NC-2	NC-1
5.	ROOF FRAMING (TRUSSES, BEAMS, GIRDERS, JOISTS, FRAME RAFTERS, PURLINS, DECK)	OVER 8 STORIES OR MORE THAN 85' IN HEIGHT			NC-2	NP
6.		3 TO 8 STORIES OR 85' IN HEIGHT OR LESS			NC-2	NC-1 1/2
7.		2 STORIES, OR UNDER 35' IN HEIGHT			NC-1	NC-1
8.		1 STORY - ROOF FRAMING MORE THAN 20' ABOVE FL			NC-0	SEE IND. 51.03(2) NC-0
9.		1 STORY - ROOF FRAMING 20' OR LESS ABOVE FL			NC-1	NC-1
10.	ROOF COVERING	OVER 8 STORIES OR MORE THAN 85' IN HEIGHT			CLASS A	NP
11.		8 STORIES OR 85' IN HEIGHT OR LESS			CLASS A	CLASS A
12.	EXTERIOR WALLS & COURT WALLS (NOT INCLUDING INTERIOR FURRING ATTACHED TO INSIDE SURFACE OF WALL)		LESS THAN 10 FT.	BEARING	NC-4	NC-3
13.			10 FT. TO 30 FT. INCLUSIVE	BEARING	NC-3	NC-2
14.			OVER 30 FT.	BEARING	NC-2	NC-1
15.			LESS THAN 10 FT.	NON-BEARING	NC-2	NC-2
16.			10 FT. TO 30 FT. INCLUSIVE	NON-BEARING	NC-1	NC-1
17.			OVER 30 FT.	NON-BEARING	NC-0	NC-0
18.	INTERIOR WALLS BEARING				NC-3	NC-2
19.	PARTITIONS				NC-0	NC-0
20.	REQUIRED EXIT CORRIDOR ENCLOS.				NC-2	NC-2
21.	FIRE ENCLOSURE (STAIRWAYS, ELEVATORS, VERTICAL SHAFTS)	3 STORIES OR MORE / 3 OR MORE FLOOR LEVELS			NC-2	NC-2
22.	PENTHOUSE WALLS				NC-0	NC-0
23.	PENTHOUSE ROOF				NC-0	NC-0

KEY TO ABBREVIATIONS :

NC - NON COMBUSTIBLE
NP - NOT PERMITTED
H.T. - HEAVY TIMBER
P/L - PROPERTY LINE

KEY EXAMPLE TO READING CHART :

(a) SEE OCCUPANCY SECTIONS OF THE CODE FO
(b) ROOF COVERING SAME AS FOR MAIN BUILDING
(c) WALLS OF SOLID WOOD 4" IN THICKNESS ARE
(d) FIRE RESISTIVE REQUIREMENTS ALSO APPLY F
(e) REFER TO TABLE 51.03-B FOR ALLOWABLE AR
(f) FOR EXCEPTIONS REFER TO IND. 51.02
(g) SETBACKS AND DISTANCES TO P/L OR OTHER
(h) APPROVED FIRE-RETARDANT TREATED WOOD WILL BE ACCEPTED IN PLACE OF 3/4-HOUR F

IVE RATINGS IN HOURS (OR FRACTIONS THEREOF)

TYPES OF CONSTRUCTION						
METAL FRAME PROTECTED	HEAVY TIMBER	EXTERIOR MASONRY	METAL FRAME UNPROTECTED	WOOD FRAME PROTECTED	WOOD FRAME UNPROTECTED	APPLICABLE NOTES
NO. 3	NO. 4	NO. 5	NO. 6	NO. 7	NO. 8	SEE IND. 51.03 FOR CONSTRUCTION STANDARDS
NP	NP	NP	NP	NP	NP	ⓐⓓ
SEE IND. 51.03(3) NC-1	SEE IND. 51.03(4) H.T. OR 1	SEE IND. 51.03(5) 0	SEE IND. 51.03(6) NC-0	SEE IND. 51.03(7) 3/4	SEE IND. 51.03(8) 0	ⓐⓓⓗ
SEE IND. 51.03(3) NC-1	SEE IND. 51.03(4) H.T. OR 1	SEE IND. 51.03(5) 0	SEE IND. 51.03(6) NC-0	NP	NP	ⓐ
NC-1	SEE IND. 51.03(4) H.T. OR 1 1 STORY-H.T. OR 0	0	SEE IND. 51.03(6) NC-0	3/4	0	ⓐⓗ
NP	NP	NP	NP	NP	NP	ⓐ
SEE IND. 51.03(3) NC-1	SEE IND. 51.03(4) H.T. OR 1	SEE IND. 51.03(5) 0	SEE IND. 51.03(6) NC-0	NP	NP	ⓐ
NC-1	SEE IND. 51.03(4) H.T. OR 1	SEE IND. 51.03(5) 0	NC-0	SEE IND. 51.03(7) 3/4	0	ⓐⓗ
NC-0	SEE IND. 51.03(4) H.T. OR 1	0	0	0	0	ⓐ
NC-1	SEE IND. 51.03(4) H.T. OR 1	0	0	SEE IND. 51.03(7) 3/4	0	ⓐⓗ
NP	NP	NP	NP	NP	NP	ⓐ
CLASS A	CLASS B	CLASS B	CLASS C	CLASS C	CLASS C	ⓐ
NC-2	NC-2	NC-2	NC-2	NP	NP	ⓐⓓⓔⓕ
NC-3/4	1	NC-1	NC-0	3/4	0	ⓐⓒⓓⓔⓕⓗ
NC-0	1	NC-1	NC-0	3/4	0	ⓐⓒⓓⓔⓕⓗ
NC-1	NC-1	NC-1	NC-1	NP	NP	ⓐⓓⓔⓕ
NC-0	1	NC-1	NC-0	3/4	0	ⓐⓒⓓⓔⓕⓗ
NC-0	3/4	NC-0	NC-0	3/4	0	ⓐⓒⓓⓔⓕⓗ
NC-1	1	1	NC-0	3/4	0	ⓐⓗⓘ
NC-0	0	0	0	0	0	ⓐⓙ
NC-1	1	1	1	3/4	3/4	ⓐⓗ
NC-1	1	1	1	NP / 3/4	NP / 3/4	ⓐⓕ
NC-0	0	NC-0	0	0	0	ⓐ
NC-0	0	0	0	0	0	ⓐⓑ

) OTHER BASIC REQUIREMENTS AND MORE RESTRICTIVE LIMITATIONS.

ACCEPTABLE AS EQUAL TO ONE HOUR FIRE-RESISTIVE RATING.
OR THOSE BRACING MEMBERS REQUIRED FOR GRAVITY LOADING.
EAS FOR WINDOWS AND OTHER OPENINGS IN EXTERIOR WALLS.

BLDGS. ON SAME PROPERTY DO NOT APPLY TO P/L ALONG STREETS.
SATISFYING THE DEFINITION FOR "NONCOMBUSTIBLE" (IND. 51.01 (69)(C))
IRE-RESISTIVE RATINGS.
EARING WALLS, SEE SECTION IND. FLOR INTERIOR WALL

TABLE 51.03-B

MAXIMUM TOTAL ALLOWABLE AREA OF WINDOWS OR OTHER WALL OPENINGS IN PERCENT OF TOTAL EXPOSED EXTERIOR WALL SURFACE

Setback from Property Line, or Other Walls on Same Property[1]	Class of Construction				
	1. Fire-Resistive "A" 2. Fire-Resistive "B" 3. Metal Frame Protected 4. Heavy Timber 5. Exterior Masonry		6. Metal Frame Unprotected	7. Wood Frame Protected	8. Wood Frame Unprotected
	Bearing Wall	Nonbearing Wall			
Less than 5'	No Openings	No Openings	No Openings	Not Permitted	Not Permitted
5' to less than 10'	20%[2] Fire window rqd.[3]	30%[2] Fire window rqd.[3]	30%[2]	Not Permitted	Not Permitted
10' to less than 30'	30%[2]	40%[2]	40%[2]	40%[2]	40%[2]
30' or over	No Limit	No Limit	No Limit	No Limit	No Limit

[1] Does not apply to property lines along streets.

[2] Tabulated percentage of openings shall be applied to each 100 lineal feet of wall. This tabulation will not allow wing walls or high parapets, etc. to be used to increase exposed wall areas and thereby increase allowable total area of openings. Where openings are permitted, such openings protected with approved automatic-closing, 3-hour fire door or shutter assemblies—No Limit.

[3] Fire windows shall be as required for moderate fire exposure—see Ind 51.048.

History: Cr. Register, June, 1972, No. 198, eff. 1–1–73; am. table A, Register, September, 1973, No. 213, eff. 10–1–73; am. table B, Register, July, 1974, No. 223, eff. 8–1–74.

* See Appendix A for further explanatory material.

Ind 51.03 Classes of construction standards. (1) FIRE RESISTIVE TYPE A (NO. 1). (a) A building is of fire-resistive construction if all the walls, partitions, piers, columns, floors, ceilings, roof and stairs are built of noncombustible material, with a fire-resistive rating as specified in table 51.03-A.

1. Concealed draft openings in columns, walls and partitions shall be firestopped with noncombustible material at each floor level.

(b) All buildings of this classification shall not be restricted in height.

(c) Stairs and stair platforms shall be constructed of noncombustible material.

(d) Doors and windows may be of wood except as otherwise specified in section Ind 51.02 (5), Table 51.03-B, sections Ind 51.17, 51.18, 51.19 and 51.20, or in the occupancy chapters of this code.

1. Doors leading into main public corridors other than rated exit corridors shall be noncombustible or 20-minute fire door assemblies, or equivalent, unless otherwise specified above.

Note: Public corridors are intended to include principal corridors serving a floor and leading directly to building exits, but do not include communicating passageways within a given use area.

(e) Bays, oriels, and similar exterior projections from the walls shall be constructed of material with fire-resistive ratings as required for exterior walls.

(f) Mansards shall be of noncombustible construction.

1. The wall construction behind mansard shall extend to underside of roof deck and shall have a fire-resistive rating of not less than that specified for exterior walls in table 51.03-A.

(g) Penthouses and other roof structures shall have enclosing walls of noncombustible construction and roof framing and coverings shall be equal to that specified in table 51.03-A. Wood cooling towers are permitted.

(h) Wood may be used for finished floors, trim and wall paneling if open spaces behind the material are completely firestopped with noncombustible materials unless prohibited under the occupancy requirements of this code.

(i) Acoustical materials may be used on ceilings and walls provided they are noncombustible and the open spaces between furring on walls are completely firestopped with noncombustible material.

(j) In required fire-resistive floor and roof assemblies one electric outlet box, not exceeding 16 square inches in area, may be installed in such ceilings in each 90 square feet of ceiling area. Recessed electric fixtures shall have protection boxes built above the fixture, constructed of approved fire-resistant material of rating equal to that of

*See Appendix A for further explanatory material.

the ceiling, to cover the opening in case fixture is displaced. Duct openings in ceilings shall be protected by fire dampers.

(2) FIRE-RESISTIVE TYPE B (NO. 2). (a) A building is of fire-resistive construction if all the walls, partitions, piers, columns, floors, ceilings, roof and stairs are built of noncombustible material, with a fire-resistive rating as specified in table 51.03-A.

(b) All buildings of this classification shall not exceed a height of 85 feet, in which height there shall be not more than 8 stories.

(c) Roofs. Where roof framing is greater than 20 feet above the floor, or highest level of any balcony, roof decks may be:

1. Matched or splined wood roof decking of not less than 2 inches in nominal thickness; or

2. Solid lumber not less than 3 inches in nominal thickness, set on edge securely fastened together; or

3. Approved 1⅛ inch thick plywood with exterior glue, tongue and groove with all end joints staggered and butting on centers of beams spaced not over 4 feet apart; or

4. Other forms of roof decks, if of noncombustible material.

(d) Stairs and stair platforms shall be constructed of noncombustible material.

(e) Doors and windows may be of wood except as otherwise specified in section Ind 51.02 (5), Table 51.03-B, sections Ind 51.17, 51.18, 51.19 and 51.20, or in the occupancy chapters of this code.

1. Doors leading into main public corridors other than rated exit corridors shall be noncombustible or 20-minute fire door assemblies, or equivalent, unless otherwise specified above.

Note: Public corridors are intended to include principal corridors serving a floor and leading directly to building exits, but do not include communicating passageways within a given use area.

(f) Bays, oriels, and similar exterior projections from the walls shall be constructed of material with fire-resistive ratings as required for exterior walls.

(g) Mansards shall be of noncombustible construction.

1. The wall construction behind mansard shall extend to underside of roof deck and shall have a fire-resistive rating of not less than that specified for exterior walls in table 51.03-A.

(h) Penthouse and other roof structures shall have enclosing walls of noncombustible construction and roof framing and coverings shall be equal to that specified in table 51.03-A. Wood cooling towers are permitted.

(i) Wood may be used for finished floors, trim and wall paneling if open spaces behind the material are completely firestopped with

*See Appendix A for further explanatory material.

noncombustible materials unless prohibited under the occupancy requirements of this code.

(j) Acoustical materials may be used on ceilings and walls provided they are noncombustible and the open spaces between furring strips on walls are completely firestopped with noncombustible material.

(3) METAL FRAME—PROTECTED (NO. 3). (a) A building is of metal frame protected construction if the structural parts and enclosing walls are of metal, or metal in combination with other noncombustible materials, with time resistance ratings as set forth in table 51.03-A.

(b) All buildings of this classification shall not exceed a height of 75 feet, in which height there shall be not more than 4 stories.

(c) Stairs and stair platforms shall be constructed of noncombustible material.

(d) Bays, oriels and similar exterior projections from the walls shall be constructed of material with fire-resistive ratings not less than that specified for exterior walls in table 51.03-A.

(e) Mansards shall be of noncombustible construction.

1. The wall construction behind mansard shall extend to underside of roof deck and shall have a fire-resistive rating of not less than that specified for exterior walls in table 51.03-A.

(4) HEAVY TIMBER (NO. 4). (a) A building is of heavy timber construction if the structural frame consists of heavy timber or heavy timber in combination with metal, reinforced concrete or masonry. The structural and enclosing wall shall be as set forth in table 51.03-A.

(b) All buildings of this classification shall not exceed a height of 75 feet, in which height there shall be not more than 4 stories.

(c) Columns:

1. Wood columns shall be not less than 8 inches, nominal, in any dimension when supporting floor loads and not less than 6 inches, nominal, in least dimension and not less than 8 inches, nominal, in other dimension when supporting roof loads only.

2. All wood columns in the structural frame shall be superimposed, end to end, one above the other, and joined by metal or wood connectors.

Note: See structural chapter Ind 53 for design requirements.

(d) Floor framing:

1. Beams and girders of wood shall be not less than 6 inches, nominal, in any dimension and not less than 45 square inches in actual cross-sectional area.

2. Wood arches which support floor loads shall be not less than 8 inches, nominal, in any dimension.

*See Appendix A for further explanatory material.

3. Framed timber trusses supporting floor loads shall have members of not less than 8 inches, nominal, in any dimension.

4. Floor framing and structural framing of material other than wood shall have a fire-resistive protection of not less than one hour.

(e) Roof framing:

1. Beams and girders of wood shall be not less than 6 inches, nominal, in any dimension and not less than 45 square inches in actual cross-sectional area.

2. Wood arches, timber trusses, purlins and rafters for roof construction shall have members not less than 4 inches, nominal, in width and not less than 6 inches, nominal, in depth. Spaced members may be composed of 2 or more pieces not less than 3 inches, nominal, in thickness when blocked solidly throughout their intervening spaces or when such spaces are tightly closed by a continuous wood cover plate of not less than 2 inches, nominal, in thickness, secured to the underside of the members. Splice plates shall be not less than 3 inches, nominal, in thickness.

(f) Floors:

1. Wood floor construction shall be tongued and grooved, or splined lumber not less than 3 inches nominal thickness, or of solid lumber placed on edge and securely fastened together to make a floor not less than 4 inches, nominal, in thickness. A top layer of flooring of one inch nominal thickness shall be placed over all such floor construction.

(g) Stair construction may be of wood in buildings not exceeding 3 stories in height. In 4-story buildings, all stairs, platforms and stair construction shall be constructed of noncombustible material.

(h) Roofs. Roof decks shall be:

1. Matched or splined wood roof decking of not less than 2 inches in nominal thickness; or

2. Solid lumber not less than 3 inches in nominal thickness, set on edge securely fastened together; or

3. Approved 1⅛ inch thick plywood with exterior glue, tongue and groove with all end joints staggered and butting on centers of beams spaced not over 4 feet apart; or

4. Other forms of roof decks, if of noncombustible material.

(5) EXTERIOR MASONRY (NO. 5). (a) A building is of exterior masonry construction if all enclosing walls are constructed of masonry or reinforced concrete with fire-resistive ratings as set forth in table 51.03-A.

1. Exterior masonry walls shall extend to the underside of projecting roof rafters or joists or bearing points of beams and trusses.

*See Appendix A for further explanatory material.

2. Spaces between projecting rafters, joists, beams or trusses shall be firestopped with nominal 2-inch wood blocking or rigid noncombustible material to the underside of the roof decking.

(b) All buildings of this classification shall not exceed a height of 50 feet, in which height there shall be not more than 4 stories.

(c) The interior structural framing shall be metal, reinforced concrete, masonry or wood. Fire protection of metal or wood structural members may be omitted except that all such members supporting load-bearing masonry in all parts of buildings of more than one story shall be of metal, reinforced concrete or masonry with not less than one-hour fire-resistive protection of supporting metal.

(d) In walls where fire protection is required, the bottom of lower flange of lintels supporting load-bearing masonry shall be protected for openings exceeding 12-foot spans.

(e) Floors, roofs, partitions and stairs may be of wood but no joist, rafter, stud or stringer shall be less than 2 inches in nominal thickness.

(f) Bays, oriels and similar exterior projections from the walls shall be constructed of material with fire-resistive ratings as required for exterior walls.

(g) A mansard shall be constructed entirely of noncombustible material or fire-retardant treated wood satisfying the definition of "noncombustible" if it is subject to one of the following conditions:

1. If the mansard is closer than 20 feet to the adjoining property line or other building (s) on the same property.

2. If the vertical projected area of the mansard exceeds 30% of the area of the wall surface to which it is attached.

(h) Penthouses and other roof structures shall have enclosing walls of noncombustible construction and roof framing and coverings shall be equal to that specified in table 51.03-A.

(6) METAL FRAME—UNPROTECTED (NO. 6). (a) A building is of metal frame unprotected construction if the enclosing walls are of unprotected metal or unprotected metal in combination with other noncombustible materials and all building elements are as set forth in table 51.03-A unless otherwise exempted.

1. Heavy timber may be used for interior columns and floor framing.

2. Interior mezzanines and balconies within the first story may be constructed of one-hour fire-resistive construction.

3. Panels of combustible materials may be used in exterior walls requiring NC-O hour rating up to a limit of 10% of the surface area within any 100 lineal feet of the building. The bottom of the panels shall be at least 12 feet above grade.

*See Appendix A for further explanatory material.

(b) All buildings of this classification shall not exceed a height of 50 feet, in which height there shall be not more than 3 stories.

(c) Stairs and stair platforms may be of wood with stringers not less than 2 inches in nominal thickness.

(d) Bays, oriels and similar exterior projections from the walls shall be constructed of material with fire-resistive ratings not less than that specified for exterior walls in table 51.03-A.

(7) WOOD FRAME—PROTECTED (NO. 7). (a) A building is of wood frame protected construction if the structural parts and enclosing walls are of protected wood, or protected wood in combination with other materials, with fire-resistive ratings as set forth in table 51.03-A. If such enclosing walls are veneered, encased or faced with stone, brick, tile, concrete, plaster or metal, the building is also termed a wood frame protected building.

(b) All buildings of this classification shall not exceed a height of 40 feet, in which height there shall be not more than 2 stories.

(c) Floors, roofs, partitions and stairs may be of wood but no joist, rafter, stud or stringer shall be less than 2 inches in nominal thickness.

(d) The structural members supporting the finished ceiling in the topmost story shall be protected on the underside by fire-resistive material acceptable in systems approved for one-hour fire-resistive ratings as covered in section Ind 51.04.

(8) WOOD FRAME—UNPROTECTED (NO. 8). (a) A building is of wood frame unprotected construction if the structural parts and enclosing walls are of unprotected wood, or unprotected 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 wood frame unprotected building.

(b) All buildings of this classification shall not exceed a height of 35 feet, in which height there shall be not more than 2 stories.

(c) Floors, roofs, partitions and stairs may be of wood but no joist, rafter, stud or stringer shall be less than 2 inches in nominal thickness.

History: Cr. Register, June, 1972, No. 198, eff. 1-1-73; am. (1) (d), renum. (1) (e) 1. to be (f), (1) (f) 1. a. to be (1) (f) 1., (1) (f) (g) (h) (i) to be (1) (g) (h) (i) (j), (2) (f) 1. to be (2) (g), (2) (g) 1. a. to be (2) (g) 1., (2) (g) (h) (i) to be (2) (h) (i) (j), (3) (d) 1. to be (e), (3) (e) 1. a. to (3) (e) 1., (7) (b) to be (c), (7) (c) to be (b), am. (2) (e), r. (4) (e) 3., r. and recr. (6) (a), cr. (7) (d), Register, September, 1973, No. 213, eff. 10-1-73; r. and recr. (6) (a), Register, May, 1974, No. 221, eff. 6-1-74; cr. (5) (a) 1. and 2.; am. (5) (f) and r. and recr. (5) (g), Register, July, 1974, No. 223, eff. 8-1-74; am. (1) (d) 1. and (2) (e) 1., Register, December, 1974, No. 228, eff. 1-1-75; cr. (6) (a) 3, Register, December, 1977, No. 264, eff. 1-1-78.

*See Appendix A for further explanatory material.

Fire-Resistive Standards for Materials of Construction

Ind 51.04 Scope. This section shall include standards applicable to various types of fire-resistive construction. Requirements established herein are considered minimum safety standards and will not necessarily result in the most advantageous insurance rates.

History: Cr. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71 and recr. eff. 1-1-72, Register, July, 1971, No. 187.

Ind 51.042 General requirements. (1) Construction details and quality of material used for these systems must be those used by the testing laboratory for the test, and/or those dictated by good construction practice.

(2) Connection of structural members. (a) The minimum fire-resistive protection of a connection shall be equal to the maximum required for the members to which it is attached.

(3) For structural components with a fire-resistive rating obtained by test with restrained ends, the supporting structure shall be designed to provide for this restraint.

(4) ASTM standard methods of test. (a) All products manufactured and tested according to ASTM standard methods prior to effective dates of standards specified in "Fire-Resistive Standards for Materials of Construction" shall be accepted unless the ASTM standard method used in the test is judged to be inadequate in comparison with the currently adopted standard method.

(5)* The heat transmission requirements of ASTM E-119 (25b), with the exception of high hazard areas, penal and health care facilities and warehouses for combustible materials, may be reduced to one-half (½) of the hourly rating required by this code, but not less than one hour.

Note: For ASTM E-119 Standard adopted see Ind 51.25 (49).

(a) The fire-resistive rating for structural integrity required by this code shall be maintained where the heat transmission criteria has been reduced.

(6) The use of fire-resistive protection implies consent by owner to maintain material in a serviceable condition. Where this protection is concealed, provisions shall be made for periodic visual inspection of the structural insulating material at each story.

Note: Definition of owner—see 101.01 (2) (i), Wis. Stats.

History: Cr. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71, and recr. eff. 1-1-72, Register, July, 1971, No. 187.

Ind 51.043 Approved rating methods. (1) Ratings of fire-resistive assemblies shall be determined by one of the following methods:

(a) Test by approved testing laboratories (see Ind 51.044).

*See Appendix A for further explanatory material.

(b) Typical examples as listed in this code in lieu of approved test (see Ind 51.045).

(c) Approved method of calculation in lieu of approved test (see Ind 51.046).

History: Cr. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71, and recr. eff. 1-1-72, Register, July, 1971, No. 187.

Ind 51.044 Approved testing laboratories. (1) Fire rating tests conducted according to table 1 listed ASTM standards shall be acceptable if conducted by the recognized testing laboratory for referenced test.

Note: Other testing laboratories will be recognized as an approved agency if accepted in writing by the department.

TABLE 1

Name of Recognized Laboratories	ASTM Standard Tests					
	E-84	E-108	E-119	E-136	E-152	E-163
Forest Prod. Lab., Madison, Wis.*	—	—	X	—	X	—
Nat'l. Bureau of St'd., Washington, D.C.	—	—	X	X	—	—
Ohio State Univ., Columbus, Ohio	—	—	X	X	X	X
Portland Cement Assoc., Skokie, Ill.	—	—	X	—	—	—
Southwest Research Inst., San Antonio, Tex.	X	—	—	—	—	—
Underwriters' Lab., Inc., Chicago, Ill.	X	X	X	—	X	X
Underwriters' Lab., Inc., Scarborough, Ont., Canada	X	X	X	X	X	X
Univ. of Calif., Berkeley, Calif.	—	X	X	—	—	X
U.S. Testing Co., Hoboken, N.J.	—	X	X	—	—	X

*Note: Reference based on research and development data. Facility is not available for conducting routine rating tests.

Note: For column identification and specific standards adopted, see sections Ind 51.25 (47)-(50) and (52)-(53).

History: Cr. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71, and recr. eff. 1-1-72, Register, July, 1971, No. 187; am. Register, December, 1977, No. 264, eff. 1-1-78.

Ind 51.045 Typical examples of fire-resistive structural components. (1) Basic design and construction for specified fire-resistive protection of structural components listed in table 2, including references (a) through (p), shall be acceptable.

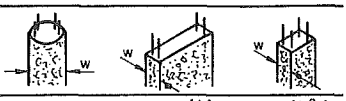
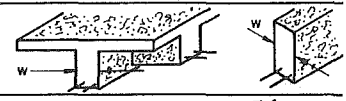
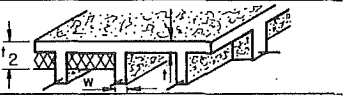
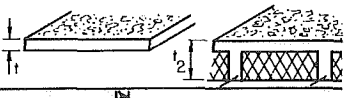
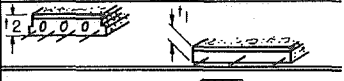
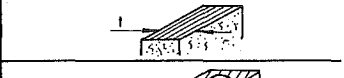
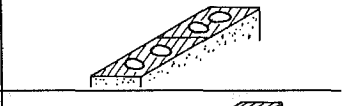
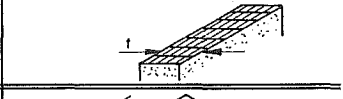
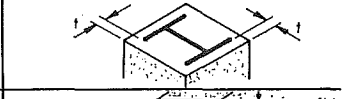
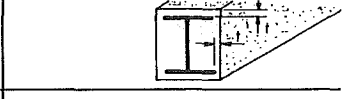
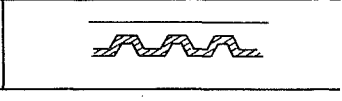
Note: The following table is based on performance, interpretation of various test data and/or data from ASTM E-119 test (see table 2).

(a) Types of concrete. 1. Type I—normal weight concrete with limestone, calcareous gravel and air-cooled slag aggregate.

2. Type II—normal weight concrete with siliceous gravel, granite or quartz aggregate containing more than 40% quartz, chert or flint. Values given for type I apply except where values are tabulated for type II.

*See Appendix A for further explanatory material.

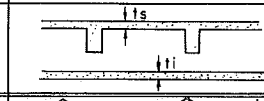
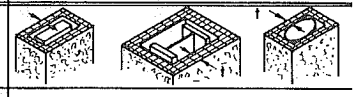
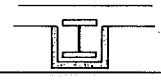
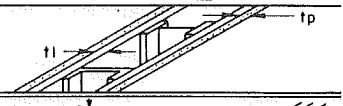
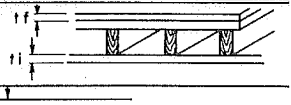
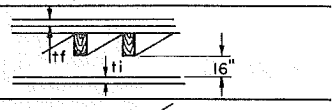
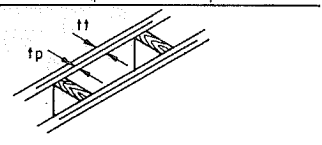
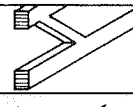
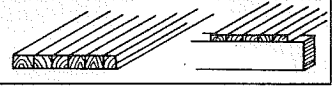
TYPICAL EXAMPLES OF FIRE RESISTIVE

TYPE OF CONSTRUCTION		ROW NO.	STRUCTURAL COMPONENTS	SKETCHES
COMPONENTS WITHOUT APPLIED PROTECTION	CONCRETE CAST IN PLACE AND PRECAST MILD STEEL REINF.	1.	COLUMNS	
		2.	GIRDERS AND BEAMS	
		3.	JOISTS & WAFFLES WITHOUT FILLERS OR PARTIAL FILLERS OF TYPE I OR II MASONRY OR CLAY TILE	
		4.	SLABS OR JOISTS & WAFFLES WITH TYPE I OR II MASONRY OR CLAY TILE FILLER	
		5.	WALLS AND PARTITIONS BR'G. & NON-BR'G.	
	CONCRETE PRECAST & CAST IN PLACE POSTTENSION OR PRETENSIONED SIMPLE SPAN	6.	GIRDERS AND BEAMS	
		7.	JOISTS AND WAFFLES	
		8.	SINGLE TEE	
		9.	MULTI-TEE UNITS	
		10.	SOLID & CORED SLABS	
	MASONRY BEARING AND NON BEARING	11.	UNREINFORCED CONCRETE WALLS & PARTITIONS	
		12.	HOLLOW MASONRY WALLS & PARTITIONS...BLOCK TILE CORED BRICKS CAVITY WALLS	
		13.	SOLID MASONRY BRICK BLOCK...CLAY TILE WITH LESS THAN 25% VOIDS OR WITH THE CORES FILLED	
COMPONENTS WITH DIRECT APPLIED PROTECTION	STEEL	14.	COLUMNS	
		15.	GIRDERS...BEAMS...TRUSSES	
		16.	COLUMNS...BEAMS...GIRDERS...TRUSSES...JOISTS & STEEL FLOOR UNITS	

STRUCTURAL COMPONENTS, TABLE 2

INSULATING MATERIAL	DESCRIPTION	MINIMUM REQUIREMENTS											
		4 HR.			3 HR.			2 HR.			1 HR		
CONCRETE TYPE I II & III (a) (b)	REINF. COVER	I 2	II 2	III 2	I 2	II 2	III 2	I 1½	II 1½	III 1½	I 1½	II 1½	III 1½
	MIN. DIM. & AREA—SQ. IN.	12-144			10-120			8-64			6-48		
CONCRETE TYPE I II & III (a) (b) (n)	REINF. COVER	2	2	2	1½	1½	1½	1½	1½	1½	1	1	1
	WIDTH (w)	8	8	8	8	8	8	6	6	4	4	4	4
CONCRETE TYPE I II & III (a) (b) (c) (d) (e) (h) (n)	REINF. COVER	1	1	1	1	1	1	¾	¾	¾	¾	¾	¾
	WIDTH WEB (w)	6	6	6	5	5	5	4	4	4	4	4	4
	TH. TOP SLAB (t)	6¾	7	5½	5¾	6¼	4¾	4¾	5	3¾	3¼	3½	2¾
CONCRETE TYPE I II & III (a) (b) (c) (d) (e) (h) (n)	REINF. COVER	1	1	1	1	1	1	¾	¾	¾	¾	¾	¾
	TOP SLAB (t)	6¾	7	5½	5¾	6¼	4¾	4¾	5	3¾	3¼	3½	2¾
CONCRETE TYPE I II & III (d) (b) (e)	REINF. COVER	1	1	1	1	1	1	¾	¾	¾	¾	¾	¾
	THICKNESS (t)	6	6½	5	5	5½	4½	4	4½	4	3	3	3
CONCRETE TYPE I II & III (a) (b) (k)	AVE. COVER (w)	I & II 3½ 11		III 3 10	I & II 3 9½		III 2¾ 8	I & II 2½ 7		III 2 6¼	I & II 1¾ 4		III 1¾ 4
CONCRETE TYPE I II & III (a) (b) (c) (d) (e) (k)	AVE. COVER AVE. WEB TH. (w) SLAB TH. (t)	3½ 11 6¾	7	3 10 5½	3 9½ 5¾	6	2¾ 8 4¾	2½ 7 4¾	5	2 6¼ 3¾	1¾ 4 3¼	3½	1¾ 4 2¾
CONCRETE TYPE I II & III (a) (b) (c) (d) (e) (k)	AVE. COVER AVE. WED TH. (w) TOP THICK'S (t)	2¾ 8 6¾	7	2¾ 8 5½	1¾ 8 5¾	6	1¾ 8 4¾	1¾ 8 4¾	5	1¾ 8 3¾	1¾ 4 3¼	3½	1¾ 4 2¾
CONCRETE TYPE I II & III (a) (b) (c) (d) (e) (k)	AVE. COVER AVE. WEB TH. (w) TOP THICK'S (t)	BY TEST OR LISTING BY APPROVED TESTING LAB.						2 4 4¾	4 5	1¾ 4 3¾	1¾ 2½ 3¼	1½ 2½ 3½	1½ 2½ 2¾
CONCRETE TYPE I II & III (a) (b) (c) (d) (e) (h) (k)	t_1 OR t_2 AVE. COVER	6¾ 7 2½		5½ 2¼	5¾ 6 2		4 1¾	4¾ 5 1¾		3¾ 1½	3¼ 3½ 1		2¾ 1
CONCRETE TYPE I II & III (d) (m)	WALL TH. (t)	6	6½	5	5	5½	4½	4	4½	4	3	3	3
MASONRY TYPE I	EQUIV. THICK'S.	6.7			5.7			4.5			3.0		
MASONRY TYPE II (f) (g) (m)	EQUIV. THICK'S.	5.7			4.8			3.8			2.6		
MASONRY TYPE I & II CLAY, SHALE, CONCRETE, SAND OR LIME (m)	WALL TH. (t)	10"			8"			6"			4"		
CONCRETE TYPE I II & III (a) (p)	THICKNESS OF (t) PROTECTION	I 2	II 2½	III	I 1½	II 2	III	I 1	II 1½	III	I 1	II 1	III
SOLID MASONRY (i)		3¾	3¾		3¾	3¾		2¼	2¼		2¼	2¼	
CONCRETE TYPE I II & III (a) (p)	THICKNESS OF (t) PROTECTION	I 2	II 2½	III	I 1½	II 2	III	I 1	II 1½	III	I 1	II 1	III
SPRAYED FIBER...CEMENTITIOUS MIXTURE... INTUMESCENT PAINTS		BY TESTS...OR LISTING BY APPROVED TESTING LAB.											

TYPICAL EXAMPLES OF FIRE RESISTIVE STR

TYPE OF CONSTRUCTION		ROW NO.	STRUCTURAL COMPONENTS	SKETCHES
COMPONENTS WITH SUSPENDED OR ATTACHED PROTECTION	CONC.	17.	CONCRETE JOISTS OR WAFFLE	
	STEEL FRAMING	18.	STEEL COLUMNS	
		19.	STEEL GIRDERS... BEAMS... TRUSSES...JOISTS, COLUMNS INDIVIDUALLY PROTECTED	
		20.	STEEL BEAMS, GIRDERS, TRUSSES & JOISTS...W/CEILING PROTECTION & MINIMUM 2 1/2" TH. TYPE I, II OR III CONCRETE SLAB ⓐ ⓒ ⓓ	
		21.	STEEL STUD PARTITION NON BEARING	
	COMBUSTIBLE CONSTRUCTION	22.	WOOD JOISTS MIN. 2" X 10", WOOD FLOOR ATTACHED CEILING	
		23.	WOOD JOISTS MIN. 2" X 10", WOOD FLOOR SUSPENDED CEILING	
		24.	WOOD STUD PARTITION MIN. 2" X 4" STUD	
				ⓛ HEAVY T
HEAVY TIMBER SOLID OR LAMINATED		25.	COLUMNS	
		26.	GIRDERS & BEAMS	
		27.	ARCH & TRUSS FOR ROOF ONLY	
		28.	FLOOR & ROOF DECK	

RUCTURAL COMPONENTS, TABLE 2 (CON'T.)

INSULATING MATERIAL	DESCRIPTION	MINIMUM REQUIREMENTS 4 HR.	3 HR.	2 HR.	1 HR.
ⓐ ⓒ ⓓ CONCRETE TYPE I, II OR III 3/4" COVER	t_s THICK OF SLAB	3"	2"		
VERMICULITE...GYPSUM...OR PERLITE GYPSUM ON METAL LATH	t_i THICK OF INSULATION	1"	3/4"		
TYPE I & II MASONRY ⓕ 1 1/2" AIR SPACE ⓙ	THICK OF INSULATION	4" SOLID			
SPRAYED FIBRE...CEMENTITIOUS MIXTURE...LATH & PLASTER		BY TESTS...OR APPROVED TESTING LAB.		LISTING	BY
SPRAYED FIBRE...CEMENTITIOUS MIXTURE...LATH & PLASTER ACOUSTICAL TILE		BY TESTS...OR APPROVED TESTING LAB.		LISTING	BY
GYPSUM...PERLITE PLASTER ON PERFORATED GYP. LATH...2 1/2" STUD	t_p PLASTER t_l LATH			3/4" / 3/8"	1/2" / 3/8"
GYPSUM WALL BOARD...3 5/8" STUD	NO. LAYERS THICK. EACH			TWO 5/8"	ONE 5/8"
GYPSUM WALLBRD BELOW 2-2"x10"s 4'-0" c, 1-1/8" PLYWOOD FLOORING OR GYPSUM WALLBRD BELOW 2"x10"s 16" c 1/2" PLYWOOD OR 1"x6" T&G SUB-FLR'G	t_i INSUL. t_f FLOORING				5/8" 5/8" PLYWD OR 1"x3" T&G
NONCOMBUSTIBLE ACOUSTICAL TILE BELOW 2"x10"s 16" c 5/8" PLYWOOD OR 1"x4" T&G SUB-FLR'G	t_i INSUL. t_f FLOORING				5/8" 1/2" PLYWD OR 1"x6" T&G
GYPSUM WALLBOARD	NO. LAYERS / TH. OF EACH			TWO 5/8"	TWO 3/8"
GYPSUM PERLITE PLASTER ON 3/8" GYPSUM LATH	t_p			"PLASTER W/1" HEX. MESH	9/16"
GYPSUM & SAND PLASTER ON U.L. LISTED WIRE LATH	t_t				3/4"
GYPSUM & VERMICULITE PLASTER ON METAL LATH	t_t				3/4"

IMBER CONSTRUCTION TABLE

WOOD ALL SPECIES	FLOOR...WIDTH X DEPTH MIN. NOM. ROOF...WIDTH X DEPTH MIN. NOM.				8" X 8" 6" X 8"
WOOD ALL SPECIES	MIN. WIDTH X DEPTH (NOM.)				6" X 10"
WOOD ALL SPECIES	MIN. WIDTH X DEPTH EACH MEMBER				4" X 6"
WOOD ALL SPECIES	ROOF FLOOR				2" T & G. OR 3" SOLID 3" T & G. + 1" T & G. OR 4" SOLID

3. Type III—lightweight aggregate with expanded slag, shale or clay aggregate. Includes sanded—lightweight concretes not over 115 lbs. per cu. ft. oven-dried density.

(b) Cover on reinforcing steel is for sides and bottoms. Where tensile reinforcing elements have different cover, the tabulated cover is the average of the minimum values of the individual elements. The cover of an individual element shall not be less than ½ the tabulated value. Top cover to be a minimum of ¾ inch.

(c) For the heat transmission requirements of floor and roof construction, the thickness of the top slab may be reduced if noncombustible insulation is directly applied to either side of the slab and provided the U-factor is equaled or reduced.

(d) The thickness of top slab is in accordance with ASTM E-119 heat transmission requirements. For variations in thickness of top slab see section Ind 51.042 (5).

Note: For ASTM E-119 standard adopted see Ind 51.25 (49).

(e) Longitudinal joints between individual precast floor or roof units, or individual wall units shall be installed as tested or shall be grouted solid for the thickness required by the fire-resistive rating. Noncombustible insulation may be substituted for the grout if the U-factor is equaled or reduced providing the integrity of insulation remains as installed. The topping used in floor or roof units may be included.

(f) Type I Hollow Masonry is a masonry with calcareous or siliceous aggregate having an oven-dried density exceeding 115 pounds per cubic foot. Type II Hollow Masonry is a masonry with expanded slag, clay, shale or pumice aggregate having an oven-dried density of 115 pounds or less per cubic foot.

(g) Equivalent thickness = $\frac{\text{Total volume minus volume of voids}}{\text{length times height}}$

(h) t_2-equivalent thickness = $\frac{\text{Total conc. area minus area of void}}{\text{width}}$

(i) Clay, shale, concrete or sand lime—with less than 25% voids or with all spaces filled.

(j) 1½ inch space between column and masonry unit—no fill required.

(k) For restrained conditions, thickness of fire protection may be reduced if substantiated by test data or calculation method.

(l) Elements with this minimum size are recognized for heavy timber construction, acceptable for certain buildings in lieu of one hour noncombustible construction.

(m) Where combustible members are framed into a wall, the wall shall be of such thickness or be so constructed that the fire barrier

*See Appendix A for further explanatory material.

between the member and the opposite face of the wall, or between adjacent members set in from opposite sides will be 93% of the equivalent thickness shown in table 2.

(n) Cover thickness on reinforcing steel as indicated is based on continuity of system. For simple span conditions increase cover thickness by 50%.

(p) Wire mesh reinforced and with a minimum area of 0.015 inches square per foot of length or equivalent.

History: Cr. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71, and recr. eff. 1-1-72, Register, July, 1971, No. 187; am. (1) (f), Register, March, 1972, No. 195, eff. 4-1-72.

Ind 51.046 Calculation method. (1) The rational design of structural members for fire resistance shall be submitted to the department and shall be based on the type of span (simple or restrained), the magnitude of longitudinal restraint, accepted structural engineering principles and methods.

(a) Appropriate research data and design criteria to substantiate the method, interpreting between known information, shall accompany the above material and shall include:

1. Time—temperature relationship ASTM E-119.

2. The temperature—strength characteristics of the structural components.

3. The time—temperature characteristics of the insulating material, at temperature range designated by ASTM E-119.

4. The expansion characteristics of the materials comprising the member, at the temperature range designated by ASTM E-119.

Note: 1. For ASTM E-119 standard adopted see Ind 51.25 (49).

2. The department will accept published research data from Portland Cement Association, American Iron & Steel Institute, and American Institute of Steel Construction, Inc.

5. The safety factor of not less than 1.0 shall be maintained at the end of the time requirement for the full design live and dead load.

History: Cr. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71, and recr. eff. 1-1-72, Register, July, 1971, No. 187.

Ind 51.047 Fire-rated door assemblies in fire-rated construction. (1) FIRE-RATED DOOR ASSEMBLIES. Door openings, where permitted in fire-rated walls, shall be protected with fire-rated door assemblies in accordance with the following table. Fire-rated door assemblies shall be tested in accordance with ASTM E-152 standard method [Ind 51.25 (52)].

*See Appendix A for further explanatory material.

Fire-resistive Rating of Wall (in hours)	Minimum Fire-resistive Rating of Required Fire Door Assembly (in hours)
4-hour	3-hour
3-hour	3-hour
2-hour	1½-hour
1-hour	¾-hour
¾-hour	¾-hour

(a) Doors leading to fire escapes, except doors leading to Class A fire escapes in apartments and row houses, shall be at least ¾-hour fire-rated door assemblies.

(b) Where the occupancy chapters of this code permit, 20-minute fire-rated door assemblies, or equivalent, may be provided, without a closing device.

(2) LABELS. Fire-rated door assemblies shall be labeled with a permanent label, securely attached and located to permit visual inspection after installation. The label shall identify the time rating, testing laboratory, listing agency and manufacturer.

(3) INSTALLATION OF FIRE-RATED DOORS. The fire-rated door assemblies shall be installed with frame, hinges, latches, closing devices and counterweights in accordance with methods and standards approved by the department. Adequate clearance shall be maintained to permit free operation of fire-rated doors.

Note #1: The department will accept recommended practices for installation covered in "Standard for Fire Doors and Windows," NFPA No. 80.

Note #2: See Section Ind 51.15 for exit door requirements.

(4) SECURING DOOR FRAMES. Methods of securing door frames to adjacent construction shall be illustrated on the plans submitted to the department for review.

(5) DOOR CLEARANCES. The maximum swinging-door clearances to frame shall be ⅛ inch on sides and top and ¾ inch at bottom between sill or floor.

(6) DOOR CLOSING DEVICES. All labeled fire-rated doors, where required, shall be equipped with an approved automatic or self-closing device as defined in section Ind 51.01 (17).

(a) All doors serving smokeproof towers and interior enclosed stairways shall be equipped with a self-closing device or an automatic closing device actuated by products of combustion or smoke density.

Note: The department will accept detectors installed in accordance with the Standard on Automatic Fire Detectors, NFPA No. 72-E [Ind 51.27 (7a)].

(b) The requirements of section Ind 51.047 (6) (a) shall also be retroactive to existing buildings.

*See Appendix A for further explanatory material.

(c) Doors provided with a self-closing device shall remain in a closed position.

Note: The intent of this rule is to accept normal usage of the door, but not permit doors with this closing device to be blocked open at any time.

(d) Where a pilot weight is used, it shall be suspended from a chain or wire cable, and shall be installed in a protective housing.

Note: For specific types of closing devices permitted, please refer to the sections dealing with classes of construction and/or the occupancy chapters.

History: Cr. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71 and recr. eff. 1-1-72, Register, July, 1971, No. 187; am. (1) (intro.), r. and recr. (1) (a) 1., Register, September, 1973, No. 213, eff. 10-1-73; cr. (1) (a) 1. e., Register, December, 1974, No. 228, eff. 1-1-75; r. and recr., Register, December, 1975, No. 240, eff. 1-1-76; r. and recr. (6), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 51.048 Fire window and glass block assemblies in fire-rated construction. (1) WINDOW OPENINGS. Window openings, where permitted in fire-rated walls, shall be protected with fire window or glass block assemblies rated as ¾-hour by an approved laboratory and tested in accordance with ASTM E-163 standard method [Ind 51.25 (53)].

(2) SIZE. (a) *Fire window assemblies.* The size of the wired glass and frame assembly shall not exceed the size tested. Windows combined in multiple assemblies shall be separated by approved nonbearing metal mullions.

Note: Fire windows have been classified for either moderate or light fire exposure. For moderate fire exposure, the individual glass size is limited to 720 square inches. (Size limitation either 48 inches maximum width or 54 inches maximum height.) For light fire exposure, the individual glass size is limited to 1,296 square inches. (Size limitations either 54 inches maximum width or 54 inches maximum height.) Please refer to sections for classes of construction and/or occupancy chapters for fire window classifications.

(b) *Glass block assemblies.* Openings for glass block assemblies shall not exceed 120 square feet in area. The width or height of the opening shall not exceed 12 feet.

Note: Openings for glass block assemblies are classified for light fire exposure.

(3) MATERIALS AND INSTALLATION. (a) *Frames.* Approved metal frames shall be securely fastened to the construction and be capable of resisting all wind stresses and other stresses to which they are likely to be subjected.

(b) *Wired glass.* The wired glass shall be labeled wired glass, ¼-inch thick, and shall be well bedded in approved glazing compound. All exposed joints between the metal shall be struck and pointed. The clearance between the edges of the glass and metal framing shall not exceed ⅛ inch.

(c) *Glass block.* Glass block assemblies shall be installed according to the details of the tested assembly.

Note: The department will accept recommended practices for installation covered in "Standard for Fire Doors and Windows," NFPA No. 80.

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*See Appendix A for further explanatory material.

(4) LABELS. Fire window assemblies shall be labeled with a permanent label, securely attached and located to permit visual inspection after installation. The label shall identify the time rating, testing laboratory, listing agency and manufacturer. Glass block shall be listed by an approved laboratory.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76.

Ind 51.049 Miscellaneous openings in fire-rated construction. (1) SERVICE OPENINGS. Openings around ducts, pipes, conduit or other service installations penetrating required fire-resistive rated floor, wall and roof assemblies shall be filled solidly with material of fire-resistive rating equal to the required rating of assembly penetrated.

(2) FIRE DAMPERS. Duct openings in required fire-resistive rated floor and wall assemblies shall be protected as specified under section Ind 64.42.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76.

Ind 51.050 Roof coverings. (1) Roof coverings of class A, B, C or unclassified shall be provided as specified under "Classes of Construction" or under the specific occupancy requirements.

Note: Brick, concrete, tile, slate, ferrous and cupreous metals and their alloys will be accepted as "Class A" roof coverings.

History: Cr. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71, and recr. eff. 1-1-72, Register, July, 1971, No. 187; renum. from 51.048 to be 51.050, Register, December, 1975, No. 240, eff. 1-1-76.

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 have walls and floors of not less than 4-hour fire-resistive construction as specified in section Ind 51.04.

(b) A special occupancy separation shall have walls and floors of not less than 3-hour fire-resistive construction as specified in section Ind 51.04. 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 51.047, 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 51.04 and all openings

*See Appendix A for further explanatory material.

therein shall be protected on one side thereof by self-closing 1-hour fire-resistive doors as specified in section Ind 51.047 and such doors shall be kept normally closed.

(c) An ordinary occupancy separation shall have walls and floors of not less than 1-hour fire-resistive construction as specified in section Ind 51.04. All openings in such separations shall be protected by self-closing fire-resistive doors as specified in section Ind 51.047 and such doors shall be kept normally closed.

History: 1-2-56; r. and recr. (2) (c), Register, October, 1967, No. 142, eff. 11-1-67; am. (2) (a), (b) and (c), Register, February, 1971, No. 182, eff. 7-1-71; r. and recr. (2) (a), (b) and (c) eff. 8-1-71 and expiring 1-1-72 and cr. (2) (a), (b) and (c) eff. 1-1-72, Register, July, 1971, No. 187.

Ind 51.14 Glazing. History: Cr. Register, December, 1974, No. 228, eff. 1-1-75; am. (5), Register, December, 1975, No. 240, eff. 1-1-76; am. Register, December, 1976, No. 252, eff. 1-1-77; cr. (1) (a) 3, Register, December, 1977, No. 264, eff. 1-1-78; r. Register, February, 1978, No. 266, eff. 3-1-78.

Note: Effective July 6, 1977, requirements for safety glazing are under the jurisdiction of the Consumer Products Safety Commission (CPSC) and are contained in the CPSC Standard for Architectural Glazing Material. Copies of this standard are available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402.

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 Wis. Adm. Code sections Ind 54.06, 55.10, 56.08 and 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 by pushing against a single bar or plate or turning a single knob or handle.

(a) The use of a key for opening door from the inside is prohibited.

1. *Exception:* Upon written request by the owner, key-locking, or securing, of exits may be approved in fire-resistive buildings, or parts of fire-resistive buildings, accommodating occupants who must be detained in order to protect the occupants or the public from physical harm.

Note #1: Subsection Ind 51.15 (3) (a) 1. is intended to apply only to jails, prisons, mental institutions, asylums, nursing homes with senile patients, and similar type occupancies.

Note #2: The owner's request should include the following considerations: accessibility of keys to the fire department and staff personnel for the locked areas; electrical devices which release the locks; and 24-hour supervision of the locked areas by personnel who carry keys for the locked areas while on duty. Electrical devices which release the locks upon power failure or upon activation of the fire alarm or sprinkler system or the product of combustion detectors should be considered for securing of exits in nursing homes.

*See Appendix A for further explanatory material.

Note #3: Written approval to lock exits must also be obtained from the department of health and social services in accordance with the rules of that department.

(b) The door shall not be barred, bolted or chained at any time.

1. *Exception:* When authorized persons (employes, frequenters, patrons, etc.) are not present, the exit door may be secured by the use of a single bar or bolt.

Note: The intent of this rule is to prohibit padlocks or use of a key to open a door or lock at any time. The bar and bolt exception is to give added security against intruders from the outside while protecting persons in the building from being trapped.

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*See Appendix A for further explanatory material.

(2) Openings used in connection with horizontal exits shall be protected by fire-resistive doors as specified in section Ind 51.047. 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 windows for moderate fire exposure or fire-resistive doors as specified in sections Ind 51.047 and 51.048, except that if such windows or doors 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.

History: 1-2-56; am. (2) and (4), Register, February, 1971, No. 182, eff. 7-1-71; r. and recr. (2) and (4) eff. 8-1-71 and exp. 1-1-72, and cr. (2) and (4) eff. 1-1-72, Register, July, 1971, No. 187; am. (4) Register, June, 1972, No. 198, eff 7-1-72; am. (4), Register, December, 1975, No. 240, eff. 1-1-76.

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 window for moderate fire exposure or by a fire-resistive door as specified in sections Ind 51.047 and 51.048.

(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 53.50, 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,

*See Appendix A for further explanatory material.

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 except that platforms and treads constructed of flat bars on edge may be made of material 3/16 inch in thickness provided the material is galvanized after fabrication. Bars shall not be spaced 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.

*See Appendix A for further explanatory material.

(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, assembly halls, hospitals, nursing homes, residential care institutions, group foster homes, and homes for the elderly 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, assembly halls, hospitals, nursing homes, residential care institutions, group foster homes and homes for the elderly may terminate in a

*See Appendix A for further explanatory material.

platform at least 3 feet long, located not more than 10 feet above the ground and does not serve more than 8 persons.

(8) RAILINGS. A railing at least 42 inches in height and having 2 intermediate rails, uniformly spaced, measuring vertically from the floor of the platform, shall be provided on all open sides of platforms. Railings at least 36 inches in height, measuring vertically from the nose of the treads, shall be provided on the open sides of all stairways and on both sides of balanced stairways. Either a railing or a handrail fastened to the wall shall be provided on each side of all "B" fire escape stairways.

(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 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. Railing 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 department of industry, labor and human relations, 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 department of industry, labor and human relations, in place of "A" or "B" fire escapes. Every sliding fire escape shall be provided with a ladder constructed as in subsection Ind 51.20 (9), extending from 5 feet above grade, to 4 feet above the roof coping.

History: 1-2-56; am. Register, December, 1962, No. 84, eff. 1-1-63; am. (1) (a), Register, February, 1971, No. 182, eff. 7-1-71; am. (7), Register, February, 1971, No. 182, eff. 3-1-71; r. and recr. 51.20 (1) (a) eff. 8-1-71 and exp. 1-1-72 and cr. (1) (a) eff. 1-1-72, Register,

*See Appendix A for further explanatory material.

July, 1971, No. 187; am. (1) (a), Register, June, 1972, No. 198, eff. 7-1-72; am. (3) (intro. par.), Register, December, 1974, No. 228, eff. 1-1-75; am. (1) (a), Register, December, 1975, No. 240, eff. 1-1-76.

Ind 51.21 Standpipe and hose systems. (1) GENERAL REQUIREMENTS. All required standpipe and hose systems shall meet the requirements of this section.

Note: The department will accept installations conforming to the latest edition of NFPA No. 14—Standard for Installation of Standpipe and Hose Systems.

(2) CLASSES OF SERVICE. (a) *Class I - Fire department standpipes.* For use by fire departments and those trained in handling heavy fire streams from a 2½-inch hose.

(b) *Class II - First-aid standpipes.* For use primarily by occupants of a building until the arrival of the fire department (1½-inch hose).

(c) *Class III - Combination fire department and first-aid standpipes.* For use by either fire departments and those trained in handling heavy hose streams or by the building occupants.

(3) CLASS I - FIRE DEPARTMENT STANDPIPES. (a) *Where required.* Fire department standpipes shall be provided for all buildings exceeding 60 feet in height.

1. Required standpipes shall be installed as construction progresses, to make them available for fire department use in the topmost floor constructed. Temporary standpipes may be provided in place of permanent standpipes during the period of construction when approved by the local fire department.

(b) *Number of standpipes.* 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 in an unsprinklered building and 150 feet of hose in a sprinklered building.

(c) *Cross connections.* When 2 or more standpipes are required, they shall be cross connected and equipped with individual control valves. All control valves shall be of an approved indicating type valve. The valves shall be located so that the water supply to any standpipe riser can be shut off without interrupting the water supply to the remaining standpipes and be readily accessible to the fire department.

(d) *Location of outlets.* Hose outlets shall be located in stairway enclosures. Where stairways are not enclosed, outlets shall be at the inside of outside walls, within one foot of a smokeproof tower, interior stairway or fire escape. In buildings containing large interior areas, standpipes may be located at accessible interior locations.

(e) *Protection of standpipes.* Standpipes shall be protected against mechanical and fire damage. Dry standpipes shall be visible for inspection and not concealed.

Note: It is not the intent of this section to require standpipes to be protected with an hourly rated fire protection.

*See Appendix A for further explanatory material.

(f) *Size.* No required standpipe shall be less than 4 inches in diameter, and not less than 6 inches in diameter for standpipes in excess of 100 feet in height unless the building is completely sprinklered and the standpipe system is hydraulically designed in accordance with the requirements of subsection Ind 51.21 (6).

(g) *Hose valves and connections.* An approved 2½-inch hose-connection valve shall be located at each story, not less than 3 feet nor more than 6 feet above the floor level. Hose-connection valves shall be equipped with a tight-fitting cap on a chain and having lugs for a spanner wrench. When the building is completely sprinklered, and class II service is omitted, each standpipe outlet location shall be equipped with a 2½-inch hose valve, a 2½-inch by 1½-inch reducer, and a cap with an attached chain.

(h) *Hose threads.* All threads on hose connections shall be of national standard dimensions.

Note: Section 213.15, Wis. Stats., requires that all hose connections be fitted with the national standard hose threads adopted by the National Fire Protection Association.

(i) *Fire department connection.* An approved fire department siamese connection shall be installed on a 4-inch or larger pipe connection with each standpipe system. The connection shall be marked "To Standpipe". The elevation of the connection shall be not less than 18 inches nor more than 5 feet above the sidewalk or ground. In buildings with several standpipes, more than a single fire department siamese connection may be required by the local fire department.

Note: The department recommends that the fire department connection be located as close as possible to and within 150 feet of the fire department hydrant.

(j) *Automatic water supply.* An automatic water supply for a wet standpipe system shall be designed to provide not less than the following capacity from top outlets at not less than 65 psi flowing pressure for a period of 30 minutes: 500 gpm for a single standpipe; 750 gpm for 2 interconnected standpipes; 1,000 gpm for larger systems. Any of the following supplies will be acceptable:

1. Public waterworks system where pressure and discharge capacity are adequate.

2. Approved automatic fire pump (or pumps).

3. Pressure tank.

4. Gravity tank.

5. Approved manually controlled fire pump operated by remote control devices at each hose outlet.

6. Reservoirs.

(k) *Dry standpipes.* If only one standpipe is required, a dry standpipe may be used. A dry standpipe shall be limited to a single riser and shall not exceed 150 feet in height.

*See Appendix A for further explanatory material.

(4) CLASS II - FIRST-AID STANDPIPES. (a) *Where required.* First-aid standpipes shall be provided as required by the occupancy chapters of this code.

Note: See sections Ind 54.15, 55.33, 56.20 and 57.21.

(b) *Number and location.* Standpipes shall be sufficient in number so that any part of every floor area, including basements, can be reached within 30 feet by a nozzle attached to not more than 100 feet of hose connected to a standpipe.

1. Hose outlets shall be located in occupied areas and preferably in corridors or at interior columns.

(c) *Size.* No required standpipe shall be less than 2 inches in diameter for buildings 4 or less stories or 50 feet in height, and not less than 2½ inches in diameter for buildings exceeding 4 stories or 50 feet in height.

(d) *Hose valves and connections.* An approved 1½-inch hose valve shall be located not more than 5 feet above the floor level. Where the static pressure at any standpipe hose outlet exceeds 100 psi, an approved device shall be installed at the outlet to reduce the pressure with the required flow at the outlet to not more than 100 psi.

(e) *Hoses.* Not more than 100 feet of hose shall be attached to each outlet. Hoses shall be of an approved type, 1½-inches in diameter, with ½-inch solid stream or combination nozzle attached, and shall be located in approved cabinets, racks or reels. In locations where the use of a solid stream may contribute to the spread of fire by scattering the burning material or where the existence of flammable liquids make the use of spray stream desirable, combination nozzles which give a spray or a solid stream shall be provided instead of ½-inch nozzles.

(f) *Water supply.* An automatic water supply shall be provided. The water supply shall be designed for 100 gpm for 30 minutes with 65 psi flowing pressure at the top outlet. The water supply may be from a city connection, gravity tank, pressure tank or pump.

Note #1: The department will permit the domestic water supply to service class II standpipes provided no intervening control valves are installed to interrupt the service of the standpipe and a check valve is installed to prevent contamination of the domestic water supply.

Note #2: The department will permit pumps, other than fire pumps, provided the water supply meets the requirements of section Ind 51.21 (4) (f).

Note #3: See Plumbing Code, chapter H 62, rules of the department of health and social services, for requirements pertaining to cross connections.

(5) CLASS III - COMBINED FIRE DEPARTMENT AND FIRST-AID STANDPIPES. (a) *Where permitted.* The features of class I and II service may be combined in a single system if served by an acceptable automatic water supply conforming to the requirements of section Ind 51.21 (3) (j).

(b) *Requirements.* Class III standpipes shall conform to the requirements of class I service except that 1½-inch outlets with a hose

*See Appendix A for further explanatory material.

and 2½-inch outlets shall be provided on each floor and shall be installed to the requirements of the respective classes of service.

(6) COMBINED AUTOMATIC SPRINKLER AND STANDPIPE SYSTEM. (a) *Definition.* A combined system is a system where the vertical water piping serves both the automatic sprinkler system and the 2½-inch hose outlets of the standpipes used by the fire department. The combined system shall comply with the automatic sprinkler requirements of section Ind 51.23 and the standpipe and hose requirements of section Ind 51.21.

(b) *Water supply and riser size.* The minimum water supply and riser size for a combined system shall comply with the requirements of sections Ind 51.21 (3) (f) and (j), except the minimum water supply for a combined system for a completely sprinklered, light hazard occupancy building shall be 500 gallons per minute. When the building is completely sprinklered, the risers may be sized by hydraulic calculations.

Note: NFPA No. 13—Standard for Installation of Sprinkler Systems, defines light hazard occupancy as occupancies where the quantity and/or combustibility is low and fires with relatively low rates of heat release are expected, such as: churches; clubs; educational; hospitals; institutional; libraries, except large stack rooms; museums; nursing or convalescent homes; offices, including data processing; residential; restaurant seating areas; theaters and auditoriums, excluding stages and prosceniums.

(c) *Connections.* Each connection from a vertical riser of a combined system shall be provided with an individual control valve of the same size as the outlet.

(7) MAINTENANCE. Standpipe systems and equipment shall be maintained in an operable condition.

History: 1-2-56; r. and recr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 51.22 Fire extinguishers. (1) Where fire extinguishers are required, they shall be of a type approved by the department of industry, labor and human relations. 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 department of industry, labor and human relations 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 department of industry, labor and human relations for lists of approved extinguishers.

Ind 51.23 Automatic sprinklers. (1) GENERAL REQUIREMENTS. All required automatic sprinkler systems shall be designed and constructed in accordance with NFPA No. 13, Standard for the Installation of Sprinkler Systems [Ind 51.27 (7a)]. Reinstallation of used

*See Appendix A for further explanatory material.

sprinkler heads is prohibited. Approved secondhand devices may be installed by special permission of the department.

Note: The department will accept equipment, materials and devices listed or labeled by Underwriters' Laboratories or Factory Mutual. Other testing laboratories or inspection agencies will be recognized as an approved agency if accepted in writing by the department.

(2) WATER SUPPLY. (a) Approved automatic water supplies for the sprinkler system recognized by the department are listed below:

1. City water main;

2. Gravity or pressure tank;

3. Ground storage reservoir;

4. Natural bodies of water approved by the department (lakes, rivers, streams, etc.).

(b) If the water supply has inadequate pressure, an approved fire pump or tank shall be provided. The design and installation of water supply facilities for gravity tanks, fire pumps, reservoirs or pressure tanks, and underground piping shall conform to NFPA No. 22, Standard for Water Tanks for Private Fire Protection; NFPA No. 20, Installation of Centrifugal Fire Pumps; and NFPA No. 24, Outside Protection [Ind 51.27 (7a)].

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

(4) FIRE DEPARTMENT CONNECTION. Every sprinkler system shall have an approved siamese connection. The siamese connection shall be marked and readily accessible to the fire department and shall conform to the requirements of section Ind 51.21 (3) (i).

(5) SPRINKLER ALARMS. Every sprinkler system shall be provided with a suitable audible alarm. In all buildings over 60 feet in height, each sprinkler system on each floor shall be equipped with a separate water flow device connected to an alarm system.

(6) MAINTENANCE. All installed automatic sprinkler systems shall be properly maintained for efficient service. The employer or owner shall be responsible for the condition of his sprinkler system and shall use due diligence in keeping the system in good operating condition.

(7) PARTIAL AUTOMATIC SPRINKLER SYSTEMS. The sprinkler system shall be so installed and maintained as to provide complete coverage for all portions of the building except where partial protection is specified by this code.

(a) *Exception.* The department will permit any partial sprinkler system containing 15 or less sprinkler heads to be connected to the domestic water supply service or a first-aid standpipe, provided the connection is equipped with an approved indicating valve and a check valve. The water pressure and volume shall be adequate to supply the required flow and the system shall be hydraulically calculated. An

*See Appendix A for further explanatory material.

audible alarm is recommended. A fire department connection is not required.

Note: See Plumbing Code, chapter H 62, rules of the department of health and social services, for requirements pertaining to cross connections.

History: 1-2-56; r. and recr. Register, December, 1974, No. 228, eff. 1-1-75; cr. (7) (a), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 51.24 Fire alarm systems. Interior fire alarm systems required under Wis. Adm. Code sections Ind 54.19, 56.19 and 57.22 shall be designed and constructed in conformity with the following requirements:

(1) 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 signalling 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.

(a) In all buildings where a fire alarm system and a complete automatic sprinkler system are required, a water flow detecting device shall be provided to actuate the fire alarm system.

(2) Every fire alarm system shall be electrically operated or activated by non-combustible, nontoxic gas. Electrically operated systems 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 undergrounded conductor, audible trouble signals will be given instantly. Gas-activated systems shall be mechanically supervised and under constant gas pressure, so arranged that in case of a pressure drop an audible trouble signal will be given instantly. Means shall be provided for testing purposes.

(3) 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, non-coded continuous sounding fire alarm systems under constant electrical or gas activated supervision will be approved.

(4) 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

*See Appendix A for further explanatory material.

device to permanently record the transmission of an alarm, "Open Door" type stations may be used). The fire alarm operating stations shall be mounted not less than 4 feet nor more than 5 feet above the finished floor as measured from the floor to the center of the box.

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

(6) Existing fire alarm systems that are effective in operation will be accepted if approved by the department of industry, labor and human relations.

(7) The gas for operation of non-combustible, non-toxic gas activated fire alarm systems shall be supplied from approved pressure cylinders on the premises. The cylinders shall have sufficient capacity and pressure to properly operate all sounding devices connected to the system for a period of not less than 10 minutes. Cylinders shall be removed for recharging immediately after use and shall be replaced by fully charged cylinders.

(8) Spare cylinders shall be kept on the premises at all times for immediate replacement and separate cylinders for testing shall be incorporated in the system.

(9) Tubing in connection with non-combustible, non-toxic gas activated fire alarm systems shall be installed in rigid metal conduit, flexible metal conduit, or surface metal raceways where subject to mechanical injury. Non-corrosive metallic tubing not less than 3/16" in diameter which will withstand a bursting pressure of not less than 500 pounds per square inch shall be used. The maximum length of 3/16" tubing shall not exceed 300 feet between charged cylinders. All tubing and other component parts shall be installed by skilled workmen in accordance with the provisions of this code.

Note: See Wisconsin Administrative Electrical Code, Volume 2.

History: 1-2-56; am. (4) (a), Register, November, 1963, No. 95, eff. 12-1-63; am. Register, August, 1964, No. 104, eff. 9-1-64; r. (10), (11) and (12), Register, December, 1975, No. 240, eff. 1-1-76; cr. (1) (a) and am. intro. and (2), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 51.25 Adoption of ASTM Standards. Pursuant to section 227.025, Wis. Stats., the attorney general and the revisor of statutes have consented to the incorporation by reference of the following standards of the American Society of Testing and Materials (ASTM), 1916 Race Street, Philadelphia, Pa. 19103. Copies of the standards in reference are on file in the offices of the department, the secretary of state, and the revisor of statutes.

Note: Part numbers refer to 1973 set of standards.

(1) GENERAL REQUIREMENTS FOR DELIVERY OF ROLLED STEEL PLATES, SHAPES, SHEET PILING AND BARS FOR STRUCTURAL USE. Part 4 ASTM Designation A 6-72.

(2) STRUCTURAL STEEL. Part 4 ASTM Designation A 36-70a.

*See Appendix A for further explanatory material.

(3) COLD-DRAWN STEEL WIRE FOR CONCRETE REINFORCEMENT. Part 4 ASTM Designation A 82-72.

(4) ZINC-COATED (GALVANIZED) IRON OR STEEL FARM-FIELD AND RAILROAD RIGHT-OF-WAY WIRE FENCING. Part 3 ASTM Designation A 116-71.

(5) ZINC COATING (HOT-DIP) ON IRON AND STEEL HARDWARE. Part 3 ASTM Designation A 153-73.

(6) DEFORMED AND PLAIN BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT. Part 4 ASTM Designation A 615-72.

(7) RAIL-STEEL DEFORMED AND PLAIN BARS FOR CONCRETE REINFORCEMENT. Part 4 ASTM Designation A 616-72.

(8) AXLE-STEEL DEFORMED AND PLAIN BARS FOR CONCRETE REINFORCEMENT. Part 4 ASTM Designation A 617-72.

(9) GYPSUM. Part 9 ASTM Designation C 22-50 (1972).

(10) CHEMICAL ANALYSIS OF LIMESTONE, QUICKLIME, AND HYDRATED LIME. Part 9 ASTM Designation C 25-72.

(11) STRUCTURAL CLAY LOAD-BEARING WALL TILE. Part 12 ASTM Designation C 34-62 (1970).

(12) COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS. Part 10 ASTM Designation C 39-72.

(13) OBTAINING AND TESTING DRILLED CORES AND SAWED BEAMS OF CONCRETE. Part 10 ASTM Designation C 42-68.

(14) SAMPLING, INSPECTION, PACKING, AND MARKING OF LIME AND LIMESTONE PRODUCTS. Part 9 ASTM Designation C 50-57 (1968).

(15) GYPSUM PARTITION TILE OR BLOCK. Part 12 ASTM Designation C 52-54 (1972)

(16) CONCRETE BUILDING BRICK. Part 12 ASTM Designation C 55-71.

(17) STRUCTURAL CLAY NON-LOAD-BEARING TILE. Part 12 ASTM Designation C 56-71.

(18) STRUCTURAL CLAY FLOOR TILE. Part 12 ASTM Designation C 57-57 (1972).

(19) BUILDING BRICK (SOLID MASONRY UNITS MADE FROM CLAY OR SHALE). Part 12 ASTM Designation C 62-69.

(20) SAMPLING AND TESTING BRICK. Part 12 ASTM Designation C 67-66.

*See Appendix A for further explanatory material.

(21) HOLLOW LOAD-BEARING CONCRETE MASONRY UNITS. Part 12 ASTM Designation C 90-70.

(22) MASONRY CEMENT. Part 9 ASTM Designation C 91-71.

(23) ABSORPTION AND BULK SPECIFIC GRAVITY OF NATURAL BUILDING STONE. Part 12 ASTM Designation C 97-47 (1970).

(24) MODULUS OF RUPTURE OF NATURAL BUILDING STONE. Part 12 ASTM Designation C 99-52 (1970).

(25) PHYSICAL TESTING OF QUICKLIME AND HYDRATED LIME. Part 9 ASTM Designation C 110-71.

(26) SAMPLING AND TESTING STRUCTURAL CLAY TILE. Part 12 ASTM Designation C 112-60 (1970).

(27) Not used.

(28) SAMPLING AND TESTING CONCRETE MASONRY UNITS. Part 12 ASTM Designation C 140-70.

(29) AGGREGATE FOR MASONRY MORTAR. Part 12 ASTM Designation C 144-70.

(30) SOLID LOAD-BEARING CONCRETE MASONRY UNITS. Part 12 ASTM Designation C 145-71.

(31) PORTLAND CEMENT. Part 9 ASTM Designation C 150-73a.

(32) COMPRESSIVE STRENGTH OF NATURAL BUILDING STONE. Part 12 ASTM Designation C 170-50 (1970).

(33) HYDRATED LIME FOR MASONRY PURPOSES. Part 9 ASTM Designation C 207-49 (1968).

(34) MORTAR FOR UNIT MASONRY. Part 12 ASTM Designation C 270-71.

(35) GYPSUM CONCRETE. Part 9 ASTM Designation C 317-64 (1970).

(36) MICROSCOPICAL DETERMINATION OF AIR-VOID CONTENT AND PARAMETERS OF THE AIR-VOID SYSTEM IN HARDENED CONCRETE. Part 10 ASTM Designation C 457-71.

(37) CHEMICAL ANALYSIS OF GYPSUM AND GYPSUM PRODUCTS. Part 9 ASTM Designation C 471-72.

(38) PHYSICAL TESTING OF GYPSUM PLASTERS AND GYSUM CONCRETE. Part 9 ASTM Designation C 472-73.

(39) PHYSICAL TESTING OF GYPSUM BOARD PRODUCTS AND GYPSUM PARTITION TILE OR BLOCK. Part 9 ASTM Designation C 473-68.

*See Appendix A for further explanatory material.

(40) MORTAR AND GROUT FOR REINFORCED MASONRY. Part 12 ASTM Designation C 476-71.

(41) HOLLOW BRICK (HOLLOW MASONRY UNITS MADE FROM CLAY OR SHALE). Part 12 ASTM Designation C 652-70.

(42) RESISTANCE OF CONCRETE TO RAPID FREEZING AND THAWING. Part 10 ASTM Designation C 666-73.

(43) ESTABLISHING STRUCTURAL GRADES AND RELATED ALLOWABLE PROPERTIES FOR VISUALLY GRADED LUMBER. Part 16 ASTM Designation D 245-70.

(44) EVALUATING THE PROPERTIES OF WOOD-BASE FIBER AND PARTICLE PANEL MATERIALS. Part 16 ASTM Designation D 1037-72a.

(45) LOAD-SETTLEMENT RELATIONSHIP FOR INDIVIDUAL PILES UNDER STATIC AXIAL LOAD. Part 11 ASTM Designation D 1143-69.

(46) CONDUCTING STRENGTH TESTS OF PANELS FOR BUILDING CONSTRUCTION. Part 14 ASTM Designation E 72-68.

(47) SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS. Part 14 ASTM Designation E 84-70.

(48) FIRE TESTS OF ROOF COVERINGS. Part 14 ASTM Designation E 108-58 (1970).

(49) FIRE TESTS OF BUILDING CONSTRUCTION AND MATERIALS. Part 14 ASTM Designation E 119-73.

(50) NONCOMBUSTIBILITY OF ELEMENTARY MATERIALS Part 14 ASTM Designation E 136-73.

(51) BOND STRENGTH OF MORTAR TO MASONRY UNITS. Part 14 ASTM Designation E 149-66.

(52) FIRE TESTS OF DOOR ASSEMBLIES. Part 14 ASTM Designation E 152-73.

(53) FIRE TESTS OF WINDOW ASSEMBLIES. Part 14 ASTM Designation E 163-65 (1972).

(54) COMPRESSIVE STRENGTH OF MASONRY ASSEMBLAGES. Part 14 ASTM Designation E 447-72.

History: Cr. Register, October, 1967, No. 142, eff. 11-1-67; cr. (88) to (93), Register, February, 1971, No. 182, eff. 7-1-71; r. (88) to (93) eff. 8-1-71 and recr. (88) to (93) eff. 1-1-72, Register, July, 1971, No. 187; r. and recr., Register, July, 1974, No. 223, eff. 1-1-75.

Ind 51.26 Adoption of ACI Standards. Pursuant to section 227.025, Wis. Stats., the attorney general and the revisor of statutes have consented to the incorporation by reference of the following standards of the American Concrete Institute (ACI), P. O. Box 4754, Redford Station, Detroit, Michigan 48219. Copies of the standards in

*See Appendix A for further explanatory material.

reference are on file in the offices of the department, the secretary of state, and the revisor of statutes.

(1) BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE. ACI 318-71.

(2) RECOMMENDED PRACTICE FOR MANUFACTURED REINFORCED CONCRETE FLOOR AND ROOF UNITS. ACI 512-67.

(3) MINIMUM REQUIREMENTS FOR THIN-SECTION PRECAST CONCRETE CONSTRUCTION. ACI 525-63.

History: Cr. Register, October, 1967, No. 142, eff. 11-1-67; r. and recr., Register, July, 1974, No. 223, eff. 1-1-75.

Ind 51.27 Adoption of miscellaneous standards. Pursuant to section 227.025, Wis. Stats., the attorney general and the revisor of statutes have consented to the incorporation by reference of the following standards. Copies of the standards in reference are on file in the offices of the department, the secretary of state, and the revisor of statutes.

(1) Aluminum Association (The), 750 Third Avenue, New York City 10017, SPECIFICATIONS FOR ALUMINUM STRUCTURES, Aluminum Construction Manual, Section 1, second edition, November 1971.

(2) American Institute of Steel Construction, 1221 Avenue of the Americas, New York, N.Y. 10020, SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS, February 12, 1969; and COMMENTARY ON THE SPECIFICATIONS FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS, February 12, 1969.

(3) American Institute of Timber Construction, 333 West Hampden Ave., Englewood, Colorado 80110, STANDARD SPECIFICATIONS FOR STRUCTURAL GLUED LAMINATED TIMBER OF DOUGLAS FIR, WESTERN LARCH, SOUTHERN PINE AND CALIFORNIA REDWOOD, AITC 117-71; STANDARD SPECIFICATIONS FOR HARDWOOD GLUED LAMINATED TIMBER, AITC 119-71; STANDARD SPECIFICATIONS FOR STRUCTURAL GLUED LAMINATED TIMBER USING "E" RATED AND VISUALLY GRADED LUMBER OF DOUGLAS FIR, SOUTHERN PINE, HEM-FIR, AND LODGEPOLE PINE, AITC 120-71.

(4) American Iron and Steel Institute, 150 East 42nd St., New York, N. Y. 10017, SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS, 1968 edition, including Addendum No. 1, Nov. 19, 1970; SPECIFICATION FOR THE DESIGN OF LIGHT GAGE, COLD-FORMED STAINLESS STEEL STRUCTURAL MEMBERS, 1968 edition.

(5) American National Standards Institute, Inc., 1430 Broadway, New York, N. Y. 10018, SPECIFICATION FOR REINFORCED

*See Appendix A for further explanatory material.

GYPSUM CONCRETE, ANSI A 59.1-1968; SPECIFICATION FOR VERMICULITE CONCRETE ROOFS AND SLABS ON GRADE, ANSI A 122.1-1965; PERFORMANCE SPECIFICATIONS AND METHODS OF TESTING FOR SAFETY GLAZING MATERIALS USED IN BUILDINGS, ANSI Z 97.1-1972.

(6) American Welding Society, 2501 NW 7th Street, Miami, Florida 33125, STRUCTURAL WELDING CODE, AWS D 1.1-72.

(7a) National Fire Protection Association, 470 Atlantic Avenue, Boston, Mass. 02210, STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS, NFPA No. 13-1974; STANDARD FOR THE INSTALLATION OF CENTRIFUGAL FIRE PUMPS, NFPA No 20-1974; STANDARD FOR WATER TANKS FOR PRIVATE FIRE PROTECTION, NFPA No. 22-1974; STANDARD FOR OUTSIDE PROTECTION, NFPA No. 24-1973; STANDARD FOR CENTRAL STATION PROTECTIVE SIGNALING SYSTEMS, NFPA No. 71-1974; STANDARD FOR AUXILIARY PROTECTIVE SIGNALING SYSTEMS, NFPA No. 72B-1974; STANDARD FOR REMOTE STATION PROTECTIVE SIGNALING SYSTEMS, NFPA No. 72C-1974; STANDARD FOR PROPRIETARY PROTECTIVE SIGNALING SYSTEMS, NFPA No. 72D-1974; STANDARD ON AUTOMATIC FIRE DETECTORS, NFPA No. 72E-1974.

(8) National Forest Products Association (Recommended by), 1619 Massachusetts Ave. NW, Washington, D.C. 20036, NATIONAL DESIGN SPECIFICATION FOR STRESS-GRADE LUMBER AND ITS FASTENINGS, 1973 edition, including SUPPLEMENT TO 1973 EDITION, dated April 1973.

(9) Steel Joist Institute, 2001 Jefferson Davis Highway, Arlington, Virginia 22202, STANDARD SPECIFICATIONS AND LOAD TABLES, 1973.

(10) Truss Plate Institute, Inc., 7100 Baltimore Avenue, College Park, Maryland 20740, DESIGN SPECIFICATIONS FOR LIGHT METAL PLATE CONNECTED WOOD TRUSSES, TPI-74.

(11) Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, U. S. PRODUCT STANDARDS PS 1-66 for softwood plywood/construction and industrial, including all amendments through No. 6, dated June 8, 1970 (National Bureau of Standards).

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75, am. (5) and (10), cr. (7a), Register, December, 1974, No. 228, eff. 1-1-75; am. (2) and r. (7), Register, December, 1976, No. 252, eff. 1-1-77.

*See Appendix A for further explanatory material.