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Chapter Comm 51

DEFINITIONS AND STANDARDS

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Note: Chapter Ind 51 was renumbered to be chapter ILHR 51 effective January 1, 1984. Chapter ILHR 51 was renumbered to be chapter Comm 51 under s. 13.93 (2m) (b) 1. and corrections were made under s. 13.93 (2m) (b) 7., Stats., Register, December, 1997, No. 504.

Note: The definitions of words and phrases not defined in this section should be taken from the current edition of Webster's New International Dictionary.

Note: Chapter Comm 51 is repealed effective July 1, 2002.

Comm 51.01 Definitions. (1) "Accessory room" means 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 and other similar floor spaces, in addition to habitable rooms, are not considered accessory rooms.

(1g) "Adult family home" has the meaning given in s. 50.01 (1), Stats.

Note: Under s. 50.01 (1), Stats., an "adult family home" means a private residence to which all of the following apply:

The private residence was licensed under s. 48.62 as a foster home for the adults specified in par. (a) at least 12 months before any of the adults attained 18 years of age.

(1m) 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.

(2m) "Amusement facility" has the meaning given in s. 101.128 (1) (a), Stats.

Note: Section 101.128 (1) (a), Stats., defines amusement facility as any zoo, state or local park, amusement or theme park, state fair park, or county or other local fairgrounds. For the purposes of calculating sanitary fixtures, an amusement facility may also be referred to as an outdoor event.

(2r) "Annular space" means the opening around a penetrating item.

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

(3a) "Approved diversified tests" means fire tests which evaluate materials or construction assemblies representative of actual end use applications.

Note: Approved diversified tests may include, but are not limited to: ASTM E 84—Test for Surface Burning Characteristics of Building Materials; ASTM E 119—Fire Tests of Building Construction and Materials; ASTM D 1929—Standard Test Method for the Ignition Properties of Plastics: FM 4880—Factory Mutual Building Corner Fire Test; and UL 1040—Outline of Investigation of Insulated Wall Construction.

(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, stairways, 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.

(5b) "Atrium" means a floor opening or series of floor openings connecting 3 or more floor levels, but not including a mezzanine or a balcony, that is covered at the top of the series of openings and is used for purposes other than an enclosed stairway; elevator hoistway; or utility shaft used for plumbing, electrical, air conditioning or communication facilities.

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

(6m) "Authorized representative" means any certified municipality or county as specified in s. Comm 50.21, and any appointed agent as specified in s. Comm 50.22.

(7) "Automatic" means a function that occurs without human intervention.

(7a) "Automatic fire sprinkler system", for fire protection purposes, means 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 supply side of an approved gate valve 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.

(7b) "Automatic fire suppression system" means a mechanical system designed and equipped to detect a fire, actuate an alarm and suppress or control a fire using water, water spray, foam, car-

bon dioxide, halogenated agent or other approved suppression agent.

(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)."

(11a) "Bed and breakfast establishment" has the meaning given in s. 254.61, Stats.

Note: Section 254.61, Stats., reads: *"Bed and breakfast establishment" means any place of lodging that:*

(a) Provides 8 or fewer rooms for rent to no more than a total of 20 tourists or transients;

(b) Provides no meals other than breakfast and provides the breakfast only to renters of the place;

(c) Is the owner's personal residence;

(d) Is occupied by the owner at the time of rental;

(e) Was originally built and occupied as a single−family residence, or, prior to use as a place of lodging, was converted to use and occupied as a single−family residence; and

(f) Has had completed, before May 11, 1990, any structural additions to the dimensions of the original structure, including by renovation, except that a structural addition, including a renovation, to the structure may, after May 11, 1990, be made within the dimensions of the original structure.

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

Note: See Appendix A for further explanatory material.

(13) "Building or structure" means public building or place of employment.

(13m) "Building, public" has the meaning given in s. 101.01 (12), Stats.

Note: Section 101.01 (12), Stats., reads: "Public building" means 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. When used in relation to building codes, "public building" does not include a previously constructed building used as a community−based residential facility as defined in s. 50.01 (1g) which serves 20 or fewer residents who are not related to the operator or administrator or an adult family home, as defined in s. 50.01 (1).

(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)."

(15m) 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.

(16) "Cemetery authority" means any person who owns or operates a cemetery specified in s. 157.065 (1), Stats.

(16a) "Certified commercial building inspector" means a person who holds a credential issued by the department under ch. Comm 5 as a certified commercial building inspector.

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

(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.

(17g) "Cfm" means cubic feet per minute.

(17m) "Code" means chs. Comm 50 to 64.

(17n) "Column" means an upright member in a building's structural framing, having a spacing of 48 inches or greater on center, which is constructed of heavy timber with nominal cross−sectional dimensions of at least 6 inches by 8 inches, precast or load−bearing concrete, masonry, or steel, and which is used primarily to support axial compressive loads.

(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.

(19a) "Commercial motor vehicle" means all motor vehicles other than passenger vehicles for not more than 9 passengers.

(19b) "Community−based residential facility" or "CBRF" has the meaning given in s. 50.01 (1g), Stats.

Note: Section 50.01 (1g), Stats., reads: *"Community−based residential facility" means a place where 5 or more adults who are not related to the operator or administrator and who do not require care above intermediate level nursing care reside and receive care, treatment or services that are above the level of room and board but that include no more than 3 hours of nursing care per week per resident. "Community−based residential facility" does not include any of the following:*

(a) A convent or facility owned or operated by members of a religious order exclusively for the reception and care or treatment of members of that order.

(b) A facility or private home that provides care, treatment and services only for victims of domestic abuse, as defined in s. 46.95 (1) (a), and their children.

(c) A shelter facility as defined under s. 16.352 (1) (d).

(d) A place that provides lodging for individuals and in which all of the following conditions are met:

1. Each lodged individual is able to exit the place under emergency conditions without the assistance of another individual.

2. No lodged individual receives from the owner, manager or operator of the place or the owner's, manager's or operator's agent or employee any of the following:

a. Personal care, supervision or treatment, or management, control or supervision of prescription medications.

b. Care or services other than board, information, referral, advocacy or job guidance; location and coordination of social services by an agency that is not affiliated with the owner, manager or operator, for which arrangements were made for an individual before he or she lodged in the place; or, in the case of an emergency, arrangement for the provision of health care or social services by an agency that is not affiliated with the owner, manager or operator.

(e) An adult family home.

(f) A residential care apartment complex.

(g) A residential facility in the village of Union Grove that was authorized to operate without a license under a final judgment entered by a court before January 1, 1982, and that continues to comply with the judgment notwithstanding the expiration of the judgment.

(19m) "Composting toilet system" means a method that collects, stores and converts by bacterial digestion nonliquid−carried human wastes or organic kitchen wastes, or both, into humus.

(20) CONCRETE. See "Types of Concrete," s. Comm 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 19 of Table 51.03−A.

(23) COURT. A court is an open, exterior space providing required natural light or ventilation for the building or providing a pathway for public egress from a building exit to a public thoroughfare.

(24) COURT (INNER). An inner court is a court surrounded on all sides by walls.

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

(26) COURT (OUTER). An outer court is 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 commerce.

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(29a) "Direct vent sealed combustion chamber appliance" means a gas−fired heating appliance which is constructed and installed so that all air for combustion is brought directly from the outside atmosphere to inside the combustion chamber and all flue gases are discharged directly to the outside atmosphere and that is capable of operating only when the integrity of the sealed combustion chamber is maintained.

(29m) "Damper (ceiling)" means a device to limit radiant heat transmission through an air outlet or inlet opening in the ceiling membrane of a floor/roof−ceiling assembly having an assembly fire resistance rating of not less than 1−hour.

(29n) "Damper (fire)" means a device, installed in an air distribution system, designed to close automatically upon detection of heat, to interrupt migratory airflow, and to restrict the passage of flame. A combination fire and smoke damper meets the requirements of both.

(29o) "Damper (smoke)" means a device installed in an air distribution system to control the movement of smoke.

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

(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 ch. Comm 18.

(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.

(36a) "Exit" means that portion of a means of egress which is separated from all other spaces of the building or structure by construction providing a protected way of travel to the exit discharge.

(36b) "Exit access" means that portion of a means of egress which leads to an entrance to an exit.

(36c) "Exit access corridor" means an aisle or passageway in a building that forms that portion of the means of egress which leads to an exit.

(36d) "Exit access door" means any door that leads to the exit access.

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

(37a) "Exit discharge" means that portion of a means of egress between the termination of an exit and a street, alley, court or a public way.

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

(38a) "Exit door" means a door that leads from that portion of a means of egress known as the exit access to the outside of a building or to a required exit, such as a stairway, smokeproof tower, ramp or horizontal exit.

(38b) "Exit passageway" means a horizontal means of exit travel that is protected from a fire in a manner similar to an enclosed interior exit stair.

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

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

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

(41c) "F−rating" means the time period in hours that a through−penetration fire−stop system will limit the spread of flame through the penetrated assembly, including the penetrating elements, when tested in accordance with ASTM E814.

(41g) "Facility where the public congregates" has the meaning given in s. 101.128 (1) (b), Stats.

Note: Section 101.128 (1) (b), Stats., defines "facility where the public congregates" as any of the following that has a *capacity or a seating capacity of 500 or more persons:*

1. An amusement facility.
2. A convention or trade hall or center.
3. A specialty event center.
4. A sports or entertainment arena, center, or building.
5. A stadium.
6. An airport, bus terminal, train station or other transportation center.

(41m) 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.

Note: See Appendix A for further explanatory material.

(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 s. 102.04 (3), 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. "Farm premises" means areas used for the operations set forth in s. 102.04 (3), Stats., but does not include other areas, greenhouses or other similar structures unless used principally for the production of food and farm plants.

(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 specific conditions of tests and performance.

(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 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.

(52m) "Fire−stop system, approved" means a fire−stop product or device that is tested and listed by an approved testing laboratory under ASTM E814 regarding the ability, the F−rating, to retard the passage of flame for a specific time period.

Note: See sub. (41c) for the definition of F−rating.

(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.

(56m) 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.

(57b) "Foam plastic" means a manufactured organic material used as a building material, insulation or sound−absorbing material.

(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.

(58a) "Freestanding freezer and cooler" means equipment with an aggregate floor area of less than 400 square feet used to provide a controlled environment at 50°F. or less for storing, displaying or merchandising of products. The freezers and coolers are installed in a building or structure for weather protection and do not rely upon the building or structure for lateral or vertical support, except for the floor load.

Note: Freezers and coolers which do not meet this definition are considered refrigerated facilities. See s. Comm 51.06 (7) (a) for additional requirements.

(58b) "Freezer warehouse" means a building or structure designed and operated at a temperature of 32°F. or below and adapted to the reception and storage of goods, products and merchandise.

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

(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.

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

(64) "Grade, exit discharge" means the elevation of the finished exterior surface of paved or unpaved ground directly below 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.

Note: See Appendix A for further explanatory material.

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

(68a) "Health care facility" means both hospital or nursing home.

(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 $^1/_2$ 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)."

(71k) "Home occupation" means any business, profession, trade or employment conducted in a person's dwelling which may involve that person's immediate family or household and a maximum of one other unrelated person, but does not include a business involving:

(a) Explosives, fireworks or repair of motor vehicles; or

(b) More than 25% of the habitable floor area of the dwelling.

(71m) "Hospital" means any building, structure, institution or place used for the maintenance and operation of facilities for the diagnosis, treatment of and medical or surgical care for 3 or more nonrelated individuals hereinafter designated patients, suffering from illness, disease, injury or disability, whether physical or mental, and including pregnancy and regularly making available at least clinical laboratory services, and diagnostic x−ray services and treatment facilities for surgery, or obstetrical care, or other definitive medical treatment.

(71n) "Household" means those persons who live together in the same dwelling and treat the dwelling as their permanent home or residence.

(71p) "Incinerating toilet" means a self−contained device for the treatment of nonliquid carried wastes that deposits the wastes directly into a combustion chamber, reduces the solid portion to ash and evaporates the liquid portion.

(71t) "Independent inspection agency" means any person, firm, association, partnership or corporation, other than a municipal corporation that performs certified inspections under this code.

(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)."

(75a) "Interior finish" means the exposed interior surfaces of buildings, including, but not limited to fixed or movable walls and partitions, columns, ceilings, and floors.

(a) "Class A interior finish" includes any material classified at 25 or less on the flame spread test scale and 450 or less on the smoke test scale in accordance with ASTM E 84.

(b) "Class B interior finish" includes any material classified at more than 25 but not more than 75 on the flame spread test scale

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and 450 or less on the smoke test scale in accordance with ASTM E 84.

(c) "Class C interior finish" includes any material classified at more than 75 but not more than 200 on the flame spread test scale and 450 or less on the smoke test scale in accordance with ASTM E 84.

(d) "Class I interior floor finish" includes any material with a minimum critical radiant flux of 0.45 watts per square centimeter as determined in accordance with ASTM E 648.

(e) "Class II interior floor finish" includes any material with a minimum critical radiant flux of 0.22 watts per square centimeter as determined in accordance with ASTM E 648.

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

(76a) "Landowner" means any person holding fee title, an easement or other interest in property which allows the person to undertake land disturbing construction activity on the property.

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

(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.

(79m) 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.

(79r) "Mausoleum" means a building, structure or part of a building or structure that is used or intended to be used for the burial of human remains.

(80) "Mausoleum space" means a niche, crypt or specific place in a mausoleum that contains or is intended to contain human remains.

(80a) "Means of egress" means a continuous and unobstructed way of exit travel from any point in a building or structure to a street, alley, court or a public way. A means of egress consists of the exit access, the exit and the exit discharge. A means of egress includes the vertical and horizontal ways of travel and includes intervening room space, doorways, hallways, corridors, passageways, balconies, ramps, stairs, enclosures, lobbies, horizontal exits and courts.

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

(81m) "Membrane penetration" means an opening made through one side of an assembly that is a building element as listed in Table 51.03.

Note: An example of a membrane penetration is a recessed outlet box penetrating the gypsum wallboard (the gypsum wallboard is the "membrane") on one side of stud wall construction.

(82) "Mezzanine" means an intermediate floor level, either open or enclosed.

Note: See also sub. (122), "stories, number of." and s. Comm 51.02 (14) pertaining to the determination of the number of stories.

(82a) "Mini−storage building" means an unoccupied compartmentalized building used for storage.

(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 par. (a) or (b). 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 par. (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 par. (a), with a surfacing not more than $^1/_8$ inch thick which has a flame−spread classification (FSC) not greater than 50 when tested in accordance with ASTM E−84.

(86a) "Nursing home" means any building, structure, institution or place which provides 24−hour services including board and room to 3 or more unrelated residents who because of their mental or physical condition require nursing care or personal care in excess of 7 hours a week. The term "nursing home" wherever used in chs. Comm 50−64, includes nursing and convalescent homes, skilled nursing facilities, infirmaries in homes for the aged, and intermediate care facilities of 15 beds or more.

(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.

(89g) "Outdoor event" means an event held at a location generally without a permanent structure and may include organized sports games, home tours, auctions, picnics, concerts, art shows, fairs, or any similar, infrequent, short−term event.

(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.

(90g) "Outdoor toilet" means either a permanently constructed toilet with a disposal cavity, or a portable toilet provided where either a public sewer is unavailable or where additional toilet fixtures are temporarily needed to meet the required number for an outdoor event.

Note: A privy may also be referred to as an outdoor toilet.

(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.

(93a) "Outpatient surgical facility" means a facility devoted to the performance of surgical procedures utilizing inhalation anesthetics without anticipation of the overnight stay of patients.

(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. A partition is an interior nonbearing vertical element serving to enclose or divide an area, room or space. Portable or demountable partitions requiring tools for installation or removal are considered partitions not furniture.

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

(99) "Penthouse" means an enclosed or partially enclosed structure extending above a roof of a building or structure and 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.

(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" means any service piping conveying flammable or toxic gases or liquids.

(102a) "Place of abode" means a residential building or part of a residential building used as follows:

(a) Occupied as a residence of 3 or more families living independently or occupied by 2 such families and used also for business purposes; or

(b) Occupied for sleeping or lodging purposes by 3 or more persons not members of the same family.

Note: Examples of places of abode include but are not limited to apartment buildings, garden apartments, row houses, town houses, condominiums, hotels, motels, rooming houses, dormitories, convents, monasteries, homes for the aged and certain community−based residential facilities.

(102b) 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 of any building, and having a roof and floor. (See also "Terrace" and "Balcony.")

(103d) "Portable restroom" means a self−contained portable unit that includes fixtures, incorporating holding tank facilities, designed to receive human excrement.

(103g) "Privy" means an enclosed nonportable toilet into which nonwater−carried human wastes are deposited to a subsurface storage chamber.

Note: Section Comm 83.02 (42) defines a privy as a structure, not connected to a plumbing system, which is used by persons for the deposition of human body wastes.

(104) "Property line" means the following:

(a) 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; or

(b) A permanent easement recorded with the county register of deeds, on file with the department, on adjoining property providing control over the property eased.

(104m) "Public mausoleum" means a mausoleum that holds or is intended to hold the remains of more than 10 humans or a mausoleum in which at least one mausoleum space is offered for sale to the general public.

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

(105a) REMODELING. To remodel or alter, or both, 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.

(105e) "Recyclable material" means solid waste material prohibited for land disposal and incineration, that is separated, temporarily stored and collected. These materials include, but are not limited to, aluminum and glass containers, corrugated paper or container board, magazines, newspapers, office paper, foam polystyrene packaging, and plastic or steel containers.

(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 or the adjacent construction, or both, provides complete or partial restraint against rotation of the ends of the member or partial restraint against horizontal displacement, or both, when subject to a gravity load or temperature change, or both.

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

(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° 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.

(114a) "Rowhouse" means a place of abode not more than 3 stories in height, arranged to accommodate 3 or more attached, side by side or back to back living units.

(114m) "Second class city" has the meaning given in s. 62.05 (1) (b), Stats.

Note: Section 62.05 (1) (b), Stats., reads: Cities of 39,000 and less than 150,000 population shall constitute 2nd class cities.

(115) "Setback" means the distance between the property line or public thoroughfare, and the nearest part of the building, as measured perpendicular to the bisector of the angle formed by the intersection or projected intersection of the building face with the property line or another building face.

Note: See Appendix A for further explanatory material.

(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.

(117m) "Shelter facility" has the meaning given in s. 16.352 (1) (d), Stats.

Note: Section 16.352 (1) (d), Stats., reads: "Shelter facility means a temporary place of lodging for homeless individuals or families."

(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 or the adjacent construction, or both, allows free rotation of the ends of the member and horizontal displacement when subject to a gravity load or a temperature change, or both.

(119a) "Sleeping area" means the area of residential buildings in which bedrooms or sleeping rooms are located. Bedrooms or sleeping rooms separated by other use areas such as kitchens or living rooms, but not bathrooms, are considered as separate sleeping areas. Each individual room or suite of rooms in hotels, motels, dormitories or congregate living facilities is considered a separate sleeping area.

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(119b) "Smoke detector" means a device which detects particles or products of combustion other than heat.

(119e) "Smokeless propellant" means a solid propellant used in small arms ammunition, cannons, rockets or propellant − actuated devices that emits a minimal amount of smoke when ignited.

(119m) "Solid−fuel equipment" means equipment burning solid rather than gas or liquid fuel.

Note: Typical solid fuels are coal and wood.

(120) "Space heater" means a fuel−fired vented, self−contained free−standing or wall recessed heating appliance.

(120a) "Spandrel" means that portion of wall filling the space between the top of a window in one story and the sill of the window in the story above.

(120am) "Specialty event center" has the meaning given in s. 101.128 (1) (g), Stats.

Note: Section 101.128 (1) (g), Stats., defines specialty event center as an open arena used for rallies, concerts, exhibits, or other assemblies with no permanent structure for such assembly. Also refer to sub. (89g) for definition of an outdoor event.

(120b) "Step" means one riser and one tread.

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

Note: See Appendix A for further explanatory material.

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

(124) "Street" means any legally established public thoroughfare or all−weather hard surface area 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. Streets must extend at least 50% of the length of the side of the building and must be accessible to fire fighting equipment.

(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.

(125m) "Stud" means an upright member of a framing wall, having a spacing of less than 48 inches on center, and which is primarily intended to have sheathing fastened to it.

(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.

(130d) "Through penetration" means an opening that passes through an entire assembly that is a building element as listed in Table 51.03.

(130g) "Toilet room" means a room in a permanent structure solely designated for sanitary fixtures which ensures privacy of their use. A toilet room may include a water closet, urinal and a lavatory.

(130m) "Townhouse" means an apartment building where each living unit is served by an individual exterior exit within 3 feet of the exit discharge grade.

(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 propeller 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 employees and frequenters.

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

(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.

(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 the underside of the lowest floor. The volume of structures without enclosing walls (canopies, roofed shelters and similar structures) will be computed by projecting imaginary vertical planes as the enclosing walls at the outer surface of the exterior supports or columns. For cantilevered structures with interior supports, the imaginary vertical planes will be projected at the farthest roof projection or overhang.

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 30º 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.

Note: See Appendix A for further explanatory material.

(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.

(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.

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Note: See Appendix A for further explanatory material.

(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" means a building or structure used primarily for 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; am. (23) to (26), (97) and (139a), r. (86) (c), Register, December, 1978, No. 276, eff. 1−1−79; cr. (16a), (71a), (79a) and (114a), Register, May, 1980, No. 293, eff. 6−1−80; am. (1) and (124), r. (123), r. and recr. (120), renum. (102a) to be (102b), renum. (114a) to be (114b), cr. (19a), (36a), (36b), (36c), (37a), (38a), (38b), (71b), (75a), (80a), (82a), (102a), (114a), (119a), (119b), (119c) and (130a), Register, December, 1981, No. 312, eff. 1−1−82; renum. (71a) to be (71c), cr., (68a), (71a), (86a) and (93a), Register, February, 1982, No. 314, eff. 3−1−82; r. and recr. (7a), renum. (19a) to be (19b), cr. (7b) and (19a), Register, June, 1983, No. 330, eff. 7−1−83; renum. (120a) to be (120b), cr. (3a), (57b), (58a), (58b) and (120a), r. and recr. (13), am. (86) (a), (104) and (120), Register, December, 1983, No. 336, eff. 1−1−84; am. (7b), Register, February, 1984, No. 338, eff. 3−1−84; cr. (5b), (11a) and (29a), am. (75a) and (99), r. and recr. (104) and (114a), Register, August, 1985, No. 356, eff. 1−1−86; reprinted to correct error in (99), Register, May, 1988, No. 389; am. (5), (5b), (33) and (99), renum. (36c), (71a) to (71c) to be (36d), (71m), (71o) and (71p) and am. (71o), cr. (6m), (17g), (17m), (36c), (71k), (71n) and (117m), r. and recr. (11a), (19b) and (82), r. (114b) and (138), Register, February, 1991, No. 423, eff. 4−1−91; renum. (16) and (80) to be (15m) and (79m), cr. (16), (79r), (80) and (104m), Register, March, 1992, No. 435, eff. 4−1−92; cr. (105e), Register, October, 1992, No. 442, eff. 5−1−93; cr. (2m), (41g), (89g), (90g), (103g), (120am) and (130g); renum. (41a) and (130a) to be (41m) and (130m), Register, August, 1993, No. 452, eff. 3−1−94; cr. (17n) and (125m), am. (64), (75a) (a) to (e), (82), (86) (b) and (104) (b), r., and recr. (82a), (104a), (115) and (120b), Register, January, 1994, No. 457, eff 2−1−94; r. (79a), Register, March, 1995, No. 471, eff. 4−1−95; renum. (76a) to be (76b), cr. (76a), Register, August, 1995, No. 476, eff. 9−1−95; am. (7), r. and recr. (102), Register, December, 1995, No. 480, eff. 4−1−96; renum. (71o) to be ILHR 66.03 (4m), Register, June, 1996, No. 486, eff. 7−1−96; r. and recr. (16a), (71p), Register, October, 1996, No. 490, eff. 11−1−96; correction in (29) and (33) made under s. 13.93 (2m) (b) 6. and 7., Stats., Register, October, 1996, No. 490; r. and recr. (7), (102), (153a), cr. (29m), (29n) and (29o), Register, March, 1997, No. 495, eff. 4−1−97; cr. (2r), (41c), (52m), (81m), and (130d), Register, September, 1998, No. 513, eff. 10−1−98; am. (7) and (47), renum. (56a) to be (56m) and (119c) to be (119m), r. (60) and cr. (119e), Register, March, 2000, No. 531, eff. 4−1−00; renum. (71p) to be (71t), cr. (19m), (71p) and (103d) and r. and recr. (103g), Register, April, 2000, No. 532, eff. 7−1−00; renum. (1a) and (6m) to be (1m) and (1g), cr. (6m), (13m) and (114m), am. (11a), r. and recr. (42b), r. (104a), Register, September, 2000, No. 537, eff. 10−1−00.

Subchapter I — Standards for Classes of Construction

Comm 51.015 Scope. This chapter covers minimum standards for common types of building designs being constructed. This chapter does not specifically include standards for uncommon building designs such as shells, domes, space frames and similar types of designs. The standards contained in this chapter shall be used as a guide for uncommon building designs to achieve the degrees 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; am. Register, January, 1994, No. 457, eff. 2−1−94; **am. Register, September, 2000, No. 537, eff. 10−1−00.**

Comm 51.02 General requirements. (1) FIRE−RESISTIVE RATINGS. 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 s. Comm 51.042 (5).

(2) SUBSTITUTE. 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.

(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.

Note: See Comm 64.41 (1) for requirements pertaining to combustible ceiling materials used in conjunction with air−handling plenums.

(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) *General.* All floor framing shall satisfy the requirements of Table 51.03−A, unless more restrictive requirements are noted under the occupancy chapters of this code.

(b) *Permanent raised platforms.* 1. Permanent raised platforms shall be constructed of the types of materials and fire resistive properties as specified in:

a. Table 51.03−A line 3 or 4 for the appropriate class of construction and number of stories involved; or

b. Table 51.03−A line 18 for the appropriate class of construction, if the platform is directly supported by a structural floor system which satisfies the appropriate material and fire resistive properties as outlined in Table 51.03−A line 3 or 4.

2. Permanent raised platforms shall be designed and constructed to support the dead loads and live loads as specified in ss. Comm 53.10 and 53.11.

3. The highest floor level of a permanent raised platform which is constructed in accordance with subd. 1. b. may not be more than 3 feet above the structural floor.

4. The floor coverings of permanent raised platforms shall conform with s. Comm 51.07.

5. Spaces created between a permanent raised platform which is constructed in accordance with subd. 1. b. and the structural floor system supporting the platform may not be used for storage and other purposes, unless the platform floor system has at least a one−hour fire resistive rating.

6. Open sides of raised platforms shall be guarded in accordance with s. Comm 51.162.

(c) *Temporary platforms.* Temporary raised platforms may be provided and shall be designed and constructed to support the dead loads and live loads as specified in ss. Comm 53.10 and 53.11. A temporary raised platform to be used for more than 30 consecutive days shall conform with par. (b), the requirements for permanent raised floors.

(4) EXTERIOR WALL CONSTRUCTION. (a) All exterior walls which are in contact with the soil shall be of masonry or concrete except that all−weather wood foundations are permitted if constructed in accordance with the provisions outlined in s. Comm 53.64.

(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. In buildings where the class of construction permits exterior walls to be of combustible construction, no floor level that is more than one level below the first floor framing system may have exterior walls constructed of combustible materials.

(c) 1. Except as provided in subd. 2., fenestration in−fill panels in the exterior walls of existing buildings of types 1, 2, 3, 5A and

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5B construction meeting the percentage of openings requirements of Table 51.02−B shall be of noncombustible construction.

2. a. The studding and structural framework may be of fire retardant treated wood.

b. The interior finish of the in−fill panel may be of combustible materials providing the materials comply with the provisions of s. Comm 51.07.

c. Foam plastic insulation complying with the provisions of s. Comm 51.06 may be used in the construction of the in−fill panels provided the foam plastic is protected on both sides by an approved thermal barrier as specified in s. Comm 51.06 (3).

3. In−fill panels located in exterior walls required to have a fire−resistive rating need not be constructed to provide the hourly rating provided the panels satisfy the requirements of this section.

4. The exterior finish of the in−fill panel shall comply with the requirements of Table 51.03−A for the class of construction of the building in which the panel is located except that the exterior finish of in−fill panels located in buildings of types 5A or 5B construction need not be of masonry.

Table 51.02−B
Maximum Total Area Of Windows Or Other Openings In Percent Of Total Exposed Wall Surface

Setback from Property Line or Other Walls on same property	CLASS OF CONSTRUCTION				
	1. Fire Resistive "A" 2. Fire Resistive "B" 3. Metal Frame Prot. 4. Heavy Timber 5A Ext. Masonry 5B Ext. 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	No openings	No openings
5′ to less than 10′	20% A Fire Window is Required	30% A Fire Window is Required	30%	No openings	No openings
10′ to less than 30′	30%	40%	40%	40%	40%
30′ or over	No limit	No limit	No limit	No limit	No limit

(d) 1. Except as allowed under subd. 6, the maximum area of windows or other openings shall be as required by Table 51.02−B.

2. Table 51.02−B does not apply to property lines along streets.

3. The maximum percentage of openings in Table 51.02−B shall be calculated for each 100 lineal feet of wall measured in the plane of the wall. Wing walls, parapets or similar structures may not be used to increase the exposed wall area.

4. Fire windows required by Table 51.02−B shall comply with s. Comm 51.048.

5. Setbacks specified in Table 51.02−B shall be measured as specified in s. Comm 51.01 (115).

6. Where openings are permitted, and Table 51.02−B shows a numerical percentage of allowed openings, openings are allowed in excess of the given percentage, provided the excess openings are protected with automatic closing, 3−hour fire resistive door or shutter assemblies.

(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 ss. Comm 51.047 and 51.048, or fire damper or fire curtain door assemblies as specified in s. Comm 51.0485.

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

(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, including the area between 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 s. Comm 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, including the area between 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.

(b) Buildings on the same property may be located less than 30 feet from each other with no restriction on the percentage of wall openings, provided the combined gross area of the buildings, including the area between the buildings, is no more than the area permitted by the occupancy chapters of this code.

(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) IMBEDDED MATERIAL. (a) *Structural members*. Pipes, wires, cables, ducts or other service equipment shall not be imbedded in the required fire−resistive protection of any structural member.

(b) *Assemblies*. Pipes, wires, cables, metallic ducts or other service equipment may be imbedded or installed:

1. As permitted in approved fire−rated assemblies; or

2. In fire−resistive assemblies of 2−hour rating or less in buildings of Types No. 4 to 8 construction. The pipe, wire, cable, metallic duct or other service equipment shall be contained within the fire−resistive rated assembly.

(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) PROTECTION OF VERTICAL OPENINGS. (a) Except as specified in ss. Comm 54.08, 55.09, 57.08 and in par. (b), stairways, elevator shafts and other vertical openings, which serve 2 or more

floor levels, shall be enclosed with fire−resistive rated construction equal to or better than the hourly ratings specified in Table 51.03−A. Stairways serving as required means of egress shall comply with the requirements specified in s. Comm 51.18.

(b) *Exceptions*. Vertical openings need not be enclosed under the following conditions:

1. Serving and contained within individual living units;

2. Serving raised or depressed areas, open mezzanines or open balconies contained within a single story;

3. Serving 2 floor levels in buildings containing chs. Comm 54 to 58 or 60 to 62 occupancies provided:

a. The opening is not a required means of egress; and

b. The opening is separated from any exit access corridor or exit stairway by fire−resistive rated construction with at least the hourly rating specified for fire−rated enclosures in line 20 of Table 51.03−A; or

4. As permitted by chs. Comm 54 to 62.

(c) Openings in required exit enclosures shall be limited to exit doors serving public passageways and corridors or serving floors occupied by a single tenant.

(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 subd. 4. 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; and

4. Parapets are not required on exterior walls which front streets and alleys or where exterior walls connect with roofs of noncombustible construction. For the purposes of this requirement, built−up roof coverings of a class A rating, shall be considered as being noncombustible.

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

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

1. a. Except as provided in subd. 1. b., the fire division wall shall extend 3 feet above the roof. Where a difference in roof elevations occurs at the fire division, the parapet height shall be measured from the lower roof elevation.

b. Where a difference in roof elevations occurs at the fire division wall in buildings of Type No. 4 construction with combustible exterior walls, Type No. 7 or No. 8 construction, the fire division wall shall extend above the lower roof to the high roof elevation and shall be unpierced. In all cases, the fire division wall shall extend at least 3 feet above the lower roof elevation.

2. 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; or

3. 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. For the purposes of this requirement, built−up roof coverings, including those of a class A rating, shall be considered as being combustible and do not conform with the conditions of this requirement.

(b) Structural members shall not continue through or over the fire wall.

(c) 1. All openings in fire division walls shall be protected by fire−resistive door assemblies as specified in s. Comm 51.047.

2. The total area of all openings in any fire division wall in any one story shall not exceed 25% of the area of the wall in that story.

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

Note: See Appendix A for further explanatory material.

Note: See ch. Comm 69 for definition of "story" relative to accessibility issues.

(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 above or below; and

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

2. a. The elevation of the first floor and the sills of all required exit discharges from the first floor shall be not more than 6 feet above an exit discharge grade.

b. Existing buildings to be licensed as child day care centers or to be converted to sheltered facilities for battered women shall comply with the requirements specified in ss. Comm 57.015 and 60.105.

(b) An interior balcony or mezzanine shall be considered as a story if:

1. The net floor area of the balcony or mezzanine exceeds one−third of the net main area enclosed within exterior walls or fire division walls, or both; or

2. The net floor area of the balcony or mezzanine exceeds one−third of the net floor area enclosed with the walls of a single living unit or single tenant space.

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

(d) Total number of stories shall include the first floor plus all stories above and those stories determined by pars. (b) and (c).

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

(15) DECORATIVE COMBUSTIBLE MATERIALS. Any combustible materials applied to a required noncombustible exterior surface of "0" hourly rated construction or better shall not exceed the surface area percentage specified in Table 51.02−A, within any 100 lineal feet of the building.

TABLE 51.02−A

Separation of Building From Property Line or Other Buildings[1]	Maximum Surface Area Percentage[2]
Less than 10 feet	0
10 to 20 feet	10
20 to 30 feet	20
More than 30 feet	30

[1]The maximum surface area percentage along a street is 30, regardless of the separation.

[2]Fire−retardant treated wood may be applied to all required noncombustible exterior surfaces of "0" hourly rated construction without limit.

(16) PROJECTIONS INTO SETBACKS. (a) Unenclosed terraces, slabs or stoops, without roofs or walls, may be located within required setbacks providing they are not greater than 7 inches above adjacent grade at any point and are in contact with the ground to prevent an exposed cavity which could promote fire or smoke. Grade changes from these appendages shall be of a gradual slope.

(b) Open cantilevers, including but not limited to roof overhangs and eaves, may project 2 feet into the required setback from property lines. These cantilevers shall not project into the required setbacks between buildings on the same property.

(c) Enclosed or partially enclosed appendages, including but not limited to decks, porches or ramps, shall not project into the required setbacks from property lines or buildings on the same property.

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(18) ACCESS TO ATTIC AND ROOF. (a) *Attic.* Every attic compartment shall be provided with access from the floor level immediately below it. The access opening shall be at least 20 by 30 inches and shall be located above the stair landing or in an accessible location.

Note: A single access point to the attic from the floor level immediately below will be acceptable if all the attic compartments are interconnected with access openings of at least 20 by 30 inches.

(b) *Roof.* 1. Except as provided in subd. 2., all buildings more than 2 stories, or 25 feet in height, where the slope of the roof is less than 3 in 12, shall be provided with a means of access to the main roof from the floor level immediately below. The roof opening shall be at least 20 by 30 inches and shall be provided with a permanent ladder or stairway.

2. Roof access shall not be required in 3 story buildings without attic space.

(19) ATTIC COMPARTMENTALIZATION. (a) Except as provided in par. (b), attics of combustible construction shall be divided into areas not greater than 3,200 square feet as specified in this section.

1. Compartmentalization shall extend into the eave and soffit areas to provide a complete separation between compartments.

2. Panels for access openings in compartment walls shall be equipped with self−closing devices and shall normally be kept closed.

3. Materials used for attic compartmentalization shall be as specified in s. Comm 51.02 (24) (c).

(b) Attic compartmentalization need not be provided in buildings completely protected, including the attic space, by an automatic fire sprinkler system.

(20) CLASS OF CONSTRUCTION SEPARATION. (a) Except as provided in par. (b) and s. Comm 62.93, portions of buildings of different classes of construction, as specified in s. Comm 51.03, shall be separated by fire division walls as specified in s. Comm 51.02 (13) or the building classification will be reduced to the lowest class of construction utilized.

(b) A health care facility, parts of which are different types of construction as described in s. Comm 51.03, shall be classified as the lowest type of construction utilized, unless the different parts of the building are separated from one another by a separation wall in which case each part of the building shall be individually classified as to the appropriate type of construction. A separation wall:

1. Shall have a minimum fire−resistive rating of 2 hours;

2. Shall extend at least to the underside of the roof deck of the lowest part of the building to be separated; and

3. May not have structural members extend through or over it.

(21) HEIGHT LIMITATIONS. (a) Except as provided in par. (b), the height of buildings shall be limited as specified in the appropriate occupancy chapter for the building and as specified in s. Comm 51.03 and Table 51.03−A for the class of construction utilized.

(b) The height limitations specified in s. Comm 51.03 may be increased by one story and 10 feet in height in buildings, other than buildings within the scope of chs. Comm 58, 60 and 61, when the building is completely protected by an automatic fire sprinkler system and the system is supervised and monitored as specified in s. Comm 51.23 (9).

Note: See chs. Comm 54 to 61 for specific application of height increases. Tables 54.01−2, 57.02−3 and 59.12−2 already include the one story height increase.

(22) FIRE RESISTIVE RATINGS. (a) Except as provided in par. (b), the fire resistive ratings specified in chs. Comm 50 to 64 may be reduced in rating by one hour to a minimum of one hour in all buildings which are completely protected by an automatic fire sprinkler system and the system is supervised and monitored as specified in s. Comm 51.23 (9).

(b) The fire resistive rating may not be reduced for the following:

1. The fire−resistive ratings specified in ch. Comm 58;

2. The fire−resistive ratings specified for stairway enclosures in buildings more than 3 stories in height;

3. The fire−resistive ratings for buildings more than 60 feet in height; and

4. The fire−resistive ratings for buildings where increases in building area or building height due to automatic fire sprinkler system protection have been utilized.

(23) WOOD BLOCKING IN NONCOMBUSTIBLE RATED ASSEMBLIES AND ROOF ASSEMBLIES. Combustible wood blocking may be installed:

(a) At the intersection of roofs with exterior walls or parapet walls to fasten roof edging, roof membranes, facias and roofing expansion joints; and

(b) In noncombustible rated wall assemblies to fasten window frames, door frames, sinks, toilets and urinals, toilet partitions, grab bars, book shelves, and other similar components. In these applications, the amount of wood blocking shall not exceed that required to secure or fasten the item to the assembly.

(24) FIREBLOCKING OF CONCEALED SPACES. (a) *General.* 1. Fireblocking shall be installed in combustible concealed locations in accordance with this section.

2. Fireblocking shall be provided across the full width of intersections of interior and exterior walls with floors, ceilings and roof in order to cut off communication by fire through hollow concealed spaces and prevent both vertical and horizontal drafts.

3. Fireblocking shall be provided at openings around wires, vents, pipes, ducts and other penetrations in floors and ceilings at all levels to prevent vertical drafts.

4. Fireblocking shall be provided at openings around wires, vents, pipes, ducts and other penetrations in walls separating adjacent tenant spaces to prevent horizontal drafts.

5. Noncombustible fireblocking shall be provided between chimneys and wood framing at all floor levels.

6. Fireblocking shall be installed to remain securely in place when exposed to fire conditions.

7. The integrity of fireblocking shall be maintained.

(b) *Specific locations.* 1. Concealed spaces in stud walls or furred walls shall have fireblocking placed immediately above and below the junction of any floor construction with the walls, or shall be fireblocked the full depth of the joist.

2. Concealed spaces between vertical stud walls or partitions and the spaces created by soffits, dropped ceilings, cove ceilings and similar areas shall be fireblocked.

3. All concealed spaces between stair stringers at the top and bottom of the stair run shall be fireblocked.

4. All spaces between chimney and wood framing shall be solidly filled with noncombustible material at floor levels.

5. a. Except as provided in subd. 5. b. and c., wood floors laid on noncombustible construction with sleepers or furring strips shall be fireblocked so that no open space under the flooring will exceed 100 square feet.

b. Fireblocking is required only at the ends of each lane in a bowling facility.

c. Fireblocking is not required for slab−on−grade floors in gymnasiums unless the floor is partitioned into separate rooms or areas by permanent stud wall or furred wall construction.

Note: Subd. 1 still requires fireblocking under permanent walls that serve to subdivide the gymnasium floor.

(c) *Fireblocking materials.* Where combustible material is allowed under this section, fireblocking shall consist of one of the following:

1. Lumber with a nominal thickness of at least 2 inches.

2. Two layers of lumber, each with a nominal thickness of one inch, with staggered lap joints.

3. Wood structural panel or particle board with a nominal thickness of 3/4 inch thick with joints backed.

4. Gypsum board with a minimum thickness of 1/2 inch.
5. Cement fiber board.
6. Fiberglass or mineral wool batts or blankets.
7. Caulk, putty or drywall compound.
8. Other noncombustible materials.

(25) COMBUSTIBLE STORAGE. Combustible materials covered under the scope of NFPA 230 shall be stored in accordance with the requirements of NFPA 230.

Note: NFPA 230, Standard for the Fire Protection of Storage, is intended to apply to a broad range of combustible materials stored indoors and outdoors. Examples include plastics, rubber tires, baled cotton and roll paper. Configurations include palletized, solid piled, in bin boxes, on racks or on shelves. Exemptions include high−hazard materials, such as flammable liquids and unpackaged bulk material, such as grain or coal.

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; am. (4) (a), (18) and (19), cr. (15) (a) and (20), Register, December, 1978, No. 276, eff. 1−1−79; am. (11) (a) and (c) (intro.), (13) and (19), r. and recr. (6) (b), Register, January, 1980, No. 289, eff. 2−1−80; r. and recr. (11), am. (14) (a) 2., r. (14) (a) 3., Register, December, 1981, No. 312, eff. 1−1−82; reprinted to correct error in (14) (a) 2., Register, February, 1982, No. 314; am. (11) (a) and (19), Register, October, 1982, No. 322, eff. 11−1−82; cr. (4) (c) and (13) (c), r. (6), am. (11) (b) 3., (14) (a) 2. and (20), Register, December, 1983, No. 336, eff. 1−1−84; am. (4) (c) 2. c., (9), (11) (b) 3., (13) (c) 2., (14) (b) and (18) (b), r. and recr. (13) (a) 1., Register, August, 1985, No. 356, eff. 1−1−86; emerg. cr. (21) and (22), eff. 9−6−86; cr. (21) and (22); Register, November, 1986, No. 371, eff. 12−1−86; am. (3) (a), (12) (a) 4., (13) (a) 3., cr. (3) (c) and (d), r. (4) (b) 1. b. and (14) (d), r. and recr. (11) (b) 3., (14) (a) 2. a., (b) and (20) (b), renum. (14) (e) to be (14) (d) and am., Register, February, 1991, No. 423, eff. 4−1−91; renum. (3) (a), (c) and (d) to be (a), (b) and (c) and am. (a), (b) 1. intro., b. and 3, and (c), am. (7) (a) 1. and 2. and (9), cr. (7) (b), (16) and (23), r. and recr. (15), Register, January, 1994, No. 457, eff. 2−1−94; cr. (22) (b) 5., Register, March, 1994, No. 459, eff. 4−1−94; cr. (4) (b) 1. b., Register, March, 1995, No. 471, eff. 4−1−95; correction in (22) (b) 5. made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1996, No. 490; r. (22) (b) 5., Register, April, 1998, No. 508, eff. 5−1−98; am. (4) (c) 1., (5) (a) 1., (15) and (19) (a) (intro.), cr. (4) (d) and Table 51.02−B, (19) (a) 3., (24) and (25), renum. Table 51.02 to be Table 51.02−A, Register, March, 2000, No. 531, eff. 4−1−00.

Comm 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.

(b) A building of this classification shall be limited in height in accordance with Table 51.03−C.

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

(d) Doors and windows may be of wood except as otherwise specified in s. Comm 51.02 (5), Table 51.02−B, ss. Comm 51.17, 51.18, 51.19 and 51.20, or in the occupancy chapters of this code.

(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) The wall construction behind a mansard shall extend to the underside of the 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.

(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 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) A building of this classification shall be limited in height in accordance with Table 51.03−C.

(c) 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;
2. Solid lumber not less than 3 inches in nominal thickness, set on edge securely fastened together;
3. Approved $1^1/_8$ 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 s. Comm 51.02 (5), Table 51.02−B, ss. Comm 51.17, 51.18, 51.19 and 51.20, or in the occupancy chapters of this code.

(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) The wall construction behind a mansard shall extend to the underside of the 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.

(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) A building of this classification shall be limited in height in accordance with Table 51.03−C.

(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 as required for exterior walls.

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TABLE 51.03-A
CLASSES OF CONSTRUCTION FIRE-RESISTIVE RATINGS IN HOURS

	BUILDING ELEMENT	MODIFYING CONDITIONS: NUMBER OF STORIES m	MODIFYING CONDITIONS: SEE NOTES f g n BLDG SETBACK DIST. TO P/L OR TO OTHER BLDG. ON SAME PROP.	TYPES OF CONSTRUCTION: FIRE RESISTIVE TYPE A No. 1	FIRE RESISTIVE TYPE B No. 2	METAL FRAME PROTECTED No. 3	HEAVY TIMBER No. 4	EXTERIOR MASONRY, PROT No. 5A	EXTERIOR MASONRY, UNPROT No. 5B	METAL FRAME UNPROTECTED No. 6	WOOD FRAME PROTECTED No. 7	WOOD FRAME UNPROTECTED No. 8	APPLICABLE NOTES SEE S. ILHR 51.03 FOR CONSTRUCTION STANDARDS
1.	INTERIOR SUPPORTS (columns, piers, frame legs, posts)	Over 8 stories or more than 85 ft. in height		NC-4	NC-3	NP	NP	NP	NP	NP	NP	NP	a d
2.		8 stories or 85 ft. in height or less		NC-3	NC-2	See s. ILHR 51.03 (3) NC-1	See s. ILHR 51.03 (4) H.T. or NC-1	See s. ILHR 51.03 (5) 1	See s. ILHR 51.03 (5) 0	See s. ILHR 51.03 (6) NC-0	See s. ILHR 51.03 (7) 1	See s. ILHR 51.03 (8) 0	a d
3.	FLOOR FRAMING (beams, girders, joists, slabs, deck)	More than 2 stories		NC-3	NC-2	See s. ILHR 51.03 (3) NC-1	See s. ILHR 51.03 (4) H.T. or NC-1	See s. ILHR 51.03 (5) 1	See s. ILHR 51.03 (5) 0	See s. ILHR 51.03 (6) NC-0	1	0	a
4.		2 stories or less		NC-2	NC-1	NC-1	See s. ILHR 51.03 (4) H.T. or NC-1 1 Story H.T. or 0	1	0	See s. ILHR 51.03 (6) NC-0 or 1	1	0	a
5.	ROOF FRAMING (trusses, beams, girders, joists, frame rafters, purlins, deck)	Over 8 stories or more than 85 ft. in height		NC-2	NC-1-1/2	NP	NP	NP	NP	NP	NP	NP	a
6.		3 to 8 stories or 85 ft. in height or less		NC-2	NC-1-1/2	NC-1	See s. ILHR 51.03 (4) H.T. or NC-1	1	0	NC-0	1	0	a
7.		2 stories or under 25 ft. in height		NC-1	NC-1	NC-1	See s. ILHR 51.03 (4) H.T. or NC-1	See s. ILHR 51.03 (5) 1	See s. ILHR 51.03 (5) 0	NC-0	See s. ILHR 51.03 (7) 1	0	a
8.		1 story - roof framing more than 20 ft. above fl.		NC-0	See s. ILHR 51.03 (2) NC-0	NC-0	See s. ILHR 51.03 (4) H.T. or NC-1	0	0	0	0	0	a
9.		1 story - roof framing 20 ft. or less above fl.		NC-1	NC-1	NC-1	See s. ILHR 51.03 (4) H.T. or NC-1	1	0	0	See s. ILHR 51.03 (7) 1	0	a
10.	ROOF COVERING			CLASS A	CLASS A	CLASS A	CLASS B	CLASS B	CLASS B	CLASS C	CLASS C	CLASS C	a
11.	EXTERIOR WALLS & COURT WALLS Includes columns in the plane of the wall and outward therefrom. Does not include interior furring attached to inside surface of wall. (see Table 51.03-B concerning openings)		Bearing - Less than 10 ft.	NC-4	NC-3	NC-2	NC-2	2	2	NC-2	See s. ILHR 51.03(7)(a) 4	See s. ILHR 51.03 (8)(d) 4	a d e f
12.			Bearing - 10 ft. to 30 ft. inclusive	NC-3	NC-2	NC-3/4	1	2	1	NC-0	1	0	a c d e f
13.			Bearing - Over 30 ft.	NC-2	NC-1	NC-0	1	2	1	NC-0	1	0	a c d e f k
14.			Nonbearing - Less than 10 ft.	NC-2	NC-2	NC-1	NC-1	2	1	NC-1	See s. ILHR 51.03(7)(e) 4	See s. ILHR 51.03(8)(d) 4	a d e f
15.			Nonbearing - 10 ft. to 30 ft. inclusive	NC-1	NC-1	NC-0	1	2	1	NC-0	1	0	a c d e f
16.			Nonbearing - Over 30 ft.	NC-0	NC-0	NC-0	3/4	1	0	NC-0	1	0	a c d e f h k
17.	INTERIOR WALLS BEARING			NC-3	NC-2	NC-1	1	1	1	NC-0	1	0	a j
18.	PARTITIONS			NC-0	NC-0	NC-0	0	0	0	0	0	0	a j
19.	REQUIRED EXIT CORRIDOR ENCLOS.			NC-2	NC-2	NC-1	1	1	1	1	1	1	a
20.	FIRE ENCLOSURE (stairways, elevators, p vertical shafts)	Over 3 stories		NC-2	NC-2	NC-2	2	2	1	1	1	1	a f
		3 stories or less		NC-2	NC-2	NC-1	1	1	1	1	1	1	a f
21.	PENTHOUSE WALLS			NC-0	NC-0	NC-0	0	NC-0 or 3/4	NC-0 or 3/4	0	0	0	a h
22.	PENTHOUSE ROOF			NC-0	NC-0	NC-0	0	0	0	0	0	0	a b

KEY TO ABBREVIATIONS

NC - Noncombustible
NP - Not Permitted
H.T. - Heavy Timber
P/L - Property Line

KEY EXAMPLE TO READING CHART

0 = 0, No Hour Rating
1 = Combustible or Noncombustible 1-Hour Rating
NC-0 = Noncombustible 0-Hour Rating

a - See occupancy sections of the code for other basic requirements and more restrictive limitations.
b - Roof covering same as for main building.
c - Walls of solid wood 4 inches in thickness are acceptable as equal to 1-hour fire-resistive rating.
d - Fire-resistive requirements also apply for those bracing members required for gravity loading.
e - Refer to Table 51.03-B for allowable areas for windows and other openings in exterior walls.
f - For exceptions, refer to s. ILHR 51.02.
g - Setbacks and distances to P/L or other buildings on same property do not apply to P/L along streets.
h - Approved fire-retardant treated wood will be accepted in lieu of 3/4-hour fire-resistive ratings.
j - For openings in partitions and interior bearing walls, see s. ILHR 51.02.
k - Hourly ratings specified as for fire exposure from the inside of the building only.
m - See Table 51.03-C concerning height limitations.
n - Setbacks shall be measured as specified in ILHR 51.01 (115).
p - The elevator machine rooms shall have the same fire-resistive rating specified in line 20 for fire enclosures. Where the elevator machine room is the only room located above the roofline of a building, the fire-resistive rating for fire enclosures is not required.

TABLE 51.03−C
HEIGHT LIMITATIONS
BASED ON CLASS OF CONSTRUCTION

Class of Construction	Sprinklered[a,b]		Nonsprinklered	
	Height (in feet)	Number of Stories[c]	Height (in feet)	Number of Stories[c]
Type 1	No limit	No limit	60[d]	No limit
Type 2	95	9	60[d]	8
Type 3	85	5	60[d]	4
Type 4	85	5	60[d]	4
Type 5A	60	5	50	4
Type 5B	50	4	40	3
Type 6	60	4	50	3
Type 7	50	4	40	3
Type 8	45	3	35	2

[a] An automatic fire sprinkler system designed and installed in accordance with s. Comm 51.23 is provided throughout the entire building.
[b] Section Comm 51.02 (21) and (22) may limit or restrict the credit for sprinklers as it applies to the maximum height or number of stories permitted depending upon the type of occupancy involved or whether a reduction in fire−resistive ratings has been utilized.
[c] The occupancy chapters, chs. Comm 54 to 62, may further limit or restrict the maximum number of stories based upon the type of occupancy involved or the number or type of occupants.
[d] Section Comm 52.01 requires the installation of sprinklers for buildings more than 60 feet in height.

(e) The wall construction behind a mansard shall extend to the underside of the 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, and all building elements are as set forth in Table 51.03−A unless otherwise exempted.

(b) A building of this classification shall be limited in height in accordance with Table 51.03−C.

(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 ch. Comm 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.

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*. 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 buildings of 4 or more stories, 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;

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

3. Approved $1^1/_8$ 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.

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

(5) EXTERIOR MASONRY, PROTECTED AND UNPROTECTED (NOS. 5A AND 5B). (a) A building is of protected or unprotected exterior masonry construction if all exterior walls are constructed of masonry or reinforced concrete or of other materials in combination with a minimum 6 inch nominal masonry wall and all building elements are as set forth in Table 51.03−A unless otherwise exempted.

(b) A building of this classification shall be limited in height in accordance with Table 51.03−C.

(c) The interior structural framing shall be metal, reinforced concrete, masonry or wood. Fire protection of metal or wood structural members shall be as specified in Table 51.03−A.

(d) In walls where fire protection is required, the bottom of lower flange of steel 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, stringer, truss member or top and bottom member of a wood I−Beam may 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) The portion of exterior wall above the bearing points of the roof structural framing system and enclosing non−occupied space shall be considered part of the roof construction and shall comply with the requirements of Table 51.03−A for roof framing.

(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.

(b) A pole building is considered type No. 6, metal frame unprotected construction, provided the following conditions are satisfied:

1. The poles supporting the roof only shall be at least 6 inches by 8 inches nominal in dimension. Poles supporting floors shall be 8 inches by 8 inches nominal in dimension. Poles may be built

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up from individual 2−inch nominal lumber if the pieces are bolted or glued and nailed together;

2. The girts shall be of noncombustible, fire−retardant treated wood or heavy timber construction;

3. The enclosing wall skin shall be of noncombustible materials. A non−structural 2" x 6" nominal wood skirt is permitted if it is in contact with the ground or foundation;

4. The roof cover shall have a class B rating or better; and

5. All other requirements of this section and Table 51.03−A are satisfied.

(c) A building of this classification shall be limited in height in accordance with Table 51.03−C.

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

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

(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 at least equal to or better than those set forth in Table 51.03−A. Except as specified in s. Comm 51.03 (5) (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) A building of this classification shall be limited in height in accordance with Table 51.03−C.

(c) Floors, roofs, partitions and stairs may be of wood, but no joist, rafter, stud, or stringer, truss member or top and bottom member of a wood I−Beam may 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 s. Comm 51.04.

(e) Buildings of wood frame protected construction may be located less than 10 feet from a property line provided any wall closer than 10 feet from a property line is a 4−hour fire division wall, without openings, as specified in s. Comm 51.02 (13).

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

(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 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 unprotected building.

(b) A building of this classification shall be limited in height in accordance with Table 51.03−C.

(c) Floors, roofs, partitions and stairs may be of wood but no joist, rafter, stud, stringer, truss member or top and bottom member of wood I−Beam may be less than 2 inches in nominal thickness.

(d) Buildings of wood frame unprotected construction may be located less than 10 feet from a property line provided any wall closer than 10 feet from a property line is a 4−hour fire division wall, without openings, as specified in s. Comm 51.02 (13).

History: Cr. Register, June, 1972, No. 198, eff. 1−1−73, am. table A and (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. table B and (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; renum. (6) (b) to (d) to be (6) (c) to (e), cr. (6) (b), (7) (e) and (8) (d), am. (1) (f) (intro.), (h), (i), (2) (g) (intro.), (i), (j), (3) (e) (intro.), (4) (a), (5) (a) (intro.) and (8) (a), Register, December, 1978, No. 276, eff. 1−1−79; am. (1) (d)1., (2) (e)1., (5) (g) (intro.) and (6) (a)3., cr. (5) (a)3., Register, January, 1980, No. 289, eff. 2−1−80; am. (5), (7) (a), (b) and (e), (8) (d), cr. (9) (f), Register, December, 1981, No. 312, eff. 1−1−82; am. (5) (a) and (7) (f), Register, October, 1982, No. 322, eff. 11−1−82; am. table A, (3) (d) and (6) (c), r. (1) (h) and (i), (2) (i) and (j) and (6) (a) 13., cr. (4) (i) and (7) (g), r. and recr. (5) (h), Register, December, 1983, No. 336, eff. 1−1−84; am. (7) (f), Register, August, 1985, No. 356, eff. 1−1−86; r. and recr. table A, (1) (b), (2) (b), (3) (b), (4) (b), (5) (b), (6) (c), (7) (b) and (8) (b), cr. table c, r. (1) (d) 1., (2) (e) 1. and (7) (f), renum. (7) (g) to be (f), Register, March, 1991, No. 423, eff. 4−1−91; am. tables A and B, (4) (g), (5) (e), (7) (c) and (8) (c), r. and recr. (1) (f), (2) (g) and (3) (e), r. (5) (g), renum, (5) (h) to be (5) (g), Register, January, 1994, No. 457, eff. 2−1−94; am. Table 51.03−B, Register, December, 1995, No. 480, eff. 4−1−96; r. and recr. Table 51.03−B, Register, March, 1997, No. 495, eff. 4−1−97; r. (1) (a) 1., Register, September, 1998, No. 513, eff. 10−1−98; am. (1) (d) and (2) (e), r. Table 51.03−B, Register, March, 2000, No. 531, eff. 4−1−00.

Subchapter II — Fire−Resistive Standards for Materials of Construction

Comm 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.

Comm 51.042 General requirements. (1) Construction details and the quality of materials used for fire resistive assemblies shall be those used by the testing laboratory for the listed test assembly or those recognized by good engineering practice, including:

(a) The addition of mineral fiber or glass fiber insulation within a stud cavity without reducing the fire resistive rating of wall or partition assembly when not specified as the listed assembly.

(b) The substitution of studs with greater depths than those specified in a listed wall or partition assembly without reducing the fire resistive rating of the assembly.

(c) An increase in the distance between parallel rows of studs, such as in chase wall assemblies, greater than those specified in listed wall or partition assemblies without reducing the fire resistive rating of the assembly.

(2) 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) (a) All products manufactured and tested according to ASTM standard methods prior to the effective dates of the standards specified in ASTM E−119 shall be accepted unless the ASTM standard method used in the test is judged to be inadequate in comparison with the most currently adopted standard method.

(5) The heat transmission requirements of ASTM E−119, with the exception of high hazard areas, penal and health care facilities and warehouses for combustible materials, may be reduced to one−half (1/2) of the hourly rating required by this code, but not less than one hour.

Note: See s. A 52.011 of Appendix A for additional information pertaining to high hazard occupancies.

(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.

(7) In one−hour fire−resistive rated construction and in living unit separations as specified in s. Comm 57.01 (2), the ceiling may be omitted over unusable crawl space not more than 42 inches in height and the flooring may be omitted where unusable space occurs above.

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(8) Structural elements which support building components or assemblies required to have a fire−resistive rating shall be protected to afford at least the same fire−resistive rating of the component or assembly supported.

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; cr. (7), Register, December, 1981, No. 312, eff. 1−1−82; cr. (8), Register, December, 1983, No. 336, eff. 1−1−84; am. (7), Register, August, 1985, No. 357, eff. 1−1−86; r. and recr. (1), am. (5) (intro.), Register, March, 1991, No. 423, eff. 4−1−91; renum. (2) (a) and (4) (a) to be (2) and (4) and am. (4), Register, January, 1994, No. 457, eff. 2−1−94**;** r. (1) (d), Register, March, 2000, No. 531, eff. 4−1−00.

Comm 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.

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

(c) Approved method of calculation in lieu of approved test (see s. Comm 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**;** am. (1) (a), Register, March, 2000, No. 531, eff. 4−1−00.

Comm 51.044 Testing laboratories. 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; am. table, Register, December, 1978, No. 276, eff. 1−1−79; r. and recr., Register, December, 1981, No. 312, eff. 1−1−82; r. and recr. table, Register, December, 1983, No. 336, eff. 1−1−84; r. and recr. table, Register, August, 1985, No. 356 eff. 1−1−86; r. and recr. Register, February, 1991, No. 423, eff. 4−1−91; r., Register, March, 2000, No. 531, eff. 4−1−00.

Comm 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 pars. (a) through (r), shall be acceptable.

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

(a) *Types of concrete.* 1. Type I—normal weight concrete with lime−stone, 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.

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 $^1/_2$ the tabulated value. Top cover to be a minimum of $^3/_4$ 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 s. Comm 51.042 (5).

Table 2

TYPICAL EXAMPLES OF FIRE RESISTIVE STRUCTURAL COMPONENTS

Components Without Applied Protection—
CONCRETE CAST IN PLACE AND PRECAST MILD STEEL REINFORCEMENT

Row No.	Structural Components	Insulating Material	Description	Sketch & Minimum Requirements											
1.	Columns	Concrete Type I, II & III (a) (b)		4 Hour			3 Hour			2 Hour			1 Hour		
				I	II	III	I	II	III	I	II	III	I	II	III
			Reinf. Cover	2	2	2	2	2	2	1½	1½	1½	1½	1½	1½
			Min. Dim. & Area−Sq. In.	12−144			10−120			8−64			6−48		
2.	Girders and Beams	Concrete Type I, II & III (a) (b) (n)		4 Hour			3 Hour			2 Hour			1 Hour		
				I	II	III	I	II	III	I	II	III	I	II	III
			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
3.	Joists and Waffles without Fillers or Partial Fillers of Masonry or Clay Tile Filler	Concrete Type I, II & III (a) (b) (c) (d) (e) (h) (n)		4 Hour			3 Hour			2 Hour			1 Hour		
				I	II	III	I	II	III	I	II	III	I	II	III
			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
4.	Slabs or Joists and Waffles with Masonry or Clay Tile Filler	Concrete Type I, II & III (a) (b) (c) (d) (e) (h) (n)		4 Hour			3 Hour			2 Hour			1 Hour		
				I	II	III	I	II	III	I	II	III	I	II	III
			Reinf. Cover	1	1	1	1	1	1	¾	¾	¾	¾	¾	¾
			Th. Top Slab (t)	6¾	7	5½	5¾	6¼	4¾	4¾	5	3¾	3¼	3½	2¾
5.	Walls and Partitions Bearing and Nonbearing	Concrete Type I, II & III (a) (b) (e)		4 Hour			3 Hour			2 Hour			1 Hour		
				I	II	III	I	II	III	I	II	III	I	II	III
			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

Table 2 (continued)

Components Without Applied Protection—
CONCRETE PRECAST & CAST IN PLACE POST–TENSION OR PRE–TENSIONED SIMPLE SPAN

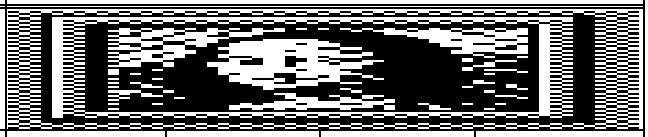
Row No.	Structural Components	Insulating Material	Description	Sketch & Minimum Requirements											
															
6.	Girders and Beams	Concrete Type I, II & III (a) (b) (k)		4 Hour			3 Hour			2 Hour			1 Hour		
				I & II		III	I & II		III	I & II		III	I & II		III
			Ave. Cover	3½		3	3		2¾	2½		2	1¾		1¾
			(w)	11		10	9½		8	7		6¼	4		4
7.	Joists and Waffles	Concrete Type I, II & III (a) (b) (c) (d) (e) (k)		4 Hour			3 Hour			2 Hour			1 Hour		
				I & II		III	I & II		III	I & II		III	I & II		III
			Ave. Cover	3½		3	3		2¾	2½		2	1¾		1¾
			Ave. Web Th. (w)	11		10	9½		8	7		6¼	4		4
			Slab Th. (t)	6¾	7	5½	5¾	6	4¾	4¾	5	3¾	3¼	3½	2¾
8.	Single Tee	Concrete Type I, II & III (a) (b) (c) (d) (e) (k)		4 Hour			3 Hour			2 Hour			1 Hour		
				I & II		III	I & II		III	I & II		III	I & II		III
			Ave. Cover	2¾		2¾	1¾		1¾	1¾		1¾	1¾		1¾
			Ave. Web Th. (w)	8		8	8		8	8		8	4		4
			Top Thick's (t)	6¾	7	5½	5¾	6	4¾	4¾	5	3¾	3¼	3½	2¾
9.	Multi–Tee Units	Concrete Type I, II & III (a) (b) (c) (d) (e) (k)		4 Hour			3 Hour			2 Hour			1 Hour		
				I & II		III	I & II		III	I & II		III	I & II		III
			Ave. Cover	By Test or Listing by Approved Testing Laboratory						2		1¾	1¾	1½	1½
			Ave. Web Th. (w)							4	4	4	2½	2½	2½
			Top Thick's (t)							4¾	5	3¾	3¼	3½	2¾
10.	Solid and Cored Slabs	Concrete Type I, II & III (a) (b) (c) (d) (e) (h) (k)		4 Hour			3 Hour			2 Hour			1 Hour		
				I & II		III	I & II		III	I & II		III	I & II		III
			t_1 or t_2	6¾	7	5½	5¾	6	4	4¾	5	3¾	3¼	3½	2¾
			Ave. Cover	2½		2¼	2		1¾	1¾		1½	1		1

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Table 2 (continued)

Components Without Applied Protection—
MASONRY BEARING AND NONBEARING

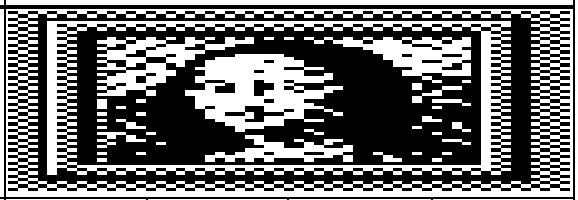
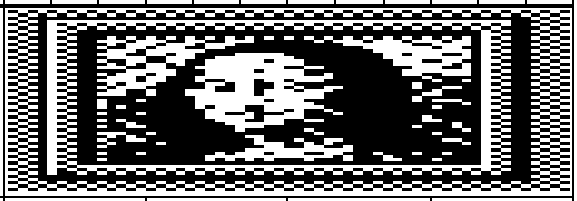
Row No.	Structural Components	Insulating Material	Description	Sketch & Minimum Requirements											
															
11.	Unreinforced Concrete Walls and Partitions	Concrete Type I, II & III (a) (m)		4 Hour			3 Hour			2 Hour			1 Hour		
				I	II	III	I	II	III	I	II	III	I	II	III
			Wall Th. (t)	6	6½	5	5	5½	4½	4	4½	4	3	3	3
															
12.	Hollow Masonry Walls and Partitions— Block Tile, Cored Bricks, Cavity Walls	Coarse Aggregate (g) (m)		4 Hour			3 Hour			2 Hour			1 Hour		
		Expanded Slag	Equiv. Thick's (r)	4.7			4.0			3.2			2.1		
		Expanded Clay, Shale or Slate	Equiv. Thick's (r)	5.1			4.4			3.6			2.6		
		Limestone, Cinders, Unexpanded Slag	Equiv. Thick's (r)	5.9			5.0			4.0			2.7		
		Calcareous or Siliceous Gravel	Equiv. Thick's (r)	6.2			5.3			4.2			2.8		
13.	Solid Masonry Brick Block— Clay Tile with Less than 25% Voics or with the Cores Filled	Masonry Clay, Shale, Concrete, Sand or Lime (m)		4 Hour			3 Hour			2 Hour			1 Hour		
			Wall Th. (t)	10″			8″			6″			4″		

Table 2 (continued)

Components With Direct Applied Protection— STEEL														
Row No.	**Structural Components**	**Insulating Material**	**Description**	**Sketch & Minimum Requirements**										
14.	Columns			**4 Hour**			**3 Hour**			**2 Hour**			**1 Hour**	
				I	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**
		Concrete Type I, II & III (a) (p)	Thickness of Protection (t)	2	2½		1½	2		1	1½		1	1	
		Solid Masonry (i)	Thickness of Protection (t)	3¾	3¾		3¾	3¾		2¼	2¼		2¼	2¼	
15.	Girders...Beams... Trusses			**4 Hour**			**3 Hour**			**2 Hour**			**1 Hour**	
				I	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**
		Concrete Type I, II & III (a) (p)	Thickness of Protection (t)	2	2½		1½	2		1	1½		1	1	
16.	Columns...Beams... Girders...Trusses... Joists and Steel Floor Units	Sprayed Fiber...Cementitious Mixture...Intumescent Paints		**4 Hour**			**3 Hour**			**2 Hour**			**1 Hour**	
				By Tests...or Listing by Approved Testing Laboratory										

Table 2 (continued)

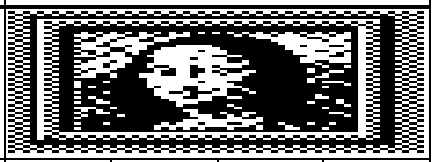
Components With Suspended or Attached Protection— CONCRETE							
Row No.	**Structural Components**	**Insulating Material**	**Description**	**Sketch & Minimum Requirements**			
							
17.	Concrete Joists or Waffle			**4 Hour**	**3 Hour**	**2 Hour**	**1 Hour**
		Concrete Type I, II or III ¾″ cover (a) (c) (d)	t_s Slab Thickness	3″	2″		
		Vermiculite...gypsum...or perlite gypsum on metal lath	t_i Insulation Thickness	1″	¾″		

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Table 2 (continued)

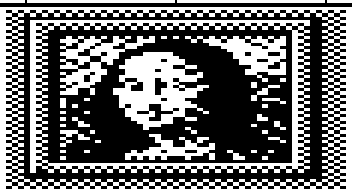
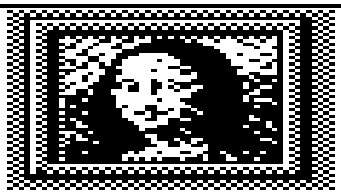
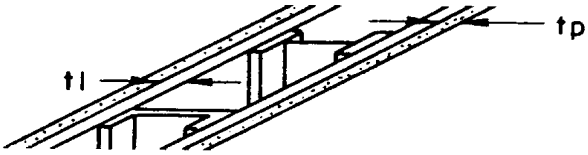
Components With Suspended or Attached Protection— STEEL FRAMING							
Row No.	**Structural Components**	**Insulating Material**	**Description**	**Sketch & Minimum Requirements**			
18.	Steel Columns			**4 Hour**	**3 Hour**	**2 Hour**	**1 Hour**
		Type I & II Masonry 1½″ air space (j)	t Insulation Thickness	4″ solid			
							
19.	Steel Girders...Beams...Trusses... Joists, Columns Individually Protected	Sprayed Fibre... Cementitious Mixture...Lath & Plaster		**4 Hour**	**3 Hour**	**2 Hour**	**1 Hour**
				By Tests...or Listing by Approved Testing Lab			
							
20.	Steel Beams, Girders, Trusses and Joists...with Ceiling Protection and Minimum 2½ Th. Type I, II or III Concrete Slab a(c)(d)	Sprayed Fibre... Cementitious Mixture...Lath & Plaster Acoustical Tile		**4 Hour**	**3 Hour**	**2 Hour**	**1 Hour**
				By Tests...or Listing by Approved Testing Lab			
							
21.	Steel Stud Partition Nonbearing, Min. 2½″ Stud			**4 Hour**	**3 Hour**	**2 Hour**	**1 Hour**
		Gypsum...Perlite Plaster on Perforated Gyp. Lath	t_p Plaster t_l Lath			$^3/_4$″ $^3/_8$″	$^1/_2$″ $^3/_8$″
		Gypsum Wall Board (q)	No. Layers Thick, Each			Two $^5/_8$″	One $^5/_8$″

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Table 2 (continued)

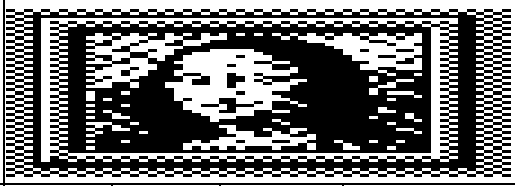
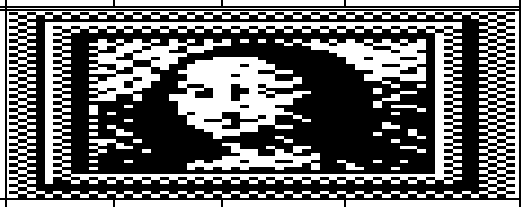
Components With Suspended or Attached Protection— COMBUSTIBLE CONSTRUCTION							
Row No.	**Structural Components**	**Insulating Material**	**Description**	**Sketch & Minimum Requirements**			
22.	Wood Joists Min. 2″ x 10″, Wood Floor Attached Ceiling (q)			**4 Hour**	**3 Hour**	**2 Hour**	**1 Hour**
		Gypsum Wallbrd Below 2″ x 10″s Max. 24″ o/c	t_i Wallbrd Thickness				$^5/_8$″
		½″ Plywood or 1″ x 6″ T&G Sub−Flrg	t_f Flooring				$^5/_8$″ Plywood or Nom. 1″ x 3″ T&G
							
23.	Wood Joists Min. 2″ x 10″, Wood Floor Suspended Ceiling			**4 Hour**	**3 Hour**	**2 Hour**	**1 Hour**
		Noncombustible Acoustical Tile Below 2″ x 10″s 16″ o/c	t_i Insulation				$^5/_8$″
		$^5/_8$″ Plywood or Nom. 1″ x 4″ T&G Sub−Flrg	t_f Flooring				$^1/_2$″ Plywood or Nom. 1″ x 6″ T&G
							
24.	Wood Stud Partition Min. 2″ x 4″ Stud			**4 Hour**	**3 Hour**	**2 Hour**	**1 Hour**
		Gypsum Wallboard (q)	No. Layers/Th. of Each			Two $^5/_8$″	Two $^3/_8$″ or One $^5/_8$″
		Gypsum Perlite Plaster on $^3/_8$″ Gypsum Lath	t_p			1″ plas. w/1″ hex. mash	$^9/_{16}$″ plaster
		Gypsum & Sand Plaster on U.L. Listed Wire Lath	t_t				$^3/_4$″ plaster
		Gypsum & Vermiculite Plaster on Metal Lath	t_t				$^3/_4$″ plaster

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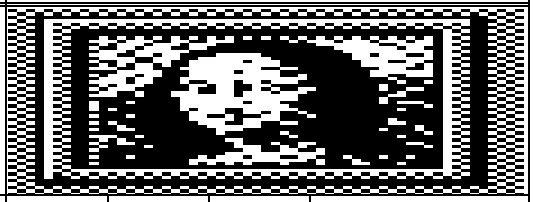
Table 2 (continued)
Heavy Timber Construction Table

HEAVY TIMBER SOLID OR LAMINATED							
Row No.	**Structural Components**	**Insulating Material**	**Description**	**Sketch & Minimum Requirements**			
							
25.	Columns	Wood All Species		**4 Hour**	**3 Hour**	**2 Hour**	**1 Hour**
			Floor...Width x Depth Min. Nom.				8″ x 8″
			Roof...Width x Depth Min. Nom.				6″ x 8″
26.	Girders and Beams	Wood All Species		**4 Hour**	**3 Hour**	**2 Hour**	**1 Hour**
			Min. Width x Depth (Nom.)				6″ x 10″
27.	Arch and Truss for Roof Only	Wood All Species		**4 Hour**	**3 Hour**	**2 Hour**	**1 Hour**
			Min. Width x Depth Each Member				4″ x 6″
28.	Floor and Roof Deck	Wood All Species		**4 Hour**	**3 Hour**	**2 Hour**	**1 Hour**
			Roof				2″ Nom. T&G or 3″ Solid
			Floor				3″ Nom. T&G + 1″ Nom. T&G or 4″ Solid

(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.

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

(h) $$t^2\text{−equivalent thickness} = \frac{\text{Total volume minus volume of voids}}{\text{length times height}}$$

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

(j) $1^1/_2$ 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 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.

(q) $5/_8$ gypsum wallboard shall be type "X" or "C".

(r) The specified hourly rating may be increased by 2 hours if the cores are filled with loose, dry expanded slag, water repellent vermiculite or burned clay or shale.

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; am. (1) (intro.) and (q), Register, December, 1981, No. 312, eff. 1−1−82; r. and recr. table 2, line 12, r. (1) (f) cr. (1) (r), Register, December, 1983, No. 336, eff. 1−1−84; am. (1) (intro,) and table 2, line 18, Register, February, 1991, No. 423, eff. 4−1−91.

Comm 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.

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

(a) Time—temperature relationship ASTM E−119;

(b) The temperature—strength characteristics of the structural components;

(c) The time—temperature characteristics of the insulating material, at the temperature range designated by ASTM E−119;

(d) The expansion characteristics of the materials comprising the member, at the temperature range designated by ASTM E−119; and

Note: For ASTM E−119 standard adopted see s. Comm 51.25 (4) Table 51.25−10. The department will accept published research data from the Portland Cement Association, the American Iron & Steel Institute, and the American Institute of Steel Construction, Inc.

(e) The safety factor of not less than 1.0 shall be maintained at the end of the time requirement for the full design live load 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; renum. (1) (a) (intro.) and 1. to 5. to be (2) (intro.) and (a) to (e) and am. Register, January, 1994, No. 457, eff. 2−1−94.

Comm 51.047 Fire−rated door assemblies in fire−rated construction. (1) GENERAL. (a) Except as provided in pars. (b) and (c) and ss. Comm 51.048 and 51.049, an opening, where permitted in a fire−resistive rated assembly, shall be protected by means of a fire−resistive rated door assembly installed and maintained in accordance with NFPA 80.

(b) Where a fire−resistive wall assembly is used only as an interior bearing wall as specified in line 17 of Table 51.03−A, and is not also used for separation purposes, the opening does not require protection with a fire−resistive rated door assembly, provided all parts of the opening maintain the fire−resistive rating of the wall assembly.

(c) Openings in fire−resistive rated assemblies to accommodate conveyor systems shall be protected with one of the following: 1. A fire−resistive rated door assembly installed and maintained in accordance with NFPA 80.

2. A water spray system installed in accordance with NFPA 15 and all of the following:

a. Initiating devices shall be installed on both sides of the penetrated assembly.

b. Nozzles shall protect the entire opening on both sides of the assembly.

c. The conveyor shall be constructed such that it stops running when the spray system is activated.

d. The minimum design density of the water spray shall be 0.50 gallons per minute per square foot of protected opening.

e. The minimum water supply duration shall be 120 minutes.

(2) The fire−resistive rated door assembly shall be tested in accordance with NFPA 252 or UL 10B and listed and labeled as having the fire−resistive rating required by Table 51.047.

TABLE 51.047
MINIMUM FIRE−RESISTIVE RATINGS OF DOOR ASSEMBLIES

Fire−Resistive Rating of a Wall or Wall Assembly	Fire−Resistive Rating of Door Assembly	
4−hour	3−hour	A
3−hour	3−hour	A
2−hour	$1^1/_2$−hour	B
1−hour	$^3/_4$−hour	C

The letter A, B or C following the hourly rating designates the location for which the assembly is designed, which is intended to agree with NFPA Standard 80. Compliance with the hourly rating is required regardless of the letter designation.

(3) 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.

(a) Labeled fire−door assemblies shall not be modified without written acceptance from the testing laboratory.

(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 CLOSING DEVICES. All labeled fire doors, where required, shall be equipped with an approved automatic or self−closing device as defined in s. Comm 51.01 (17). A fusible link may not be used to activate an automatic closing device.

(a) All doors serving smokeproof towers or interior enclosed stairways shall be equipped with a self−closing device or an automatic closing device actuated by products of combustion other than heat.

(b) The requirements of par. (a) shall also be retroactive to existing buildings.

(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.

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(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; cr. (2) (a), Register, January, 1980, No. 289, eff. 2−1−80; am. (1), Register, December, 1981, No. 312, eff. 1−1−82; am. (6) (a), Register, December, 1983, No. 336, eff. 1−1−84; r. and recr. (1), Register, March, 1991, No. 423, eff. 4−1−91; am. (1) (a) 2. and Table, Register, January, 1994, No. 457, eff. 2−1−94; am. (1) (a) 1., cr. (1) (a) 3., Register, September, 1998, No. 513, eff. 10−1−98; r. and recr. (1), r. (3) and (5), renum. (2) to be (3) and (6) to be (5), cr. (2) and am. (5), Register, March, 2000, No. 531, eff. 4−1−00.

Comm 51.048 Fire window and glass block assemblies in fire−rated construction. (1) WINDOW OPENINGS. (a) Except as allowed under par. (b), window openings, where permitted in fire−resistive rated assemblies, shall be protected with fire window or glass block assemblies installed and maintained in accordance with NFPA 80 and rated as 3/4−hour when tested in accordance with NFPA 257 or UL 9 by an approved laboratory.

(b) Where a fire−resistive wall assembly is used only as an interior bearing wall as specified in line 17 of Table 51.03−A, and is not also used for separation purposes, the opening does not require protection with a fire−resistive window assembly, provided all parts of the opening maintain the fire−resistive rating of the wall assembly.

(c) Windows are not permitted in fire−resistive rated assemblies required to have a fire−resistive rating greater than one hour unless specifically permitted elsewhere in this code.

(2) SIZE. (a) *Fire window assemblies*. The sizes and dimensions of the glazing materials and the frames may not exceed their respective listing. Windows combined in multiple assemblies shall be separated by approved nonbearing metal mullions.

(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.

(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, 1/4−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 $^1/_8$ 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.

(d) *Approved glass*. Glass for a fire window application shall conform to the conditions and limitations of its listing.

(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; r. and recr. (2) (a), cr. (3) (d), Register, March, 1991, No. 423, eff. 4−1−91; am. (1), Register, January, 1994, No. 457, eff. 2−1−94; renum. (1) to be (1) (a) and am., cr. (1) (b), Register, September, 1998, No. 513, eff. 10−1−98; am. (1) (a), r. and recr. (1) (b) and cr. (1) (c), Register, March, 2000, No. 531, eff. 4−1−00.

Comm 51.0485 Fire dampers, smoke dampers and ceiling dampers. (1) Except as provided under sub. (2), ducts that terminate at or pierce a code−required, fire−resistive rated assembly shall be protected with a listed fire damper, smoke damper or ceiling damper installed and maintained in accordance with the requirements of NFPA 90A.

(2) Kitchen exhaust ducts serving a hood may not have a damper installed, except under one of the following conditions:

(a) The damper is listed for such use or is part of a listed device or system.

(b) A carbon dioxide extinguishing system is installed.

Note: See s. Comm 64.67 (6) (g) for requirements on carbon dioxide extinguishing systems, in addition to the requirements of NFPA 12.

Note: See s. Comm 64.67 (5) (f) for duct enclosure requirements.

History: Cr. Register, March, 2000, No. 531, eff. 4−1−00.

Comm 51.049 Miscellaneous penetrations in fire−resistive construction. (1) GENERAL. (a) Except as specified in pars. (c) and (d), penetrations into or through fire−resistive assemblies, fire protective membranes, thermal barriers, or construction providing a finish rating as an alternative to a fire resistive assembly shall be protected in accordance with this section.

(b) Where an approved fire−stop system is used, the system shall be tested and listed for the specific application regarding the size of the opening, the size and type of the penetrating objects, the type of assembly penetrated, and the size of the annular space to be fire stopped.

(c) Where tested and listed fire resistive assemblies under s. Comm 51.044 are being used and the listing provisions regarding membrane penetrations are in conflict with this section, the provisions of the tested and listed assembly shall govern.

(d) Where the fire−resistive assembly is being used to provide only the protection required as a structural building element, as specified in lines 1 through 17, 21 and 22 of Table 51.03−A, is not also used for separation purposes and is a through penetration, the opening need not be protected in accordance with par. (a) if the opening is effectively fire stopped to ensure that the fire−resistive integrity of the structural element will not be reduced.

(2) DUCT OPENINGS. The annular space around the outside of a duct that penetrates into or through fire−resistive construction, as described in sub. (1) (a), shall be protected in accordance with one of the following:

(a) The recommendations of the manufacturer of the fire damper or the fire curtain door, when the duct is provided with a fire damper or fire curtain door at the penetration.

(b) An approved fire−stop system having an F−rating not less than the hourly rating of the assembly being penetrated.

(c) Grout, concrete or mortar for the full depth of the penetrated assembly when the assembly is constructed of concrete or masonry.

Note: See s. Comm 51.0485 for fire damper and fire curtain door requirements.

(3) NONCOMBUSTIBLE PENETRATING ITEMS. (a) *Through− penetrations*. Through−penetrations of fire−resistive assemblies by noncombustible wiring items or noncombustible piping items, excluding glass piping, shall be in accordance with this subsection.

(b) *Openings of 100 square inches or less*. Where the area of an opening is 100 square inches or less and the total aggregate area of all such openings does not exceed 100 square inches in any 100 square feet of surface area being penetrated, the annular space around the penetrating item shall be protected in accordance with one of the following:

1. Closed with an approved fire−stop system having an F−rating not less than the hourly rating of the assembly being penetrated.

2. Filled to the full depth of the penetrated assembly with grout, concrete, or mortar, when the assembly is constructed of concrete or masonry.

(c) *Openings larger than 100 square inches*. 1. Wall assemblies. Where a wall assembly opening is larger than 100 square inches or the total aggregate area of all such openings exceeds 100 square inches in any 100 square feet of wall surface area, the annular space around the penetrating item shall be closed with an approved fire−stop system having an F−rating not less than the hourly rating of the assembly being penetrated.

2. Floor assemblies. Where a floor assembly opening is larger than 100 square inches or the total aggregate area of all such open-

ings exceeds 100 square inches in any 100 square feet of surface area and the openings are not contained within a wall or column at the point the floor is penetrated, the annular space around the penetrating item shall be closed with an approved fire−stop system having an F− rating not less than the hourly rating of the assembly being penetrated.

(4) COMBUSTIBLE PENETRATING ITEMS. Through−penetrations of fire−resistive assemblies by combustible piping items, glass piping, or combustible wiring items shall be protected with an approved fire−stop system having an F−rating not less than the hourly rating of the assembly being penetrated.

(5) MEMBRANE PENETRATIONS. (a) *Openings around objects.* 1. Except as provided in subds. 2. to 4., the annular space of a membrane penetration into a fire−resistive assembly, or through a fire−protective membrane, a thermal barrier, or construction providing a finish rating as an alternative to a fire resistive assembly, shall be protected in the same manner as that provided for the membrane of a through−penetration of a similar assembly under sub. (2), (3), or (4).

2. The annular space of a membrane penetration that occurs around electrical outlet and switch boxes that are listed by an approved testing laboratory as either "outlet boxes and fittings classified for fire resistance" or "metallic outlet boxes" is not required to be protected in accordance with subd. 1., if the width of the space is 1/8 inch or less.

3. The annular space of a membrane penetration that occurs around a fire sprinkler and which is provided with a metal escutcheon plate is not required to be protected in accordance with subd. 1.

4. Membrane penetrations by electrical outlet and switch boxes that are listed by an approved testing laboratory as "outlet boxes and fittings classified for fire resistance" shall be used subject to the requirements and limitations of the listing.

(b) *Metallic outlet boxes.* The membrane penetration of vertical fire−resistive construction having a rating of 2 hours or less, including a fire−resistive wall assembly, a fire−protective membrane, a thermal barrier, or construction providing a finish rating as an alternative to a fire resistive assembly, that is created by electrical outlet and switch boxes that are listed by an approved testing laboratory as "metallic outlet boxes," shall be subject to all of the following:

1. The surface area of an individual box may not exceed 16 square inches.

2. The aggregate surface area of the boxes may not exceed 100 square inches per 100 square feet of wall surface.

3. Boxes shall not be installed on opposites sides of walls or partitions of staggered stud construction unless tested and listed for use in staggered stud construction by an approved testing laboratory.

4. Where boxes are located on opposite sides of a non−staggered stud wall or partition, the boxes shall be separated by a minimum horizontal distance of 24 inches, unless installed in accordance with one of the following:

a. The boxes shall be protected with a listed wall opening protective material installed in accordance with the listing.

b. The boxes shall be separated by solid fire blocking in accordance with s. Comm 51.02 (24).

(6) CONSTRUCTION JOINTS. (a) *General.* Except as allowed under par. (b), all joints between adjacent fire−resistive rated assemblies, such as between floor and wall assemblies, shall be designed and installed to maintain the hourly rating of the assembly.

(b) *Exceptions.* Fire−resistive construction joint systems are not required for joints in the following locations:

1. Floors within a single dwelling unit.

2. Floors where the joint is protected with a fire−resistive shaft enclosure in accordance with s. Comm 51.02 (11) (a).

3. Floors within atriums where the adjacent space is included in the volume of the atrium for smoke control purposes.

4. Floors within malls.

5. Floors within open parking structures.

6. Mezzanine floors.

7. Walls that are permitted to have unprotected openings.

8. Roofs where openings are permitted.

9. Control joints tested in accordance with ASTM E 119 that have a maximum joint width of 5/8 inch.

10. Joints that were tested as an integral part of the fire−resistive rated assembly.

(c) *Classification and testing.* 1. Except as allowed under subd. 2., construction joints under par. (a) shall be classified by an independent testing laboratory based on testing in accordance with UL 2079.

2. Voids at the intersection of fire−resistive rated assemblies and exterior curtain walls shall be protected with materials tested in accordance with ASTM E 119.

History: Cr. Register, December, 1975, No. 240, eff. 1−1−76; cr. (3), Register, January, 1980, No. 289, eff. 2−1−80; am. (3) (intro.), Register, December, 1981, No. 312, eff. 1−1−82; am. (1), (3) (c) and (d), Register, March, 1991, No. 423, eff. 4−1−91; am. (3) (intro.) and (b), Register, January, 1994, No. 457, eff. 2−1−94; r. and recr., Register, September, 1998, No. 513, eff. 10−1−98; am. (5) (b) 4. (intro.), r. and recr. (5) (b) 4. a. and b. and cr. (6), Register, March, 2000, No. 531, eff. 4−1−00.

Comm 51.05 Roof coverings. Roof coverings of class A, B, C or unclassified shall be provided as specified under "Classes of Construction" s. Comm 51.03 (1) to (8) or under the specific occupancy requirements of chs. Comm 54 to 62.

Note: Brick, concrete, tile, slate, and ferrous, cupreous and other 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; am. Register, January, 1994, No. 457, eff. 2−1−94.

Comm 51.06 Foam plastics. (1) SCOPE. The requirements of this section shall apply to the use of foam plastics in building construction.

(2) FLAME SPREAD AND SMOKE DEVELOPED CRITERIA. Except as otherwise provided, all foam plastic and foam plastic cores in manufactured assemblies used in building construction, shall have a flame spread rating of not more than 75 and a smoke developed rating of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E84.

(3) THERMAL BARRIER. (a) Except as provided in subs. (4) to (7), foam plastics shall be separated from the interior of a building by an approved thermal barrier of $^1/_2$ inch gypsum wallboard or equivalent thermal barrier material which will limit the average temperature rise of its unexposed surface to not more than 250°F. after 15 minutes of fire exposure as specified in the ASTM E119 standard time temperature curve or the equivalent using the Small Scale Horizontal Exposure Furnace, with samples for the test having a minimum length and width of 3 feet by 3 feet.

(b) The thermal barrier shall be installed in such a manner that it will remain in place for at least 15 minutes based upon approved diversified tests.

(4) EXTERIOR APPLICATIONS. The following requirements shall apply to all exterior uses of foam plastics unless specifically approved as specified in sub. (7):

(a) *Masonry or concrete components.* Foam plastics may be used without the thermal barrier specified in sub. (3) regardless of the class of construction, when the foam plastic is protected by a minimum of one inch thickness of masonry or concrete in a wall or floor system;

(b) *Noncombustible hourly rated and combustible hourly rated construction.* Foam plastics may be used within the cavity or as an element of a noncombustible hourly rated or combustible hourly rated system or assembly provided:

1. The system or assembly meets the requirements of s. Comm 51.04 for time−rated construction;

2. a. Except as provided in subd. 2. b., a thermal barrier as specified in sub. (3) is provided;

b. The thermal barrier may be omitted for exterior walls provided that the foam plastic insulation does not exceed 4 inches in thickness, has a flame spread rating of 25 or less, and is covered by a thickness of not less than 0.032 inch aluminum or corrosion−resistant sheet steel having a base metal thickness of 0.016 inches and the wall height does not exceed 50 feet and the entire building or that portion of the building closed by the walls is protected with an automatic fire sprinkler system; and

3. a. Except as provided in subd. 3., the exterior side of the assembly or system is covered with a cladding material meeting the requirements for noncombustible construction, and the wall assembly shall not propagate flame over the surface or through the core when subjected to a full scale test with the assembly in its end use condition or when subjected to an approved diversified test;

b. The exterior coating, facing or cladding material for walls may be of other than noncombustible material provided that the foam plastic core, coating, facing and cladding, each when tested individually shall have a flame spread of 25 or less and a smoke developed rating of 450 or less when tested in accordance with ASTM E84; facing, coating, cladding and core material shall be fastened to each other to prohibit failure in bond as a result of temperature which may be experienced in a building fire, or from winds or other conditions; and the wall assembly shall not propagate flame over the surface or through the core when subjected to a full scale test with the assembly in its end use condition or when subjected to an approved diversified test.

(c) *Noncombustible 0−hour (NC−0) rated construction.* Foam plastics may be used within the cavity or as an element of noncombustible 0−hour (NC−0) rated construction provided the following conditions are satisfied:

1. The foam plastic core material has a flame spread of 25 or less and a smoke developed rating of 450 or less when tested in accordance with ASTM E84;

2. a. Except as provided in subd. 2. b., a thermal barrier as specified in sub. (3) is provided;

b. The thermal barrier may be omitted for exterior walls provided that the foam plastic insulation does not exceed 4 inches in thickness, and is covered by a thickness of not less than 0.032 inch aluminum or corrosion−resistant sheet steel having a base metal thickness of 0.016 inches and the wall height does not exceed 50 feet and the entire building or that portion of the building enclosed by the walls is protected with an automatic fire sprinkler system; and

3. a. The exterior side of the assembly or system is covered with a cladding material meeting the requirements for noncombustible construction as specified in s. Comm 51.01 (86);

b. The exterior coating, facing or cladding material for walls may be of other than noncombustible material provided that the coating, facing and cladding, shall have a flame spread of 25 or less and a smoke developed rating of 450 or less when tested in accordance with ASTM E84;

c. The facing, coating, cladding and core material shall be fastened to each other to prohibit failure in bond as a result of temperature which may be experienced in a building fire, or from winds or other conditions; and

d. The wall assembly shall not propagate flame over the surface or through the core when subjected to a full scale test with the assembly in its end use condition or when subjected to an approved diversified test.

Note: Light−transmitting plastic veneer or combustible veneer materials conforming to the requirements of this paragraph need not meet the height and area limitations for light−transmitting plastics (see s. Comm 51.065).

(d) *Combustible nonrated construction.* Foam plastic insulation may be used within the cavity or as an element of combustible nonrated construction (0) provided the following conditions are satisfied:

1. The distance to a property line or other building on the same property meets the requirements of Table 51.03−A;

2. Thermal barriers as specified in sub. (3) are provided; and

3. The exterior side of the assembly or system is covered with a cladding material meeting the requirements for combustible construction as specified in Table 51.03−A.

(e) *Roofing.* Foam plastic may be used as part of a class A, B or C or unclassed roof covering as specified in s. Comm 51.05. The foam plastic:

1. Shall not be limited as to smoke development rating;

2. May not be limited as to flame spread rating if it is a component of a factory−made composite insulation or assembly and the roof system complies with the calorimeter requirements of FM 4450 or UL 1256;

3. May be installed without a protective thermal barrier if the foam plastic has a flame spread rating of 75 or less when tested at the maximum thickness intended for use and the roof system complies with the calorimeter requirements of FM 4450 or UL 1256; and

4. May be installed without a protective thermal barrier if the foam plastic has a flame spread rating of 75 or less when tested at the maximum thickness intended for use and the foam plastic is separated from the building interior by a minimum of one inch thickness of masonry or concrete or a minimum of $^1/_2$ inch thickness plywood bonded with exterior glue and properly edge supported, or equivalent.

(5) OTHER APPLICATIONS. (a) *Interior construction.* Foam plastic may be used as an element of or attached to interior construction components, including walls, partitions, floor/ceiling assemblies and similar components that divide interior spaces within the building, as follows:

1. Within the cavity or as an element of a noncombustible hourly rated or combustible hourly rated system or assembly provided the system or assembly meets the requirements of s. Comm 51.04 for time−rated construction for at least one hour with a fire exposure on both sides of the system or assembly; or

2. Within the cavity or as an element of noncombustible 0−hour (NC−0) rated construction or combustible nonrated construction (0) provided the foam plastic is protected on both sides by a thermal barrier as specified in sub. (3).

(b) *Attics and crawl spaces.* 1. Attics may be insulated with unprotected foam plastic provided the ceiling between the attic and the occupied space is covered by $^1/_2$ inch gypsum wallboard or equivalent and the attic space is not used for storage or air handling purposes.

2. Crawl space walls may be insulated with unprotected foam plastic provided the floor between the crawl space and the occupied space consists of at least $^3/_4$ inch tongue and groove plywood sheathing or equivalent, and the crawl space is not used for storage or air handling purposes.

3. Foam plastic shall be protected by a thermal barrier as specified in sub. (3) when the foam plastic is installed in an attic or crawl space and the area is used for storage or air handling purposes.

(c) *Doors and shutters.* 1. a. Except as provided in subd. 1. b., where doors and shutters are permitted without a fire−resistive rating, foam plastic having a flame spread rating of 75 or less may be used as a core material when the facing is metal having a minimum thickness of 0.032 inch aluminum or sheet steel having a minimum thickness of 0.0160 inch.

b. Foam plastic core sectional overhead doors covered by at least 1/8 inch thick hardboard may be used wherever nonrated combustible doors are permitted.

2. A thermal barrier is not required for doors and shutters meeting the requirements specified in subd. 1.

(d) *Siding backer board.* Foam plastic not more than $^1/_2$ inch thick may be used as siding backer board provided it is separated

from the interior of the building by not less than 2 inches of mineral fiber insulation or equivalent in lieu of the thermal barrier or when applied as insulation when residing over existing wall construction.

(e) *Decorative trim.* Foam plastic used as decorative trim shall conform with the provisions of s. Comm 51.07.

(f) *Protection from ultraviolet light.* Foam plastic insulation installed on the exterior of buildings above grade shall be permanently covered or protected to prevent degradation caused by exposure to ultraviolet light.

(6) SPECIFIC APPLICATIONS. (a) *Refrigerated facilities.* 1. Except as provided in subd. 2., foam plastic installed and meeting the requirements of sub. (2) when tested in a thickness of 4 inches may be used in thicknesses up to 10 inches in cold storage rooms, refrigerated food processing rooms, ice plants and similar areas. The foam plastic for refrigerated rooms within a building shall be protected on both sides by a thermal barrier as specified in sub. (3).

2. Except as provided in subd. 3., foam plastic insulation may be used without the thermal barrier when the foam plastic has a flame spread rating of 25 or less when tested as specified in subd. 1., is covered by not less than 0.032 inch of aluminum or corrosion−resistant steel having a base metal thickness not less than 0.016 inch at any point and is protected by an automatic fire sprinkler system. When a cooler or freezer module is located within a building, both the cooler or freezer module and that part of the building in which the module is located shall be protected by an automatic fire sprinkler system.

3. Foam plastics may be used in a thickness up to 4 inches in freestanding coolers or freezers having an aggregate floor area less than 400 square feet without a thermal barrier and without an automatic fire sprinkler system.

(b) *Bulk vegetable storage.* Buildings used exclusively for the bulk storage of vegetables shall have the foam plastic insulation protected on the occupied side by $^{5}/_{8}$ inch exterior grade plywood, or equivalent.

(7) SPECIFIC MATERIALS APPROVAL. Foam plastic not meeting the requirements of this section may be approved by the department for specific application based on the submittal and written acceptance of data from approved diversified tests.

Note: See ss. Comm 52.01to 52.013 for additional rules pertaining to automatic fire sprinkler systems.

Note: See s. Comm 50.19 for additional information pertaining to product approval.

History: Cr. Register, May, 1979, No. 281, eff. 6−1−79; cr, (3) (b) 8. a., Register, May, 1980, No. 293, eff. 6−1−80; cr. (3) (b) 11., Register, December, 1981, No. 312, eff. 1−1−82; r. and recr. Register, December, 1983, No. 336, eff. 1−1−84; am. (2), (3) (a), (4) (b) 3.b., (4) (c)1. and 3.b. and (4) (e) 2. and 3., Register, August, 1985, No. 356, eff. 1−1−86; am. (4) (b) 1. and (6) (a) 3. b., Register, March, 1991, No. 423, eff. 4−1−91; am. (4) (e) 2. and 3. and (5) (b) 3., Register, January, 1994, No. 457, eff. 2−1−94; am. (6) (a) 3. b., Register, February, 1999, No. 518, eff. 3−1−99; renum. and am. (6) (a) 3. a. to be (6) (a) 3. and r. (6) (a) 3. b., Register, March, 2000, No. 531, eff. 4−1−00.

Comm 51.065 Light−transmitting plastics. **(1)** SCOPE. (a) The requirements of this section shall apply to the quality and methods of application of plastics for use as light−transmitting materials in buildings and structures. When used as interior finish, plastic materials shall meet the requirements of s. Comm 51.07.

(b) Light−transmitting plastic shall meet one of the following combustibility classifications:

1. Classification CC 1 for plastic materials that have a burning rate of one inch per minute or less when tested in a nominal 0.060−inch thickness or in the thickness intended for use, in accordance with ASTM D 635.

2. Classification CC 2 for plastic materials that have a burning rate of 2.5 inches per minute or less when tested in a nominal 0.060−inch thickness or in the thickness intended for use, in accordance with ASTM D 635.

(c) Each unit or package of light−transmitting plastic shall be identified with a mark or decal satisfactory to the department that includes identification as to the material classification.

(2) DEFINITIONS. For the purpose of this section, the following definitions shall apply.

(a) "Approved light−transmitting plastic" means a single layer or multilayered composite consisting of thermoplastic, thermosetting or reinforced plastic material which has a self−ignition temperature [of] 650° F or greater when tested in accordance with ASTM D 1929, a smoke density rating no greater than 450 when tested in accordance with ASTM E 84 in the way intended for use, or a smoke density rating no greater than 75 when tested in the thickness intended for use by ASTM D 2843. Multilayered composite material shall comply as a composite in the configuration intended for use.

(b) "Glass fiber reinforced plastic" means plastic reinforced with glass fiber having not less than 20% of glass fibers by weight.

(c) "Interior secondary glazing system" means construction consisting of a glazed panel of approved light−transmitting plastic positioned on the interior side of a primary window set in an exterior wall which is designed primarily to control energy losses through exterior windows or glazed panels and is not intended for use as primary or exterior windows.

(d) "Light diffusing system" means a suspended construction consisting in whole or in part of lenses, panels, grids or baffles suspended below independently mounted electrical lighting sources.

(e) "Plastic glazing" means single glazing plastic materials which are glazed or set in a frame or sash and not held by mechanical fasteners which pass through the glazing material.

(f) "Plastic roof panels" means single glazing plastic materials which are fastened to structural members or to structural panels or sheathing and which are used as light−transmitting media in the plane of the roof.

(g) "Plastic wall panels" means single glazing plastic materials which are fastened to structural members or to structural panels or sheathing and which are used as light−transmitting media in exterior walls.

(h) "Thermoplastic material" means a plastic material which is capable of being repeatedly softened by increase of temperature and hardened by decrease of temperature.

(i) "Thermosetting material" means a plastic material which is capable of being changed into a substantially non−reformable product when cured.

(3) GLAZING OF UNPROTECTED OPENINGS. (a) *General.* Doors, sash and openings which are not required to be protected with fire window or glass block assemblies may be glazed with approved light−transmitting plastic in the following occupancies:

Note: See Table 51.03−B for additional requirements pertaining to windows and wall openings.

1. Schools and Other Places of Instruction under ch. Comm 56;

2. Residential Occupancies under ch. Comm 57; and

3. All other occupancies under chs. Comm 54, 55, 58, 59, 60, 61 and 62, subject to the following requirements:

a. Except as provided in par. (b), the area of such light−transmitting plastic glazing may not exceed 25% of the wall face of the story in which it is installed;

b. Except as provided in par. (b) 2., the area of a pane of light−transmitting plastic glazing installed above the first story shall not exceed 16 square feet where the vertical dimension of a pane may not exceed 4 feet and there shall be a spandrel constructed of materials meeting the requirements for exterior walls of s. Comm 51.03 and Table 51.03−A for the class of construction utilized between stories measuring a minimum of 3 feet in the vertical dimension;

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c. Except as provided in par. (b) 2., approved light−transmitting plastics shall not be installed more than 75 feet above grade level;

d. Combinations of light−transmitting plastic glazing and light−transmitting plastic wall panels shall be subject to the area, height and percentage limitations and separation requirements applicable to the class of plastics as specified in sub. (4).

(b) *Exceptions.* 1. Approved light−transmitting plastic glazing may be installed in areas up to 50% of the wall area of each story in structures less than 75 feet in height which are provided on each floor above the first floor with fire canopies projecting at least 3 feet from the surface of the wall and extending at least 3 feet horizontally beyond the edge of the opening above, or equivalent. The size and dimension requirements specified in par. (a) 3. b. shall not apply.

2. Where an approved automatic fire sprinkler system is provided, the permissible area of light−transmitting plastic glazing permitted by par. (a) 3. a. may be increased to a maximum of 50% of the wall face of the story in which the glazing is installed and shall be exempt from the requirements specified in par. (a) 3. b. and c.

(4) EXTERIOR WALL PANELS. (a) *General.* Subject to requirements specified in par. (b), approved light−transmitting plastics may be used as wall panels in exterior walls not requiring a fire−resistive rating in all occupancies except the following:

1. Theaters and Assembly Halls under ch. Comm 55;

2. Health Care, Correctional and Detention Facilities under ch. Comm 58; and

3. All high hazard occupancies.

(b) *Area and separation limitations.* 1. Except as provided in par. (c), area limitation and separation requirements of exterior light−transmitting plastic wall panels shall be as specified in Table 51.065−1.

2. Vertical spandrel wall separation constructed of materials meeting the requirements for exterior walls of s. Comm 51.03 and Table 51.03−A for the class of construction utilized between stories shall be:

a. Three feet for CC 1 plastic wall panels; or

b. Four feet for CC 2 plastic wall panels.

TABLE 51.065−1

AREA LIMITATION AND SEPARATION REQUIREMENTS FOR LIGHT−TRANSMITTING PLASTIC WALL PANELS*

Set−Back Distance to Property Line or Other Walls on Same Property	Class of Plastic	Maximum % Area of Exterior Walls in Plastic Panels	Maximum Single Area (Square Feet)	Minimum Separation of Panels (Feet)	
				Vertical	Horizontal
5 feet or less	—	NP	NP	—	—
5 feet or more	CC 1	10	50	8	4
but less than 10 feet	CC 2	NP	NP	—	—
10 feet or more	CC 1	25	90	6	4
but less than 30 feet	CC 2	15	70	8	4
Over 30 feet	CC 1	50	Not limited	3	0
	CC 2	25	100	6	3

NP means not permitted
*The requirements of this Table do not apply to greenhouses. See ch. Comm 62, subch. VI.

(c) *Exceptions.* 1. In structures which are provided on any floor above the first with continuous horizontal projections extending at least 36 inches from the surface of the wall in which light−transmitting plastic wall panels are installed, there need be no vertical separation at that floor except that provided by the vertical thickness of the projection.

2. Where an approved automatic fire sprinkler system is provided in the building, the maximum percent area of light−transmitting plastic panels in the exterior wall and the maximum square feet of single area given in Table 51.065−1 may be increased 100% but in no case may the area of light−transmitting plastic wall panels exceed 50% of the wall area.

(5) ROOF PANELS. (a) *General.* Except in chs. Comm 55 and Comm 58 occupancies and high hazard occupancies, approved light−transmitting plastic roof panels may be installed as follows, subject to the requirements specified in par. (b):

1. In roofs of buildings protected by an approved automatic fire sprinkler system;

2. Where the roof is not required to have a fire resistance rating; or

3. Where the light−transmitting plastic roof panels meet the requirements for roof coverings of the appropriate class of construction.

Note: See s. A52.011 for additional information regarding high hazard occupancies.

(b) *Limitations.* Except as provided in par. (c), the use of light−transmitting plastic roof panels shall be limited as follows:

1. Individual light−transmitting plastic roof panels or units shall be separated from each other by a distance of not less than 4 feet measured in a horizontal plane.

2. Where exterior wall openings are required to be protected, no light−transmitting plastic roof panels or units may be installed within 8 feet of such exterior wall.

3. Light−transmitting plastic roof panels or units shall be limited in area and the aggregate area of panels shall be limited by a percentage of the floor area of the room or space sheltered in accordance with Table 51.065−2.

TABLE 51.065−2*

AREA LIMITATIONS FOR LIGHT−TRANSMITTING PLASTIC ROOF PANELS AND SKYLIGHTS

Class of Plastic	Maximum Area Individual Unit or Panel (sq. ft.)	Maximum Aggregate Area (% of Floor Area)
CC 1	300	$33^1/_3$
CC 2	100	25

*The requirements of this table do not apply to greenhouses. See ch. Comm 62, subch. VI.

(c) *Exceptions*. 1. One−story buildings not more than 16 feet in height and not exceeding 1200 square feet in area and not closer than 10 feet to another building are exempt from the limitations specified in par. (b).

2. Low−hazard use areas such as swimming pool shelters and similar structures, are exempt from the area limitations specified in par. (b) provided they do not exceed 5,000 square feet in projected floor area and are not closer than 10 feet to the property line or adjacent buildings.

Note: See s. A52.011 for additional information regarding low hazard occupancies.

(6) SKYLIGHTS. (a) *General*. Subject to the requirements of par. (b), skylight assemblies may be glazed with approved light−transmitting plastic in all but high hazard occupancies.

Note: See s. A52.011 for additional information regarding high hazard occupancies.

(b) *Limitations*. Except as provided in par. (c), the use of skylights with approved light−transmitting plastic glazing shall be limited as follows:

1. The light−transmitting plastic shall be mounted at least 4 inches above the plane of the roof on a curb construction consistent with that required for the class of construction of the building;

2. Dome−shaped skylights shall rise above the mounting flange a minimum distance equal to 10% of the maximum span of the dome but not less than 5 inches;

3. The edges of the light−transmitting plastic skylights or dome shall be protected by metal or noncombustible material;

4. Each skylight unit of CC 1 material may have a maximum of 300 square feet within the curb and each skylight unit of CC 2 material may have a maximum of 100 square feet within the curb;

5. The aggregate area of skylights may not exceed $33^1/_3$% when CC 1 materials are used, and 25% when CC 2 materials are used, of the floor area of the room or space sheltered by the roof in which they are installed;

6. Skylights shall be separated from each other by a distance of not less than 4 feet measured in a horizontal plane; and

7. Where exterior wall openings are required to be fire protected, no skylight may be installed within 6 feet of such exterior wall.

8. Combinations of light−transmitting plastic roof panels and skylights shall be subject to the area and percentage limitations and separation requirements as specified in sub. (5) (b).

(c) *Exceptions*. 1. The requirements of par. (b) shall not apply, if:

a. The building on which the skylights of approved light−transmitting plastic glazing are located is not more than one story in height, is located not less than 30 feet from a property line and any other building on the property, and the room or space sheltered by the skylight is not a means of egress, a ch. Comm 58 occupancy, or a high hazard occupancy; or

b. The approved light−transmitting plastic material meets the roof cover requirements for the appropriate class of construction.

2. Except in chs. Comm 55 and 58 occupancies and high hazard occupancies, the requirements specified in par. (b) 4. to 6. shall not apply to skylights with approved light−transmitting plastic glazing provided:

a. The skylight serves as a fire venting system approved by a petition for variance as specified in s. Comm 50.25; or

b. The skylight is used in a building equipped with an approved automatic fire sprinkler system.

(7) LIGHT−DIFFUSING SYSTEMS. (a) *Light diffusers*. 1. Unless protected with an approved automatic fire sprinkler system, plastic light−diffusing systems may not be installed in:

a. Theaters and assembly halls under ch. Comm 55;

b. Health care, correctional and detention facilities under ch. Comm 58; and

c. High hazard occupancies.

Note: See s. A52.011 for additional information regarding high hazard occupancies.

2. Plastic light−diffuser panels shall be supported directly or indirectly from ceiling or roof construction by use of noncombustible hangers.

3. No plastic light−diffusing system may be installed in areas required to be equipped with automatic sprinklers unless appropriate tests by a recognized laboratory have shown that such system does not prevent effective operation of the sprinklers or unless sprinklers are located both above and below the light−diffusing system to give effective sprinkler protection.

4. Approved plastic materials for light−diffusing systems shall comply with s. Comm 51.07 unless the plastic panels comply with the following:

a. Fall from their mounting at an ambient temperature of at least 200°F. below the self−ignition temperature of the plastic material as measured by ASTM D 1929;

b. Remain in place at an ambient room temperature of 175°F. for a period of not less than 15 minutes; and

c. The maximum length of any single plastic panel does not exceed 10 feet and the maximum area of any single light diffuser does not exceed 30 square feet.

(b) Electrical lighting fixtures. Plastic light−transmitting panels and light−diffuser panels installed in approved electrical lighting fixtures shall comply with the requirements specified in par. (a) 4. a. to c.

(8) EXTERIOR VENEER. Approved light−transmitting plastic material may be installed as an exterior veneer for any building, provided:

(a) The plastic veneer may not be attached to any exterior wall to a height greater than 35 feet above grade;

(b) Sections of plastic veneer may not exceed 200 square feet in area; and

(c) Sections of plastic veneer shall be separated by a minimum of 4 feet vertically.

(9) INTERIOR SECONDARY GLAZING SYSTEMS. (a) Light−transmitting plastic materials used in interior secondary glazing systems shall comply with the requirements of s. Comm 51.07 unless the approved plastic used in the interior secondary glazing system meets the following requirements:

1. The approved plastic used as the glazing falls from its mounting either with or without its frame or sash at an ambient temperature of at least 200° F. below the self−ignition temperature of the plastic material as measured by ASTM D 1929;

2. Interior secondary glazing system is not installed over windows required for egress unless approved tests have shown that the system does not interfere with egress from the window; and

3. The maximum length of any single plastic panel does not exceed 10 feet and the maximum area of any single panel does not exceed 30 square feet.

History: Cr. Register, December, 1983, No. 336, eff. 1−1−84; cr. (1) (b) 3., Register, January, 1985, No. 349, eff. 2−1−85; am. (1) (b) 1. a. and b., (2) (a), Table 2, (6) (c) 2. a., (7) (a) 4.a. and (9) (a) 1. Register, August, 1985, No. 356, eff. 1−1−86; am. (1) (b) 1. intro., a. and b., (2) (a), Register, January, 1994, No. 457, eff. 2−1−94; r. and recr. (1) (b) and (c), Register, September, 2000, No. 537, eff. 10−1−00.

Comm 51.07 Interior finishes. (1) SCOPE. The requirements of this section apply to the interior finishes or surfaces of a building.

Note: See s. Comm 51.06 for the restrictions of foam plastics.

Note: Toxicity of the products of combustion is not included as a basis in determining the smoke developed criteria of this section. The smoke developed criteria is based solely upon the obscuration of light.

(2) APPLICATION TO MATERIALS. (a) Except as provided in par. (b), the classification of interior finish materials as specified in this section shall include the basic material used by itself or in combination with other materials.

(b) Subsequently applied paint or wall covering not exceeding $^1/_{28}$ inch in thickness and classified 450 or less on the smoke test scale are exempt from the provisions of par. (a).

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(3) TRIM AND INCIDENTAL FINISH. (a) Interior finish not in excess of 10% of the aggregate wall and ceiling areas of any room or space may be Class C materials in occupancies where interior finish of Class A or Class B is required.

(b) In addition to the other requirements of this section, foam plastic used as interior trim and incidental finish shall also comply with the following:

1. The minimum density is 20 pounds per cubic foot;

2. The maximum thickness of the trim is $^1/_2$ inch and the maximum width is 4 inches;

3. The trim constitutes no more than 10% of the area of any wall or ceiling; and

4. The flame−spread rating does not exceed 75 when tested in accordance with ASTM E84 and the smoke developed rating is not limited.

(4) EXPOSED CONSTRUCTION. (a) This section does not require the installation of interior finish, but where construction or fire protection materials are exposed in rooms or spaces used for the occupancies specified, the hazard from rate of flame spread of the exposed materials shall be not greater than that of the interior finish permitted for such occupancy or use.

(b) Exposed portions of structural members of Type No. 4−Heavy Timber Construction shall not be subject to the interior finish requirements of this section.

(5) USE OF INTERIOR FINISHES. Interior finish material shall be used in accordance with requirements specified in Table 51.07.

TABLE 51.07
MINIMUM INTERIOR FINISH REQUIREMENTS

Occupancy	Required Exit Enclosures		Exit Access[1,2]		Rooms or Enclosed Spaces[1,2]	
	Walls & Ceilings[4]	Floor[5]	Walls & Ceilings[4]	Floor[5]	Walls & Ceilings[4]	Floor
Ch. Comm 54 Occupancies Other than Storage and Warehouses	A	II	A or B	II	A, B or C	DOC FF−1[6]
Ch. Comm 54 Storage and Warehouse Occupancies	A or B	DOC FF−1[6]	A or B	DOC FF−1[6]	A, B or C	DOC FF−1[6]
Ch. Comm 55 Places of Assembly	A	I	A	II	A or B	DOC FF−1[6]
Ch. Comm 56 Places of Instruction	A	I	A or B	II	A, B or C	DOC FF−1[6]
Ch. Comm 57 Residential Occupancies	A	II	A or B	II	A, B or C	DOC FF−1[6]
Ch. Comm 58 Health Care and Places of Detention	SEE CHAPTER Comm 58 FOR SPECIFIC REQUIREMENTS					
Ch. Comm 59 Hazardous Occupancies	A	DOC FF−1[6]	A or B	DOC FF−1[6]	A, B or C	DOC FF−1[6]
Ch. Comm 60 Day Care Centers (20 Children or Less)	A or B	DOC FF−1[6]	A or B	DOC FF−1[6]	A, B or C	DOC FF−1[6]
Ch. Comm 60 Day Care Centers (More than 20 Children)	A	II	A or B	II	A, B or C	DOC FF−1[6]
Ch. Comm 62 Specialty Occupancies	A, B or C	DOC FF−[6]	A, B or C	DOC FF−1[6]	A, B or C	DOC FF−1[6]

[1] Exposed portions of structural members of Type No. 4−Heavy Timber Construction are not subject to the requirements of this table.
[2] Where a complete automatic sprinkler system is installed, materials with an interior finish of Class B or C may be used in places where Class A or B materials, respectively, are required and floor finish materials with an interior finish of Class II or materials complying with the DOC FF−1−70 "pill test" may be used in places where Class I or II materials, respectively, are required.
[3] Requirements for rooms or enclosed spaces are based upon the spaces being separated from exit access corridors and exits by partitions extending from the floor to the ceiling. Where the room or enclosed space is not separated from the exit access corridor, the room or space is considered part of the exit access or the exit.
[4] Materials having napped, tufted, looped or similar surfaces, such as carpet, when applied on walls or ceilings shall meet the requirements for Class A interior finish.
[5] Wood, vinyl, linoleum, terrazzo, resilient and other approved finished floors or floor covering materials are exempt from the provisions of this table.
[6] All carpet manufactured for sale in the U.S. is required by federal regulations to comply with the DOC FF−1−70 "pill test" (16 CFR Para 1630). If a material other than carpet is used, the material should be shown to be resistant to flame propagation as a material which passes the DOC FF−1−70 test (minimum critical radiant flux of 0.04 watts/cm.
[7] Class C interior finish materials may be used in places of assembly with a capacity of 400 persons or less.

(6) APPLICATION OF INTERIOR FINISH. (a) *Attachment.* Interior finish materials shall be applied or otherwise fastened in such a manner that they will not readily become detached when subjected to room temperature of 200° F. or less for 30 minutes, or otherwise become loose through changes in the setting medium from the effects of time or conditions or occupancy.

(b) *Application to structural elements.* 1. Interior finish materials applied to walls, ceilings or structural elements of a building or structure which are required to be of fire−resistive rated or noncombustible construction shall be applied directly against the exposed surface of such structural elements or to furring strips attached to such surfaces.

2. Where furring strips are used, all concealed spaces shall be firestopped into areas not greater than 10 square feet in area or 8 feet in any dimension.

(c) *Furred construction.* Where walls, ceilings or other structural elements are required to be of fire−resistive rated or noncombustible construction, and the interior finish is set out or dropped distances greater than $1^3/_4$ inches from the surface of the elements, only material of which both faces qualify as Class A shall be used, unless the finish material is protected on both sides by an approved automatic fire suppression system or is attached to a noncombustible backing as specified in par. (e) or to furring strips applied directly to such backing as specified in par. (b).

(d) *Class B and C finish materials.* Interior finish materials, other than Class A materials, which are less than 1/4 inch in thickness shall be applied directly against a noncombustible backing or a backing of fire−retardant treated wood unless the tests under which the material has been classified were made with the materials suspended from the noncombustible backing.

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(e) *Backing material.* 1. Backing for interior finish materials shall be a continuous surface with permanently tight joints, equal in area to the area of the finish, and extending completely behind such finish in all directions.

2. Backing shall be of noncombustible or fire retardant treated wood materials.

3. When the backing does not constitute an integral part of the structural elements or system, it shall be attached directly to the structural elements or to furring strips as specified in par. (b) or may be suspended from the structural members at any distance provided concealed spaces are firestopped as specified in s. Comm 51.02 (24).

Note: See s. Comm 51.01 (75a) for further explanatory information. Class A Interior Finish—flame spread 0−25, smoke developed 0−450.
Class B Interior Finish—flame spread 26−75, smoke developed 0−450.
Class C Interior Finish—flame spread 76−200, smoke developed 0−450.
Class I Interior Floor Finish—critical radiant flux—.45 watts/cm^2
Class II Interior Floor Finish—critical radiant flux—.22 watts/cm^2

History: Cr. Register, December, 1981, No. 312, eff. 1−1−82; am. table, Register, October, 1982, No. 322, eff. 11−1−82; renum. (3) to be (3) (a), cr. (3) (b) and (6), Register, December, 1983, No. 336, eff. 1−1−84; am. (6) (d) (intro.), Register, August, 1985, No. 356, eff. 1−1−86; **correction in (6) (d) 3. made under s. 13.93 (2m) (b) 7., Stats., Register, June, 2001, No. 546.**

Comm 51.08 Occupancy separations and hazard enclosures. (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 in accordance with Table 51.08−1.

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TABLE 51.08−1

OCCUPANCY SEPARATIONS

Minimum Fire Resistive Ratings in Hours

Occupancies	Ch 54	Ch 55		Ch 56	Ch 57	Ch 58		Ch 59				Ch 60	Ch 61	Ch 62
		Occupants ≤750	Occupants >750			Health Care	Detention	≤500 sq ft		>500 sq ft				Open Parking Structures
								Storage	Repair	Storage	Repair			
Ch 54	0	3[n]	4[n]	0	i	2[n]	2[b]	1[c,d]	2	2[c,d]	3	0	0	NC−2
Ch 55 ≤750 occupants	3[n]	3[e]	4[e]	3[f,g]	3	3[a]	3[b]	3	4	3	4	3[h]	3	3
>750 occupants	4[n]	4[e]	4[e]	4[f,g]	4	4[a]	4[b]	4	4	4	4	4[h]	4	4
Ch 56	0	3[f,g]	4[f,g]	0	i	2[a]	2[b]	2	3	2	3	0	0	NC−2
Ch 57	i	3	4	i	i	2[a]	2[b]	1[c]	2	2[c,i]	3	i	i	NC−2
Ch 58 Health Care	2[a]	3[a]	4[a]	2[a]	2[a]	0	2[b]	3	4	3	4	2	2	NC−2
Detention	2[b]	3[b]	4[b]	2[b]	2[b]	2[b]	0	3	4	3	4	2	2	NC−2
Ch 59 Storage ≤500 sq ft	1[c,d]	3	3	2	1[c]	3	3	0	1[k]	1[k]	1[k]	1	m	1[k]
Repair ≤500 sq ft	2	4	4	3	2	4	4	1[k]	0	1[k]	1[k]	2	2	1[k]
Storage >500 sq ft	2[c,d]	3	3	2	2[c,j]	3	3	1[k]	1[k]	0	1[k]	2	m	1[k]
Repair >500 sq ft	3	4	4	3	3	4	4	1[k]	1[k]	1[k]	0	3	3	1[k]
Ch 60	0	3[h]	4[h]	0	i	2	2	1	1	2	3	0	0	NC−2
Ch 61	0	3	4	0	i	2	2	m	2	m	3	0	0	NC−2
Ch 62 Open Parking Structures	NC−2	3	4	NC−2	NC−2	NC−2	NC−2	1[k]	1[k]	1[k]	1[k]	NC−2	NC−2	0

Keys and Examples: NC = Noncombustible construction; 0 = 0 (No hourly rating); NC−2 = Noncombustible construction 2−hour rating

[a] Auditoriums, chapels, residential facilities and other similar areas provided for the patients or employees of health care facilities need not be separated from the health care facility. Also, administrative offices, doctors' offices, medical clinics and laboratories which are intended primarily to provide in−house services or support to the health care facility need not be separated from the health care facility. Doctor's offices, medical clinics and other similar areas which are intended to provide out−patient services independent of the health care facility shall be separated in accordance with the table.

[b] Auditoriums, chapels, residential facilities, administrative offices, medical clinics, educational facilities, workshops and other similar areas which are provided for the residents or employees of the detention facility need not be separated from the facility.

[c] An occupancy separation need not be provided within a fire station or other similar facility to separate vehicles from other areas of the building, if the vehicles are directly and permanently related to the functions of the building.

[d] An occupancy separation need not be provided within an office, factory or warehouse occupancy to separate a storage garage accommodating one or 2 vehicles which are directly related to the functions of that occupancy. If a storage garage accommodating one or 2 vehicles within an office, factory or warehouse occupancy is part of a multi−occupancy/multi−tenant building (i.e., strip shopping center), the occupancy separation shall be provided at least at the adjoining tenants' walls.

[e] An occupancy separation need not be provided to separate 2 adjoining assembly hall areas or functions located within the same building, if the operation or control of the 2 assembly areas are under the same owner or tenant.

[f] An occupancy separation need not be provided between a church and a day school operated by the church provided both occupancies conform with the most restrictive requirements of chs. Comm 55 and 56.

[g] An occupancy separation need not be provided between an assembly hall or theater and an instructional facility regulated under ch. Comm 56 if the operation and control of the two occupancies is under the same owner.

[h] An occupancy separation need not be provided to separate a day care center from an assembly hall occupancy, if the day care center conforms with the more stringent requirements of ch. Comm 55.

[i] See s. Comm 57.01 concerning living unit separations.

[j] Storage garages, attached to residential occupancies under the scope of ch. Comm 57, may be separated from a residential occupancy by at least one−hour fire−resistive construction, if the storage garage is divided by walls with at least one−hour fire−resistive ratings into spaces with floor areas not exceeding 600 square feet.

[k] An occupancy separation need not be provided to separate adjoining storage garages, repair garages or open parking structures which are located within the same building, if the entire building conforms to the most stringent occupancy requirements of chs. Comm 59 and 62, subch. I.

[m] Storage garages, attached to CBRF occupancies under the scope of ch. Comm 61, may be separated from a CBRF by:

—Common walls between the garage and the CBRF protected with not less than one layer of $^5/_8$−inch Type X gypsum board with taped joints, or equivalent, on the garage side and with not less than one layer of $^1/_2$−inch gypsum board with taped joints, or equivalent, on the CBRF side;

—Floor−ceiling assemblies between garage and the CBRF protected with not less than one layer of $^5/_8$−inch Type X gypsum board on the garage side of the ceiling or roof framing; and

—Openings between the garages and the CBRF protected by self−closing, $1^3/_4$−inch solid wood core doors or with self−closing doors of equivalent fire−resistive rating.

[n] Public mausoleums constructed adjacent to or as part of an assembly hall need not be provided with an occupancy separation.

[o] All openings in occupancy separations involving detention facilities shall be protected by fire−resistive door assemblies as specified in s. Comm 58.60.

Note: See s. Comm 61.10 (2) concerning detached garages serving CBRF's.

Note: Department of health and family services has stricter requirements for buildings with joint occupancies. See HFS 83.41 (12).

Table 51.08−2
HAZARD ISOLATION

Occupancy	Minimum Fire−Resistive Rating In Hours[1]		Exceptions
	≤3 stories	> 3 stories	
Ch 54	2	2	1−hour isolation permitted for 1−story bldgs <3,000 ft^2
Ch 55	3	3	2−hour isolation permitted for bldgs with a capacity of ≤300 people
Ch 56	4	4	2−hour isolation permitted for 1−story bldg
Ch 57	1	2	
Ch 58	2	3	
Ch 59	2	2	
Ch 60	1	2	
Ch 61	Not Applicable	Not Applicable	
Ch 62 Open parking structures & assembly seating facilities	2	2	
Ch 62 Greenhouses	1	Not Applicable	
Ch. 62 Mini−storage Buildings	2	2	1−hour isolation permitted for 1−story bldgs < 3,000 ft^2

[1] Fire−resistive ratings may be reduced in accordance with s. Comm 51.02 (22).

(2) HAZARD ISOLATION. (a) *General.* 1. Fire hazards shall be stored or isolated in accordance with this section.

2. Fire−resistive rated construction specified in Table 51.08−2 and this section shall comply with ss. Comm 51.04 to 51.049.

3. Fire detection, prevention, suppression and isolation features required under an adopted NFPA standard referenced in this section shall be provided as specified in the standard.

4. a. Except as required under subd. 4. b., fuel−fired equipment that is used for processes directly related to the business and is normally in view of employees and under the control of employees while in operation is not required to be isolated.

b. If the adopted NFPA standard has isolation requirements, those requirements shall be followed.

Note: Examples of processes directly related to the business include cooking equipment at a restaurant, manufacturing process equipment, dryers at a commercial laundry, etc.

(b) *Fuel−fired heating equipment.* 1. Except as provided in subd. 2. and 3., fuel−fired heating equipment shall be provided with a fire−resistive rated enclosure as follows:

a. Gas− and oil−fired boilers, furnaces and water heaters shall be provided with a one−hour fire−resistive rated enclosure.

b. Solid fuel−fired boilers, furnaces and water heaters shall be provided with a two−hour fire−resistive rated enclosure.

c. For occupancies under ch. Comm 59, no openings other than self−closing doors are allowed within 18 inches of the floor in a required enclosure for fuel−fired heating equipment .

2. Fuel−fired heating equipment may be used without a fire−resistive rated enclosure as follows:

a. For occupancies under chs. Comm 54, 55, 56, 57, 59, 60, 61, 62 and 66, a direct vent sealed combustion chamber appliance may be used without a rated enclosure.

b. Suspended equipment, where allowed under ss. Comm 64.21 and 64.22 may be used without a rated enclosure.

c. For occupancies under chs. Comm 54, 55, 56 and 58, gas−fired booster water heaters used exclusively for sanitizing dishes and cooking utensils may be used without a rated enclosure.

3. For occupancies under ch. Comm 56, the following equipment may be used without a rated enclosure in the shop area provided the shop area is separated from other areas of the building by 3−hour fire−resistive construction:

a. Vented gas or oil open flame infrared equipment with surface temperatures that exceed 1500 ^{o} F.

b. Unvented gas direct−fired make−up air units.

(c) *Clothes dryers.* 1. Except as allowed in subd. 2, all gas, oil or electric clothes dryers shall be isolated by 2−hour fire−resistive rated construction.

2. The following exceptions apply to occupancies under chs. 54, 55, 56, 57, 59 and 60:

a. The 2−hour fire−resistive rating is not required for the isolation of clothes dryers where the entire room containing the dryers is provided with automatic fire sprinkler protection and, for gas−fired dryers, each dryer is protected with an automatic shut−off valve that stops the gas flow if there is a sudden pressure drop in the fuel supply system.

b. The 2−hour fire−resistive rating is not required for the isolation of clothes dryers where no more than two dryers with a maximum rating of 37,000 Btu each are contained in the room, and for gas−fired dryers, each is protected with an automatic shut−off valve that stops the gas flow if there is a sudden pressure drop in the fuel supply system.

(d) *Generators.* 1. Fuel−fired generators shall be isolated with fire−resistive construction with hourly ratings in accordance with the fire enclosure requirements of Table 51.03−A, line 20.

2. Emergency generators required by ch. Comm 16, Table 16.46, shall be isolated as required in subd. 1, with no other equipment allowed in the room that is not an integral part of a required emergency power supply system.

(e) *Fire pumps.* Fire pumps shall be isolated with fire resistive construction with hourly ratings in accordance with the fire enclosure requirements of line 20, Table 51.03−A.

(f) *Flammable and combustible liquids.* Flammable and combustible liquids shall be stored and isolated in accordance with NFPA 30 and 30A.

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(g) *Aerosols.* Aerosols shall be stored and isolated in accordance NFPA 30B.

(h) *Smokeless propellants.* Smokeless propellants shall be stored and isolated in accordance with NFPA 495.

(i) *Fireworks, black powder and explosive materials.* Fireworks, black powder and explosive materials shall be stored and isolated in accordance with ch. Comm 7.

(j) *Flammable and combustible gases.* 1. Liquefied petroleum gas. Liquefied petroleum gas shall be stored and isolated in accordance with ch. Comm 40.

2. Gases for welding, cutting and allied processes. Gases for welding, cutting and allied processes shall be stored and isolated in accordance with NFPA 51.

(k) *Spray applications.* Flammable or combustible materials used in spray applications shall be isolated and protected in accordance with NFPA 33.

(L) *Coating or dipping applications.* Flammable or combustible materials used in coating or dipping applications shall be stored and isolated in accordance with NFPA 34.

(m) *Liquid and solid oxidizers.* Liquid and solid oxidizers shall be stored and isolated in accordance with NFPA 430.

(n) *Organic peroxides.* Organic peroxides shall be stored and isolated in accordance with NFPA 432.

(o) *Laboratory chemicals.* Laboratory chemicals falling under the scope of NFPA 45 shall be stored and isolated in accordance with NFPA 45.

(p) *Hazardous areas.* Hazardous areas, including trash collection rooms, recycling areas, woodworking areas, maintenance shops and similar areas determined by the department shall be isolated in accordance with Table 51.08−2.

(3) (a) Openings in occupancy separations shall be protected by fire−door assemblies as specified in s. Comm 51.047 or by fire−window assemblies as specified in s. Comm 51.048 or as specified in s. Comm 51.049.

(b) Openings in hazard enclosures shall be protected with self−closing fire door assemblies as specified in s. Comm 51.047 or by fire−window assemblies as specified in s. Comm 51.048 or as specified in s. Comm 51.049.

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; am. (2) (b) 1., Register, December, 1978, No. 276, eff. 1−1−79; r. and recr. (2), Register, December, 1981, No. 312, eff. 1−1−82; am. (2) (a) and (b) (intro.), Register, October, 1982, No. 322, eff. 11−1−82; am. (2) (a) (intro.) and (b) (intro.), Register, August, 1985, No. 356 eff. 1−1−86; r and recr. Register, February, 1991, No. 423, eff. 4−1−91; am. Table 51.08, Register, March, 1992, No. 435, eff. 4−1−92; renum (2) to be (3), cr. (2), Register, January, 1994, No. 457, eff. 2−1−94; am. Table 51.08 Footnote j, Register, March, 1995, No. 471, eff. 4−1−95; am. (1), (2), renum. Table 51.08 to 51.08−1 and am., cr. Table 51.08−2, Register, December, 1995, No. 480, eff. 4−1−96; emerg. r. and recr. Table 51.03−2, eff. 4−6−96; r. and recr. Table 51.03−2; Register, December, 1996, No. 492, eff. 1−1−97; r. and recr., Register, March, 1997, No. 495, eff. 4−1−97; r. and recr. (2), Table 51.08−2, renum. and am. (3) to be (3) (a) and cr. (3) (b), Register, March, 2000, No. 531, eff. 4−1−00.

Comm 51.14 Safety glazing. (1) SCOPE. This section applies to fixed or operating glazed flat panels adjacent to doors; fire window assemblies; display cases within 7 feet of the floor in schools; skylights; sloped glazing and any other glazing materials used in hazardous impact areas which are not included within the scope of the federal consumer product safety commission (CPSC) standard for architectural glazing materials, 16 CFR 1201.

Note: The CPSC standard for architectural glazing materials pre−empts state and local regulations for framed or unframed interior or exterior glazed doors, exterior doors with glazed lights, sliding doors and the adjacent glazed fixed or operating panel, storm doors, shower doors, walk−in mirror closet doors and tub enclosures.

(2) APPLICATION. All glazing material used in hazardous impact locations shall be safety glazing material. All replacements of glazing material in hazardous impact locations made after November 30, 1976, shall be safety glazing, except that the replacement of glazing shall be as specified in sub. (3).

(a) *Location.* Hazardous impact locations shall include all glazed elements such as framed or unframed interior or exterior glass doors, the first fixed or operating flat panel within 2 feet of nearest vertical edge of an entrance or exit door, exterior doors with glass lights, or any other glazed elements which may be mistaken for a means of egress or ingress to a room or building. Other hazardous impact locations shall include sliding doors and the adjacent glazed fixed or operating panel, storm doors, shower doors, tub enclosures and display cases within 7 feet of the floor in schools except as follows:

1. A fixed or operating flat panel immediately adjacent to an entrance or exit door is exempt from the requirements of this paragraph if the lower horizontal edge of the panel is 2 feet or more above the floor; or

2. Any mirror, framed glazed picture or similar decorative object which is attached to a door or wall in a hazardous impact location and which does not in whole or in part conceal any opening in such door or wall is exempt from the requirements of this paragraph.

(b) *Material.* Safety glazing shall include any glazing material including but not limited to tempered glass, laminated glass, wired glass, safety plastic, or safety insulating units which meet the test requirements of ANSI Z97.1, and which are constructed, treated or combined with other materials so as to minimize the likelihood of cutting and piercing injuries resulting from human impact with the glazing material.

(c) *Labeling.* Safety glazing material shall be labeled with a permanent label by such means as etching, sand blasting, firing of ceramic material, or hot die stamping. The label shall be legible and visible after installation. Labels identifying safety glazing materials may be omitted provided that a notarized affidavit or invoice is submitted to the department or owner upon request certifying the installation of safety glazing material. The label or affidavit shall identify the seller, manufacturer, fabricator, or installer, the nominal thickness and type of safety glazing material, and the fact that the material meets the test requirements of ANSI Z97.1.

(3) GUARDING OF GLAZING. All interior and exterior glazed panels, subject to human impact not in a hazardous impact location, shall be guarded or provided with safety glazing, except that glazed panels with a sill height of 2 feet or more, or glazed panels less than 12 inches in width, are not required to be safety glazed or guarded.

(a) Guarding shall consist of a horizontal bar, rail, mullion, grille or screen at least 1½ inches wide and located within 3 feet 6 inches to 4 feet 6 inches above the floor. The guard assembly shall be capable of withstanding a lateral force of 100 pounds applied at any point and installed to avoid contact with the glazing when the force is applied.

(b) Safety glazing materials shall be as specified in sub. (2) (b).

(c) For replacement of glazing in buildings contracted for or existing prior to November 30, 1976, the installation of a horizontal bar, rail, mullion, grille or screen as a protective device may be provided in lieu of safety glazing material in hazardous impact locations where safety glazing would be impractical because of the size of the light required.

(4) INTERIOR DOORS WITH GLASS LIGHTS. (a) All interior doors with glass lights greater than 8 inches in the least dimension shall be provided with safety glazing material.

(b) All interior doors with glass lights less than 8 inches in the least dimension shall be provided with 1/4−inch glazing material.

(c) Safety glazing materials shall be as specified in sub. (2) (b).

(5) SKYLIGHTS AND SLOPED GLAZING. (a) *Skylights.* All glazing in skylights shall be safety glazing material, and light−transmitting plastic shall comply with the requirements specified in s. Comm 51.065 (5) or (6).

(b) *Sloped glazing.* All glazing installed more than 15º with the vertical shall be safety glazing material. This paragraph does not apply to greenhouses.

(c) *Protection.* 1. Except as provided in subd. 2., heat−strengthened glass or fully tempered glass if used in an overhead

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application shall have a screen or equivalent protection installed below the glass.

a. The screen shall be installed not more than 4 inches from the glass.

b. The screen shall be capable of supporting the weight of the glass.

c. The screen shall be constructed of noncombustible material not thinner than 0.08 inches.

d. The mesh in a screen may not be larger than one inch by one inch.

2. a. Fully−tempered glass may be used without a screen or equivalent protection, if the glass is at a slope of 30° or less from vertical and the highest point of the glass is 10 feet or less above any floor level under the sloped glass.

b. Glazing materials may be used without a screen or equivalent protection, if the walking surface or any other accessible area below the glazing is permanently protected from the risk of falling glass for a minimum horizontal distance equal to twice the height.

(6) FIRE WINDOW ASSEMBLIES. All glazing in fire window assemblies shall be designed and installed as specified in s. Comm 51.048.

(7) STRUCTURAL REQUIREMENT. Glazing material shall be designed and installed to safely withstand the loads specified in ch. Comm 53.

Note: Section 101.125, Stats., requires safety glazing in all hazardous locations.

History: Cr. Register, December, 1981, No. 312, eff. 1−1−82; am. (5) (a), Register, August, 1985, No. 356, eff. 1−1−86; am. (1), cr. (5) (c), Register, March, 1991, No. 423, eff. 4−1−91; am. (2) (b) and (c), (5) (a), Register, January, 1994, No. 457, eff. 2−1−94.

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

Note: See ss. Comm 54.06, 55.10, 56.08, 57.06, 58.04, 58.49, 59.14, 60.12, 61.12, 62.26, 62.47 and 62.75 for requirements regarding required exits.

(2) Every standard exit door shall swing outward or toward the natural means of egress. 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, overhead door or sliding door may be considered as a standard exit, except as permitted in the occupancy chapters of this code.

(3) (a) 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. The latch or other approved fastening device on the door shall be of an obvious method in its release. Except as provided in pars. (b) to (d), the installation of hardware requiring use of a key for opening an exit door from the inside is prohibited. The requirements of this subsection, except par. (g) shall apply to all buildings in existence and to any building built after the effective date of this subsection.

(b) Exit and exit access doors serving individual living units may be provided with hardware requiring the use of a key for opening from the inside.

(c) Upon written request to the department by the owner, key−locking or securing of exits may be approved in fire−resistive buildings, or parts of fire−resistive buildings, which are used as jails, prisons, mental institutions, asylums, nursing homes with senile patients, and similar type occupancies which were constructed prior to January 1, 1982.

Note: This code paragraph applies only to buildings constructed prior to 1982. Refer to ch. Comm 58 for buildings constructed after 1981.

Note: 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.

Note: 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.

(d) 1. One door serving as an exit from any building housing any office or wholesale or retail store may be equipped with hardware which requires use of a key to open it from the inside provided one of the following conditions is satisfied:

a. The door has a window which has a minimum clear opening of not less than 24 inches, and 6 square feet in area with the bottom of the window opening not more than 4 feet above the inside floor level;

b. A glazed sidelight satisfying the dimensional and location requirements for the windows specified in par. (a) is located adjacent to the door; or

c. A window satisfying the dimensional and location requirements for the window specified in par. (a) is located within five feet of the door.

2. Approved safety glazing shall be used in all installations but the glazing may not be bullet−resistant or break−resistant.

3. The door may not be used as an exit serving any required exit stairway enclosure.

4. The door shall not be key−locked during periods of occupancy by the public or employees. A readily visible, permanent sign shall be placed on or adjacent to the door on the egress side stating,"THIS DOOR SHALL NOT BE KEY−LOCKED WHEN THE BUILDING IS OCCUPIED". The sign shall be in letters at least one inch in height on a contrasting background.

5. The use of keyed hardware as specified in this section may be revoked by the department or its authorized deputy upon one violation of any of the conditions specified in subds. 1. to 4.

(e) 1. Except as provided in subd 2., the door shall not be barred, bolted or chained at any time.

2. When authorized persons, such as employees, frequenters, patrons and other such occupants are not present, the exit door may be secured by the use of a single bar or bolt. A sign or label shall be posted on the door near the single bar or bolt. The sign or label shall bear the following: "This bolt or bar shall be kept open during periods of occupancy."

Note: The intent of subd. 2. 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 security against intruders from the outside while protecting persons in the building from being trapped.

(f) 1. Except as provided in subd. 2., in a building protected throughout by either a supervised automatic fire sprinkler system or a supervised automatic fire detection system, the exit doors may be equipped with listed, locking devices which shall:

a. Release or unlock upon activation of the sprinkler system or fire detection system;

b. Release or unlock upon the loss of power to the locking device;

c. Release or unlock within 15 seconds whenever a force of not more than 15 pounds of force is continuously applied to the release device for a period of not more than 3 seconds;

d. Upon the release or unlocking of the door activate an audible alarm in the vicinity of the door;

e. Require the manual relocking of such doors; and

f. Have a sign adjacent to the locking device indicating how the door may be opened.

2. The use of locking devices as described in subd. 1. shall be limited to the following restrictions.

a. The locking device may not be employed on any door of an occupancy designated or licensed as a community based residential facility.

b. The locking devices may not be employed on any doors serving as the main entrance/exit of an assembly hall occupancy regulated under ch. Comm 55.

c. Not more than one locking device may be employed in any egress path within a health care facility regulated under ch. Comm 58, subch. I.

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(g) 1. Except as provided in subd. 2., the latch or other approved fastening device shall be located on the exit door so that the device is not less than 32 inches or more than 54 inches above the floor level.

2. The latch or approved fastening device on solid tempered glass doors may be located on the door at the floor line.

(h) Any door in a required means of egress serving an area or areas having an occupant load of 100 or more persons shall be provided with panic hardware. Acceptable panic hardware shall be a door latching assembly which complies with subds.1. to 3.

1. The assembly shall cause the door latch to release and the door leaf to open, when a force of 15 pounds and greater is applied in the direction of egress, to a bar or panel.

2. The activating portion of the bar or panel in par. (a) shall extend not less than one−half the width of the door leaf, and shall be mounted at a height of at least 30 inches but no more than 44 inches above the floor.

3. The force specified in par. (a) shall be applied at the latch side of the door.

(4) A standard exit door shall not be less than 6 feet 4 inches high by 3 feet 0 inches wide, except where especially provided under occupancy classifications and in s. Comm 51.20. Where double doors are provided with or without mullions, the width of each single door may be reduced to 2 feet 6 inches, except double doors utilized to provide accessibility in accordance with ch. Comm 69 shall have the clear width of at least one single door increased to 32 inches.

(5) (a) All exit doors, unless otherwise exempted by the occupancy requirements of this code, shall be identified by illuminated translucent exit signs.

1. An exit sign shall bear the words "EXIT" or "OUT".

2. The wording for the exit sign shall be of letters not less than 6 inches high with principal strokes of letters not less than $^3/_4$ inches wide.

3. The wording for the exit sign shall be of red or green lettering on a contrasting background.

4. A self−luminous type of exit sign which provides evenly illuminated letters shall have a minimum luminance of 0.06 foot lamberts; other types of exit signs shall be illuminated by a source providing not less than 5 foot candles at the illuminated surface.

(b) When exit doors are not readily visible to occupants, directional exit signs shall be provided in exit access corridors and other appropriate locations so to indicate the direction and way of egress.

(6) (a) The required aggregate width of exits from a level shall be determined by using the full occupant load of that level, plus the percentage effects of the occupant loads of adjacent levels (above and below) which exit through it as follows:

Note: See Appendix A for further explanatory material.

1. 50% of the occupant load of each first−adjacent level; and

2. 25% of the occupant load of each second−adjacent level.

(b) The width shall be based upon the following ratios:

1. Types No. 1 through No. 4 construction unsprinklered, 40 inches per 100 persons;

2. Types No. 5 through No. 8 construction unsprinklered, 50 inches per 100 persons;

3. Types No. 1 through No. 4 construction sprinklered, 30 inches per 100 persons; or

4. Types No. 5 through No. 8 construction sprinklered, 40 inches per 100 persons.

Note: The determination of exit width for health care facilities is specified in s. Comm 58.12 (2) and (3) and takes precedence over this section.

(c) The required aggregate width of exits from assembly seating facilities shall comply with the requirements of s. Comm 62.75 (4).

History: 1−2−56; am. Register, December, 1962, No. 84, eff. 1−1−63; am. (5) and cr. (7), Register, November, 1963, No. 95, eff. 12−1−63; r. and recr., Register, October, 1967, No. 142, eff. 11−1−67; am. (7) (j), Register, May, 1968, No. 149, eff. 6−1−68; r. and recr. (7), Register, December, 1970, No. 180, eff. 1−1−71; r. and recr. (3), Register, February, 1971, No. 182, eff. 3−1−71; am. (7) (a) 1., Register, September, 1973, No. 213, eff. 10−1−73; r. (7), r. and recr. (6), Register, December, 1974, No. 228, eff. 1−1−75; emerg. cr. (3) (b) 1., eff. 6−20−75; cr. (3) (a) 1. and (3) (b) 1., Register, November, 1975, No. 239, eff. 12−1−75; am. (4), Register, December, 1977, No. 264, eff. 1−1−78; am. (2) and (3) (b) 1., Register, December, 1978, No. 276, eff. 1−1−79; am. (4), Register, January, 1980, No. 289, eff. 2−1−80; am. (2), r. and recr. (3) (a), (intro.), cr. (6) (c), Register, December, 1981, No. 312, eff. 1−1−82; cr. (3) (c), Register, December, 1983, No. 336, eff. 1−1−84; r. and recr. (3), Register, January, 1985, No 349, eff. 2−1−85; am. (3) (a) and (4), cr. (3) (e) and (f), Register, August, 1985, No. 356, eff. 1−1−86; am. (2), (3) (a), renum. (3) (f) to be (3) (g), cr. (3) (f), r. and recr. (5), Register, February, 1991, No. 423, eff, 4−1−91; am. (1), (2) and (3) (c), cr. (3) (h), Register, January, 1994, No. 457, eff. 2−1−94; am. (4), Register, September, 2000, No. 537, eff. 10−1−00.

Comm 51.151 Exit distribution. All spaces which can accommodate more than 25 persons shall be provided with a minimum of 2 exits, 2 exit access doors or a combination of both which are located to provide the best possible egress from the room or suite. If exit access doors are used, the exit access corridors shall lead to 2 or more separate exits.

Note: See Appendix A for further explanatory material.

Note: See occupancy chs. Comm 54 to 62 for acceptable types of exits and exit accesses and exceptions.

History: Cr. Register, August, 1985, No. 356, eff. 1−1−86.

Comm 51.152 Egress configuration. (1) EGRESS DIRECTIONS. (a) Where 2 directions of egress are required, and are provided by doors opening into corridors, the angle between the 2 directions shall not be less than 90°.

(b) An angle between directions of egress within a space shall be satisfactory providing passageways are maintained to corridor access points separated a distance of at least one−half of the diagonal of the area served, or 20 feet, whichever is greater.

(2) RECESSED DOORS. Where 2 directions of egress are required, and are provided by recessed doors opening into the corridors, the doors shall be recessed no more than 3 feet into an alcove serving only that exit access, and the alcove width shall be at least 3 feet.

Note: See Appendix A for further explanatory material.

History: Cr. Register, December, 1993, No. 456, eff. 1−1−94.

Comm 51.16 Stairways and ramps. (1) DEFINITIONS. (a) "Stairway" means one or more flights of steps, and the necessary platforms or landings connecting them, to form a continuous passage from one elevation to another, including exterior porches, platforms and steps.

(b) "Ramp" means a sloping floor or walk and necessary platforms or landings connecting them to form a continuous passage from one elevation to another.

(2) REQUIRED AGGREGATE WIDTH. (a) The required aggregate width of stairway or ramp exits from any level shall be as specified in s. Comm 51.15 (6).

(b) In no case shall the minimum width of an exit stair or ramp be less than that specified in sub. (3).

(c) Under no circumstances shall stairways or ramps decrease in width in the line of travel toward the exit.

(3) MINIMUM WIDTH. (a) Except as provided in pars. (b) and (c), every required exit stairway or ramp under chs. Comm 54 to 62 shall be not less than 3 feet 8 inches wide, except as provided in the occupancy chapters, of which not more than 4 inches on each side may be occupied by a handrail. The clear dimension between handrails, or stringers, shall not be less than 3 feet 0 inches.

(b) Nonrequired stairways or ramps need not conform to the width requirements specified in chs. Comm 50 to 64.

(c) A required stairway or ramp serving a space with an occupant load not greater than 25 persons shall have a width of not less than 3 feet.

(4) RISERS, TREADS AND RAMP SLOPES. Risers and treads shall be designed and provided in accordance with the following:

(a) 1. Except as provided in subd 2., all stairways and steps shall have a rise of not more than 7 inches measured from tread

to tread, and a tread of not less than 11 inches, measured from nosing to nosing of tread. The slope of a tread may not exceed 1/4 inch per foot for the depth of the tread. Treads and risers shall be uniform in any one flight. Winders may not be used.

2. Existing stairways and steps in existing buildings, where a change in occupancy is occurring, may remain in use if they were constructed in accord with the requirements of this code relating to the proposed occupancy, that were in effect at the time of that construction.

Note: The department recommends that steps be proportioned so the sum of 2 risers and a tread, exclusive of its nosing or projection, should be not less than 24 inches or more than 25 inches.

Note: The department may accept nonstandard exit stairways serving unoccupied areas, such as equipment mezzanines or platforms, and similar areas, if approved in writing.

Note: See chs. Comm 66 and 69 for additional requirements for stairways.

(b) The edges of all treads and the edges of all stairway landings shall be finished with a nonslippery surface not less than 3 inches in width;

(c) Where an exit door leads to an outside platform or sidewalk, the level of the platform or sidewalk shall not be more than 7−3/4 inches below the doorsill;

(d) Every stairway flight shall have at least 3 risers, except as provided in par. (c) and ss. Comm 54.03 (1) (b), 55.09 (3) and 57.07 (1); and

(e) There shall be no more than 22 risers in any one flight.

(f) Slopes of ramps located in required means of egress shall comply with ch. Comm 69. Slopes of ramps not located in required means of egress shall not exceed 1 foot of rise in 6 feet of run.

(g) Ramps and landings shall be finished with a slip−resistant surface.

(5) STAIRWAY AND RAMP LANDINGS AND PLATFORMS. (a) 1. Except as provided in subd. 2., if a door is provided at the head or foot or both of a stairway or ramp, a landing or platform shall be placed between the door and the stairway or ramp regardless of the direction of swing of the door.

2. Platforms may be omitted for ramps 6 foot or less in length.

(b) Every landing or platform shall be at least as wide as the stairway or ramp, measured at right angles to the direction of travel. Every landing or platform must have a length of at least 3 feet, measured in the direction of travel.

(6) CURVED STAIRS. Interior or exterior curved stairs used as required exits shall meet all the requirements for stairways. Curved stairs shall have a radius of at least 25 feet at the interior edge of the tread.

(7) SPIRAL STAIRS. Spiral stairways may be permitted as specifically allowed by the occupancy chapters of this code. Such spiral stairs shall provide a clear walking area measuring at least 22 inches from the outer edge of the supporting column to the inner edge of the handrail and shall have treads at least 7 inches in width at a point one foot from the narrow end of the tread, and a uniform riser height of not more than 9½ inches.

(8) SPACES BENEATH STAIRS AND RAMPS. Spaces beneath the steps, stairs, ramps, landings and platforms which are within a vertical enclosure under s. Comm 51.02 (11) may not be used for any other purpose, unless that space is separated from the enclosure by the same degree of fire resistive construction required for the enclosure.

(b) Spaces beneath steps, stairs, ramps, landings and platforms which provide a means of egress, but not enclosed under s. Comm 51.02 (11), may not be used for any other purpose, unless;

1. The space is separated from steps, ramps, landings and platforms by at least one hour fire resistive construction; or

2. The space and the steps, ramps, landings and platforms are all contained within an individual living unit under the scope of ch. Comm 57.

History: 1−2−56; am. (2); (2) (a); (2) (b); Register, June, 1956, No. 6, eff. 7−1−56; r. and recr. Register, September, 1959, No. 45, eff. 10−1−59; r. (4) (b), renum. (c) to be (b), and cr. (5), Register, February, 1971, No. 182, eff. 3−1−71; am. (2) (a), Register, September, 1973, No. 213, eff. 10−1−73; r. and recr. Register, December, 1974, No. 228, eff. 1−1−75; am. (4) (a) and cr. (10), Register, December, 1977, No. 264, eff. 1−1−78; cr. (7) (a), Register, December, 1978, No. 276, eff. 1−1−79; r. (5) to (7), renum. (8) to (10) to be (5) to (7) and am. (7), Register, January, 1980, No. 289, eff. 2−1−80; r. and recr. (1), am. (2), (3) (a) and (5), renum. (3) (b) to be (3) (b) 1. and am., cr. (3) (b) 2., (4) (f) and (g), Register, August, 1985, No. 356, eff. 1−1−86; renum. (3) (b) 1. to be (3) (b), r. (3) (b) 2., am. (4) (a) (intro.), (d) and (7), cr. (8), Register, February, 1991, No 423, eff. 4−1−91; am. (3) (a), cr. (3) (c) and (4) (a) 2., renum. (4) (a) to be (4) (a) 1. and am., r. (5) (c), Register, January, 1994, No. 457, eff. 2−1−94; r. and recr. (4) (f), Register, November, 1994, No. 467, eff. 12−1−94; am. (4) (a) 1., Register, December, 1997, No. 504, eff. 1−1−98; correction in (4) (d) made under s. 13.93 (2m) (b) 7., Stats., Register, November, 1999, No. 527.

Comm 51.161 Handrails. (1) WHERE REQUIRED. Handrails shall be provided in all of the following conditions unless otherwise specified in the occupancy chapters of this code.

(a) On either side for all interior stairways of more than 3 risers and for all ramps overcoming a change in elevation of more than 24 inches.

(b) On the open side of any stairway with more than 3 risers and on the open side of any ramp overcoming a change in elevation of more than 24 inches.

(c) On both sides of interior stairways or ramps 5 feet or more in width.

(d) To divide interior stairways or ramps more than 8 feet wide into widths at least 3 feet 8 inches but less than 8 feet.

(e) On both sides of exterior stairways with more than 3 risers and on both sides of exterior ramps overcoming a change of elevation of more than 24 inches, either of which are an integral part of the building.

(f) To divide exterior stairways or ramps, either of which are an integral part of the building and more than 25 feet wide into approximately equal widths not less than 3 feet 8 inches but not greater than 25 feet.

(g) The requirements specified in pars. (a) to (f) do not apply to ramps having a slope less than 1:20.

Note: See ch. comm 69 for handrail requirements for ramps used to provide barrier free access.

(h) On fire escapes as specified in s. Comm 51.20 (8).

(2) LOADING. All handrails shall be designed and constructed to withstand a load of 200 pounds applied in any direction at any point.

(3) HEIGHT. The top of the handrail gripping surface shall be mounted between 34 inches and 38 inches above the nosing of the treads on stairways or above the surface of ramps.

Note: See s. Comm 51.20 (8) for handrail requirements for fire escapes.

(4) CONTINUITY AND EXTENSIONS. (a) Except as provided in par. (b), handrails shall be continuous for the full length of the stairway or ramp and one handrail shall extend at least 12 inches beyond the top and bottom riser or ramp end and shall not constitute a projecting hazard.

(b) 1. Handrails not required for barrier−free design construction on assembly seating facilities need not comply with the 12 inch extension requirement.

2. Handrails on stairs located within individual living units need not comply with the requirements of par. (a).

(5) CLEARANCE. Handrails shall provide a clearance of at least $1^1/_2$ inches between the handrail and the wall to which it is fastened.

(6) OPENINGS BELOW TOP RAIL. (a) Handrails protecting the open sides of stairways and ramps shall have intermediate rails or an ornamental pattern designed to prevent the passage of an object with a diameter larger than 6 inches, except in adult detention or correctional facilities, factory or warehouse occupancies the clear distance between intermediate rails measured at right angles to the rails may not exceed 21 inches.

(b) Handrails protecting the open sides of stairways and ramps not subject to use by children (i.e., waste water treatment plants, foundries, tanneries and other industrial occupancies) shall be provided with an intermediate rail at mid height or equivalent.

(7) HANDGRIP DIMENSIONS. (a) Except as specified in par. (b), handrails serving stairways or ramps shall have a circular cross−

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section with an outside diameter of at least 1¼ inches and not greater than 2 inches. Handrails shall be graspable along the entire length.

(b) Any other shape handrail with a perimeter of at least 4 inches, but not greater than 6¼ inches and with the largest cross−sectional dimension not exceeding 2¼ inches may be used.

History: Cr. Register, January, 1980, No. 289, eff. 2−1−80; am. (4), Register, December, 1981, No. 312, eff. 1−1−82; am. (1) (a) to (g), renum. (4) (b) to be (4) (b) 1., cr. (4) (b) 2., Register, August, 1985, No. 356, eff. 1−1−86; am. (1) (a), r. and recr. (6) (a), cr. (7), Register, February, 1991, No. 423, 4−1−91; am. (3), Register, January, 1994, No. 457, eff. 2−1−94; r. and recr. (7) (b), Register, April, 1998, No. 508, eff. 5−1−98.

Comm 51.162 Guardrails. (1) WHERE REQUIRED. Guardrails shall be provided in all of the following conditions unless otherwise specified in the occupancy chapters of this code:

(a) On the open side of elevated platforms, landings, walks, balconies and mezzanines which are more than 24 inches in height;

(b) On assembly seating facilities as specified in s. Comm 62.77;

(c) On open parking structures as specified in s. Comm 62.28 and as indicated in sub. (5); and

(d) On openings through floors and roofs.

(2) EXEMPT LOCATIONS. Guardrails need not be provided:

(a) On the loading side of loading docks;

(b) On the auditorium side of a stage or enclosed platform; and

(c) Around floor pits, openings or depressions for manufacturing areas and processing areas where guardrails would interfere with the operations or functions of the areas.

Note: Federal OSHA also prescribes requirements concerning the guarding of floor openings under 29 CFR 1910.

(3) LOADING. (a) Except as provided in par. (b), all guardrails shall be designed and constructed to withstand a load of at least 200 pounds applied in any direction at any point.

(b) All guardrails on assembly seating facilities shall be designed and constructed to withstand a vertical and horizontal load of 50 pounds per linear foot. Loads need not be applied simultaneously.

(4) HEIGHT. Guardrails shall not be less than 3 feet 6 inches in height.

(a) *Exception.* Guardrails within an individual living unit, or on an exterior appurtenance accessible only to the occupant of that unit, may be 36 inches in height.

(b) *Exception.* Guardrails on a balcony immediately in front of the first row of fixed seating and which are not at the end of an aisle may be 30 inches in height.

(5) OPENINGS BELOW TOP RAIL. (a) Guardrails protecting the open sides of elevated platforms, walks, balconies, and mezzanines shall have intermediate rails or an ornamental pattern designed to prevent the passage of an object with a diameter larger than 6 inches, except in adult detention or correctional facilities, factory or warehouse occupancies the clear distance between intermediate rails measured at right angles to the rails may not exceed 21 inches.

(b) Guardrails in areas not subject to use by children shall be provided with an intermediate rail at mid height or equivalent.

History: Cr. Register, January, 1980, No. 289, eff. 2−1−80; am. (1) (b), (3) and (4) (b), Register, December, 1981, No. 312, eff. 1−1−82; r. and recr. (2) and (5) (a), Register, February, 1991, No. 423, eff. 4−1−91; am. (4) (a), Register, January, 1994, No. 457, eff. 2−1−94.

Comm 51.164 Headroom. (1) GENERAL. Except as provided in sub. (2), every means of egress shall be provided with a headroom clearance of not less than 6 feet 8 inches. In stairways, the clearance shall be 7 feet 0 inches established by measuring vertically from the edge of the tread nosing to the ceiling or soffit above the tread nosing.

(2) EXCEPTION. The headroom clearance for public stairways in apartments and townhouses may be reduced to not less than 6 feet 8 inches.

Note: See s. Comm 57.07 (3) for requirements pertaining to stairways within individual living units.

Note: See ch. Comm 18, ASME A17.1 101.4 for 84−inch headroom requirement in elevator machine rooms, and s. Comm 18.85 (2) for 78−inch headroom requirement in limited−use, limited−application elevator machine rooms.

History: Cr. Register, January, 1980, No. 289, eff. 2−1−80; am. Register, December, 1983, No. 336, eff. 1−1−84.

Comm 51.165 Stairway identification. All stairways serving 4 or more stories shall have each floor level or story identified on the stair side as to its name or number with a permanent sign having letters or characters at least 2 inches in height.

History: Cr. Register, December, 1981, No. 312, eff. 1−1−82.

Comm 51.166 Stairway discharge. Where a stairway from the level below the exit discharge and a stairway from an upper floor terminate at the same exit discharge level, an approved barrier shall be provided to prevent persons from continuing down one or more full floor levels below the exit discharge level unless the exit discharge level has a vision panel to the outside or is otherwise made readily apparent.

History: Cr. Register, December, 1981, No. 312, eff. 1−1−82; am. Register, October, 1982, No. 322, eff. 11−1−82.

Comm 51.167 Exiting through areas of hazard. (1) GENERAL. Except as provided in subs. (2) and (3), exit access shall be so arranged that it will not be necessary to travel through any area of hazard in order to reach the exit.

(2) GARAGES. (a) Occupancies within the scope of ch. Comm 54 may exit through storage garages.

(b) Occupancies within the scope of ch. Comm 54 may not exit through repair garages.

(c) Occupancies within the scope of chs. Comm 55 to 62 may not exit through a storage or repair garage.

(3) KITCHENS. (a) Exiting through a kitchen within an individual living unit is permitted.

(b) Exiting through kitchens equipped with residential−type appliances in areas such as but not limited to employee lounges, activity rooms and similar areas is permitted provided the kitchen is not used for commercial purposes.

(c) Exiting through kitchens of restaurants and similar commercial operations or kitchens equipped with commercial−type appliances is prohibited.

History: Cr. Register, December, 1981, No. 312, eff. 1−1−82; am. Register, October, 1982, No. 322, eff. 11−1−82.

Comm 51.17 Smokeproof stair tower. (1) A smokeproof stair tower shall be an enclosed stairway which is entirely cut off from the building and which is reached by means of open balconies or platforms. The stairways, landings, platforms and balconies shall be of noncombustible material throughout. The enclosing walls shall be of not less than 4−hour fire−resistive construction, and the floors and ceilings of not less than 2−hour fire−resistive construction as specified in s. Comm 51.04.

(2) The doors leading from the buildings to the balconies and from the balconies to the stairways shall be fire−resistive doors, and all openings within 10 feet of any building shall be protected with fire−resistive windows for moderate fire exposure, or fire−resistive doors as specified in s. Comm 51.047.

(3) Each balcony shall be open on at least one side, with a railing not less than 3 feet 6 inches high on all open sides.

History: 1−2−56; am. Register, December, 1962, No. 84, eff. 1−1−63; am. (1) and (2), Register, February, 1971, No. 182, eff. 7−1−71; r. and recr. (1) and (2) eff. 8−1−71 and exp. 1−1−72, and cr. (1) and (2) eff. 1−1−72, Register, July, 1971, No. 187; am. (2), Register, June, 1972, No. 198, eff. 7−1−72.

Comm 51.18 Interior enclosed stairway. (1) GENERAL. An interior enclosed stairway shall be separated from other areas of the building by fire−resistive rated construction as speci-

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fied in ss. Comm 51.04 to 51.049 with the hourly ratings as specified in Table 51.03−A.

(2) EXTENT OF ENCLOSURE. (a) The enclosure shall include at each floor level a portion of the floor which will be at least as wide as the stairway.

(b) The enclosure shall provide uninterrupted passage from the uppermost floor to an outside door without leaving the enclosure.

(c) The enclosure shall also include any passageway, if provided, on the floor of exit discharge leading from the stairway to the exit discharge, so as to afford uninterrupted passage from the uppermost floor to the exit discharge, without leaving the enclosure.

(3) OPENINGS IN THE ENCLOSURE. Openings in the stairway enclosure shall be limited to exit doors serving public passageways or corridors or serving floors occupied by a single tenant.

Note: See ch. Comm 18 for additional requirements pertaining to the location of elevator equipment room access doors.

(4) PROTECTION OF OPENINGS. (a) All openings for doors shall be protected by fire−rated door assemblies as specified in s. Comm 51.047.

(b) If windows are provided in the enclosure, the window openings shall be protected by fixed fire−rated window assemblies as specified in s. Comm 51.048, except in outside walls.

History: 1−2−56; am. (1) and (3), Register, February, 1971, No. 182, eff. 7−1−71; r. and recr. (1) and (3), eff. 8−1−71 and exp. 1−1−72, and cr. (1) and (3), eff. 1−1−72, Register, July, 1971, No. 187; r. and recr. (1), Register, June, 1972, No. 198, eff. 1−1−73; am. (3), Register, December, 1975, No. 240, eff. 1−1−76; am. (2), Register, January, 1980, No. 289, eff. 2−1−80; r. and recr., Register, December, 1981, No. 312, eff. 1−1−82.

Comm 51.19 Horizontal exit. (1) GENERAL. A horizontal exit shall consist of one or more openings through an occupancy separation; a 2−hour fire−rated separation wall extending from the basement or lowest floor to the underside of the roof deck or of one or more bridges or balconies connecting 2 buildings or parts of buildings entirely separated by occupancy separations as described in s. Comm 51.08.

(2) PROTECTION OF OPENINGS. Openings used in connection with horizontal exits shall be protected by fire−resistive doors as specified in s. Comm 51.047.

(a) Doors serving as required exits shall be standard exit doors and shall swing in the direction of exit travel. Where a horizontal exit serves spaces on both sides of the wall, there shall be adjacent doorways equipped with doors which swing in opposite directions.

1. 'Exceptions.' a. The swing of the exit door may comply with the exceptions permitted in the occupancy chapters of this code.

(b) Approved illuminated exit signs shall be provided to indicate the horizontal exit.

(c) Such doors shall be kept unlocked, unobstructed, provided with a self−closing device and normally be kept closed.

1. 'Exception.' Doors protecting openings used in connection with horizontal exits may be left opened if equipped with an automatic closing device actuated by smoke density or products of combustion other than heat.

Note: See NFPA 72 for requirements on door closer initiating devices.

(3) RAMP SLOPE. Where there is a difference of elevation between connected areas, the difference shall be overcome by a ramp with a slope of not more than one foot in 8.

Note: See ch. Comm 69 for ramp requirements for accessibility.

(4) PROJECTION OF ADJACENT OPENINGS. All doors and windows within 10 feet of any balcony or bridge shall be fire−resistive doors or fire−resistive windows as specified in ss. Comm 51.047 and 51.048.

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; r. and recr. Register, December, 1978, No. 276, eff. 1−1−79; am. (1) and (3), r. (2) (a) 1. a., renum. (2) (a) 1. b. to (2) (a) 1. a., Register, January, 1980, No. 289, eff. 2−1−80.

Comm 51.20 Fire escapes. (1) GENERAL. (a) *Location.* Fire escapes shall lead directly to a street, alley or open court connected with a street.

(b) *Adjacent openings.* All openings within 6 feet horizontally of any tread, landing or platform of the fire escape shall be protected with a fire−resistive rated door assembly complying with s. Comm 51.047 or a fire window assembly complying with s. Comm 51.048 as follows:

1. Buildings of 3 stories or less, shall use either a door or window assembly having a minimum fire−resistive rating of 3/4 hour.

2. Buildings of more than 3 stories shall use a door having a minimum fire−resistive rating of 1 1/2 hours.

(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 s. Comm 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 s. Comm 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, separators and ornaments. No bar material less than $^1/_4$ 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 3/8 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 $^1/_4$ inch, but not less than $1^1/_4$ x $^1/_4$ 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 $1^1/_4$ inches, center to center.

(b) $^1/_2$ inch or $^5/_8$ inch square bars with sharp edge up, not more than $1^1/_2$ inches, center to center.

(c) $^5/_8$ inch round bars, not more than $1^1/_2$ 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 $^3/_8$ 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 $^1/_4$ inch above platform bars, except around the outside of platform.

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(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 $^7/_8$ inch square bars or $1^1/_2$ x $1^1/_2$ x $^1/_4$ 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 $^7/_8$ inch diameter), nut, and washer (at least 4 inch diameter). The slope of the lower bracket bar shall be not less than 30° with the horizontal. The lower bar shall have a washer or shoulder to give sufficient bearing against the wall.

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

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

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

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

(c) Stairway stringers shall consist of either:

1. A 5 inch channel or larger.
2. Two angles 2 x 2 x $^1/_4$ inch or larger.
3. Two flat bars 2 x $^3/_8$ inch or larger.
4. One flat bar 6 x $^1/_4$ 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 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, 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. Railings on fire escapes subject to use by children shall have intermediate rails or an ornamental pattern designed to prevent the passage of an object with a diameter larger than 6 inches. Railings on fire escapes not subject to use by children shall be provided with 2 uniformly spaced intermediate rails.

(a) Every railing shall have posts, not more than 5 feet apart made of not less than $1^1/_2$ x $1^1/_2$ x $^1/_4$ inch angles or tees, or $1^1/_4$ inch pipe; top rail not less than $1^1/_4$ x $1^1/_4$ x $^1/_4$ inch angle or equivalent; center rail not less than $1^1/_4$ x $^5/_{16}$ flat bar or equivalent. All connections shall be such as to make the railing stiff; 2 bolts ($^3/_8$ inch or larger) shall be used at the foot of each post wherever possible, or at least one $^1/_2$ 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 $^5/_8$ 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, 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 $1^1/_4$ inch pipe, or not less than 2 x $^3/_8$ inch flat bars, at least 16 inches apart in the clear. The rungs shall be not less than $^1/_2$ inch square or $^3/_4$ inch round bars, 12 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 $3^1/_2$ 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 sub. (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, 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; am. (8) (intro.), Register, January, 1980, No. 289, eff. 2−1−80; am. (8) (b), Register, December, 1981, No. 312, eff. 1−1−82; am. (9), Register, February, 1991, No. 423, eff. 4−1−91; am. (8) (intro.), Register, January, 1994, No. 457, eff. 2−1−94; r. and recr. (1), Register, March, 2000, No. 531, eff. 4−1−00.

Comm 51.21 Standpipe and hose systems. (1) All standpipe and hose systems shall meet the requirements of NFPA 14 and the requirements of this section.

(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 $2^1/_2$−inch hose.

(b) *Class II—First−aid standpipes*. For use primarily by occupants of a building until the arrival of the fire department ($1^1/_2$−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.

(d) *Dry standpipes*. For use by fire departments.

(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.

(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 sub. (6).

(g) *Hose valves and connections.* An approved $2^1/_2$−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 $2^1/_2$−inch hose valve, a $2^1/_2$−inch by $1^1/_2$−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, Stats., requires that all hose connections be fitted with the national standard hose threads adopted by the national fire protection association.

(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; or

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.

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

(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 $2^1/_2$ inches in diameter for buildings exceeding 4 stories or 50 feet in height.

(d) *Hose valves and connections.* An approved $1^1/_2$−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, $1^1/_2$−inches in diameter, with $^1/_2$−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 $^1/_2$−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: The department will permit the domestic water supply system to serve class II standpipes.

Note: The department will permit pumps, other than fire pumps, provided the water supply meets the requirements of sub. (4) (f).

(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 sub. (3) (j).

(b) *Requirements.* Class III standpipes shall conform to the requirements of class I service except that $1^1/_2$−inch outlets with a hose and $2^1/_2$−inch outlets shall be provided on each floor and shall be installed to the requirements of the respective classes of service.

(6) DRY STANDPIPES. (a) *Where required.* Dry standpipes shall be provided as required by chs. Comm 54 to 62.

Note: See ss. Comm 54.15, 55.33, 56.20, 57.15 and 62.30.

(b) *Number and location.* Required dry standpipes shall be provided in each stair enclosure.

(c) *Hose valves and connections.* 1. Required dry standpipes shall be provided with approved 2½−inch valve hose connections at each floor level with one connection in the stair tower and one immediately outside.

2. Required dry standpipes with a fire department siamese connection greater than 50 feet to a street shall be interconnected to a standpipe system with the connection 50 feet or less to a street.

(d) *Miscellaneous requirements.* Dry standpipes shall conform to the requirements specified in sub. (3) (e) to (h).

(7) 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 $2^1/_2$−inch hose outlets of the standpipes used by the fire department. The combined system shall comply with the automatic sprinkler requirements of s. Comm 51.23 and the standpipe and hose requirements of s. Comm 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 sub. (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

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the building is completely sprinklered, the risers may be sized by hydraulic calculations.

Note: NFPA 13 defines light hazard occupancies as occupancies where the quantity and/or combustibility of contents 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; and unused attics.

(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.

(8) MAINTENANCE. (a) All standpipe and hose systems shall be inspected, tested and maintained in accordance with NFPA 25.

(b) The requirements of par. (a) shall also apply to all systems in existence on the effective date of this section.

(9) CROSS CONNECTION CONTROL. (a) A standpipe system connecting to a water supply system or to a municipal water main shall be protected against backflow conditions in accordance with s. Comm 82.41. If a reduced pressure principle backflow preventer or a reduced pressure detector backflow preventer is used as the type of cross connection control, plans for the device shall be submitted for review in accordance with s. Comm 82.20 (1).

(b) Cross connection control devices shall be tested in accordance with s. Comm 82.21 (3).

History: 1−2−56; r. and recr. Register, December, 1976, No. 252, eff. 1−1−77; am. (7), Register, December, 1978, No. 276, eff. 1−1−79; am. (3) (i), Register, June, 1983, No. 330, eff. 7−1−83; emerg. renum. (6) and (7) to be (7) and (8), cr. (2) (d) and (6), eff. 9−6−86; renum. (6) and (7) to be (7) and (8), cr. (2) (d) and (6), Register, November, 1986, No. 371, eff. 12−1−86; cr. (9), Register, January, 1994, No. 457, eff. 2−1−94; am. (9), Register, December, 1996, No. 492, eff. 1−1−97; corrections in (9) made under s. 13.93 (2m) (b) 7., Stats., Register, March, 1997, No. 495**;** r. and recr. (1) and (8) and r. (3) (i), Register, March, 2000, No. 531, eff. 4−1−00; **correction in (6) (d) made under s. 13.93 (2m) (b) 7., Stats., Register, June, 2001, No. 546.**

Comm 51.22 Fire extinguishers. (1) GENERAL. All fire extinguishers shall comply with the provisions of NFPA 10.

(2) INSTALLATION. Fire extinguishers as specified in chs. Comm 54 to 62 shall be installed as specified in NFPA No. 10.

(3) MAINTENANCE AND REPLACEMENT. (a) 1. All portable fire extinguishers shall be inspected, tested, maintained in operable condition, and replaced as specified in NFPA10.

2. For fire extinguishers that are first installed after April 1, 2000 and anytime a fire extinguisher is replaced thereafter, the new or replacement extinguisher shall comply with NFPA 10.

(b) The requirements of par. (a) shall also apply to all buildings in existence on the effective date of this section.

Note: NFPA 10 requires portable fire extinguishers that serve commercial cooking equipment, such as deep fat fryers, to be classified as Type K.

Note: See Appendix A for further explanatory material.

History: 1−1−56; am. Register, October, 1967, No. 142, eff. 11−1−67; r. and recr. Register, December, 1981, No. 312, eff. 1−1−82; am. Register, December, 1983, No. 336, eff. 1−1−84; am. Register, March, 1991, No. 423, eff. 4−1−91; am. (1), renum. and am. (3) to be (3) (a) 1. and cr. (3) (a) 2. and (b), Register, March, 2000, No. 531, eff. 4−1−00.

Comm 51.23 Automatic sprinklers. (1) GENERAL REQUIREMENTS.

(a) 1. Unless otherwise specifically permitted in this code, where a sprinkler as defined in NFPA 13 is installed to provide fire protection, the system that all sprinklers are connected to shall comply with NFPA 13 or NFPA 13R as applicable, in accordance with the scope of the standard or rule.

2. The water supply for all systems that supply sprinklers shall comply with either sub. (2) or s. Comm 51.236 as applicable.

(b) 1. A sprinkler system shall be so designed, installed and maintained as to provide complete coverage for all portions of the building, except:

2. Sprinkler heads may be omitted within a room dedicated exclusively to electrical equipment provided:

a. The room is separated from other portions of the building by at least one−hour fire−resistive construction;

b. The room is equipped with a smoke detector the activation of which is either audible throughout all the occupied areas of the building or interconnected to a manual fire alarm system; and

c. The storage of combustible materials within the room is prohibited.

Note: See ch. Comm 18 for requirements pertaining to automatic fire sprinkler system protection for elevators.

(c) Reinstallation of used sprinkler heads shall be prohibited.

(d) Approved secondhand devices other than sprinkler heads 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 approved by 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. Approved automatic water supplies for the sprinkler system recognized by the department are listed below:

(a) An approved water supply shall be provided for all automatic fire sprinkler systems. Approved water supplies ~~as~~ recognized by the department are listed below:

1. Municipal water system.
2. Gravity or pressure tank.
3. Ground storage reservoir.
4. Natural bodies of water approved by the department
5. Indoor swimming pools as approved by the department.

(b) The design and installation of water supply facilities for gravity tanks, fire pumps, reservoirs or pressure tanks, and underground piping shall conform to NFPA 22, NFPA 20, and NFPA 24.

(c) The connection of an automatic fire sprinkler system to a municipal water main shall be protected against backflow conditions in accordance with s. Comm 82.41.

1. If a reduced pressure principle backflow preventer or a reduced pressure detector backflow preventer is used as the type of cross connection control, plans for the device shall be submitted for review in accordance with s. Comm 82.20 (1).

2. Cross connection control devices shall be tested in accordance with s. Comm 82.21 (3).

(3) BASEMENT SPRINKLERS. In buildings where sprinklers are installed in the basement only, sprinklers shall also be provided in all of the following:

(a) All shafts leading to the story above.

(b) All elevator hoistways as required by NFPA 13.

(4) FIRE DEPARTMENT CONNECTION. Except as provided in sub. (7), every automatic fire sprinkler system installed in accordance with NFPA 13 shall have an approved fire department connection as specified in NFPA 13. The connection shall be marked "Sprinkler". If standpipes are also supplied by the hose connection, the sign shall read "Standpipe and Automatic Sprinkler". The elevation of the connection shall be not less than 18 inches nor more than 42 inches above the sidewalk or ground. If municipal water is available at the building site, the fire department connection shall be located within 150 feet of a municipal fire hydrant, unless the fire department provides a written statement accepting a specified greater distance.

(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. (a) *Maintenance*. All installed automatic sprinkler systems shall be inspected, tested and maintained in accordance with NFPA 25. Owners or operators shall be responsible for the condition of their sprinkler system and shall maintain the system in good operating condition. Records of inspections, tests, and maintenance as specified in NFPA 25 shall be kept and shall be made available, upon request, to the department or its authorized deputies. The local fire department shall be notified whenever the automatic fire sprinkler system is shut down or impaired and when it is placed back in service. The owner shall

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arrange for immediate and continual servicing or repair of the automatic fire sprinkler system until it is placed back in operation.

(b) The requirements of par. (a) shall also apply to all systems in existence on the effective date of this section.

(c) The activities relating to the inspection and testing of all existing automatic fire sprinkler systems as required by NFPA 25, including waterflow and alarm tests, shall be conducted at least once a year by a person who holds a credential issued by department as a licensed automatic fire sprinkler contractor, licensed journeyman automatic fire sprinkler fitter, registered automatic fire sprinkler system apprentice, registered automatic fire sprinkler contractor−maintenance, registered fire sprinkler maintenance fitter or registered automatic fire sprinkler system tester.

Note: Section Comm 51.23 (6) (c) does not limit or preclude other individuals from conducting the daily, weekly, monthly, quarterly or semi−annual activities relating to inspection and testing of automatic fire sprinkler systems required under NFPA 25 and NFPA 72.

Note: See ss. 145.12 (1), 145.15 (4), 145.165 and 145.175, Stats., and ss. Comm 5.50 to 5.55 concerning who may install, modify or maintain automatic fire sprinkler systems.

(7) PARTIAL AUTOMATIC FIRE SPRINKLER SYSTEMS. Partial automatic fire sprinkler systems may be connected without a fire department connection to the domestic water supply system or a first−aid standpipe or a fire department standpipe provided all of the following conditions are satisfied:

(a) The number of sprinkler heads per building does not exceed 20;

(b) The connection is equipped with an approved indicating valve with a monitor or an approved locking device ;

(c) The water pressure and volume is adequate to supply the required flow of the largest number of sprinkler heads in any one of the enclosed areas;

(d) An audible alarm is provided to sound when the system is in operation; and

(e) A pressure gauge and test valve are provided to facilitate the testing and maintenance of the system in accordance with sub. (6).

(9) SYSTEM SUPERVISION AND MONITORING. The height limitations and fire resistive ratings in s. Comm 51.02 (21) and (22) and the unlimited area buildings specified in chs. Comm 54 to 62 shall be permitted only where the automatic fire sprinkler system is equipped with supervised sprinkler system valves or other approved component indicators, such as but not limited to fire pump power indicator or low water level indicator. The supervision function of the automatic fire sprinkler system shall be monitored by a central station, remote, auxiliary or proprietary fire alarm system company.

(10) CROSS CONNECTION CONTROL. The connection of an automatic fire sprinkler system or a partial automatic fire sprinkler system to the domestic water supply system for a building shall be protected against backflow conditions in accordance with s. Comm 82.41.

(a) If a reduced pressure principle backflow preventer or a reduced pressure detector backflow preventer is used as the type of cross connection control, plans for the device shall be submitted for review in accordance with s. Comm 82.20 (1).

(b) Cross connection control devices shall be tested in accordance with s. Comm 82.21 (3).

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; am. (6), Register, December, 1981, No. 312, eff. 1−1−82; r. and recr. (1), (4), (6) and (7), cr. (8), Register, June, 1983, No. 330, eff. 7−1−83; am. (6), Register, December, 1983, No. 336, eff. 1−1−84; emerg. am. (1) (a), (4) and (6) (a), cr. (9), eff. 9−6−86; am. (1) (a), (4) and (6) (a), cr. (9), Register, November, 1986, No. 371, eff. 12−1−86; am. (1) (a), (2) (b), (4), (6), (7) (c) and (d), r. and recr. (1) (b), cr. (7) (e), Register, March, 1991, No. 423, eff. 4−1−91; am. (4), (6) (a) and (7) (intro.), cr. (2) (c) and (10), Register, January, 1994, No. 457, eff. 2−1−94; cr. (6) (c), Register, October, 1996, No. 490, eff. 11−1−96; am. (2) (c) 1., (10), Register, December, 1996, No. 492, eff. 1−1−97; corrections made under s. 13.93 (2m) (b) 7., Stats., Register, March, 1997, No. 495; r. and recr. (3), Register, April, 1998, No. 508, eff. 5−1−98; r. and recr. (1) (a), am. (2) (a), (b), (6) (a), (b), (7) (b) and r. (8), Register, March, 2000, No. 531, eff. 4−1−00; **correction in (4) made under s. 13.93 (2m) (b) 7., Stats., Register, June, 2001, No. 546.**

Comm 51.235 Alternate fire suppression systems. **(1)** Where approved by the department, alternate fire suppression systems may be used in lieu of an automatic fire sprinkler system in areas where the use of water would have limited effect, could create a hazard or could cause unusual damage to property.

(2) Where an alternate fire suppression system is installed, it shall comply with the appropriate national standard as follows:

(a) NFPA 11, Standard for Low−Expansion Foam.

(b) NFPA 11A, Standard for Medium− and High−Expansion Foam Systems.

(c) NFPA 12, Standard on Carbon Dioxide Extinguishing Systems.

(d) NFPA 12A, Standard on Halon 1301 Fire Extinguishing Systems.

(e) NFPA 15, Standard for Water Spray Fixed Systems for Fire Protection.

(f) NFPA 16, Standard for the Installation of Foam−Water Sprinkler and Foam−Water Spray Systems.

(g) NFPA 17, Standard for Dry Chemical Extinguishing Systems.

(h) NFPA 17A, Standard for Wet Chemical Extinguishing Systems.

(i) NFPA 750, Standard on Water Mist Fire Protection Systems.

(j) NFPA 2001, Standard on Clean Agent Fire Extinguishing Systems.

(3) Inspection, testing and maintenance requirements in the standards listed in sub. (2) apply to all new alternate fire suppression systems and to all alternate fire suppression systems in existence on the effective date of this section.

History: Cr. Register, March, 2000, No. 531, eff. 4−1−00.

Comm 51.236 Manual−wet sprinkler system. **(1)** WHERE ALLOWED. A manual−wet sprinkler system may not be installed in a building unless all of the following conditions are met:

(a) There is no municipal water system available to serve the property.

(b) There is no provision under this code that requires the building to have an automatic fire sprinkler system.

(c) The municipality where the building is to be located has an adopted ordinance that requires the installation of manual−wet sprinkler systems and requires these systems to meet the provisions of this subsection.

(2) GENERAL REQUIREMENTS. (a) A building protected with a manual−wet sprinkler system shall be considered unsprinklered regarding all other code provisions.

(b) Each manual−wet sprinkler system shall be provided with a fire department connection. The fire department connection shall be installed in an accessible location acceptable to the fire chief.

(c) All above ground system piping throughout the building shall be labeled as a "manual−wet sprinkler system". Labels shall be placed at all of the following locations:

1. On the piping at intervals of not more than 25 feet and at each side where the piping passes through a wall, floor or roof.

2. At the fire department connection.

3. At all valves and hose outlets.

(d) The manual−wet sprinkler system design and installation shall comply with the automatic fire sprinkler system requirements of the adopted edition of NFPA 13, or NFPA 13R as applicable, except that the system comprised of the pilot line, fire department connection and fire department apparatus is considered as the approved water supply for the system.

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(e) A manual−wet sprinkler system shall be supplied with water through the fire department connection using fire department apparatus.

(f) The plumbing well, water service and pressure tank shall be of a size and capacity to supply the hydraulically most remote sprinkler with the required waterflow and pressure for a minimum of 10 minutes.

(g) A pilot line shall be connected from the manual−wet sprinkler system to the plumbing water supply system at the well pressure tank. The pilot line shall be of a size that is adequate to supply the hydraulically most remote sprinkler in the system.

(h) The connection of a manual−wet sprinkler system to a plumbing water supply system shall be protected against backflow conditions in accordance with s. Comm 82.41.

(i) The actuation of any sprinkler in the system shall operate the waterflow indicating device, which shall initiate a fire alarm within the building.

(j) Upon actuation of the building fire alarm, a fire alarm signal shall be sent automatically to the fire department providing fire protection to the building.

(3) INSTALLER QUALIFICATIONS. The installation of a manual−wet sprinkler system shall be performed by a licensed individual as specified for the installation of an automatic fire sprinkler system in Ch. Comm 5, Subchapter V.

(4) INSPECTION, TESTING AND MAINTENANCE. All manual−wet sprinkler systems shall be inspected, tested and maintained as specified for an automatic fire sprinkler system in NFPA 25, except the quarterly main drain test is not required.

Note: This section does not limit the owners options for providing other means of fire protection. See s. Comm 50.02 for additional information.

History: Cr. Register, March, 2000, No. 531, eff. 4−1−00.

Comm 51.24 Fire alarm systems. All fire alarm systems shall be designed and constructed in accordance with NFPA 72 and 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 ungrounded 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) (a) Except as provided in par. (b), coded fire alarm systems shall be provided in buildings more than 3 stories in height and the systems shall be so arranged that the code transmitted shall indicate the location and story of the structure in which the signal originated.

(b) 1. The department shall approve non−coded continuous sounding fire alarm systems under constant automatic supervision in apartment buildings.

2. The department shall approve non−coded continuous or march time sounding fire alarm systems with electrically supervised annunciator panels that indicate the location and the story of the structure in which the signal originated.

3. The department shall approve fire alarm and communication systems for high rise construction as specified in s. Comm 52.01 (2) (e).

(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 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 3 feet nor more than 4 feet above the finished floor as measured from the floor to the center of the box;

(5) All alarm systems shall be tested at least once a month and a record of the tests shall be kept;

(6) Existing fire alarm systems that are effective in operation will be accepted if approved by the department;

(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 $^{3}/_{16}$ inch in diameter which will withstand a bursting pressure of not less than 500 pounds per square inch shall be used. The maximum length of $^{3}/_{16}$ inch tubing shall not exceed 300 feet between charged cylinders. All tubing and other component parts shall be installed by skilled workers in accordance with the provisions of this code; and

Note: See Wisconsin State Electrical Code, Volume 2, ch. Comm 16.

(10) MAINTENANCE. (a) All fire alarm systems shall be inspected, tested and maintained in accordance with NFPA 72.

(b) The requirements of par. (a) shall also apply to all systems in existence on the effective date of this section.

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; am. (intro.) and (4), r. (3) (a), Register, January, 1980, No. 289, eff. 2−1−80; am. (3) and (6), cr. (10), Register, December, 1981, No. 312, eff. 1−1−82; am. (5), Register, August, 1985, No. 356, eff. 1−1−86; emerg. r. and recr. (3), eff. 9−6−86; r. and recr. (3), Register, November, 1986, No. 371, eff. 12−1−86; am. (2), Register, March, 1991, No. 423, eff. 4−1−91; am. (intro.) and (10), Register, February, 1999, No. 518, eff. 3−1−99; am. (intro.), renum. and am. (1) to be (10) (a) and cr. (10) (b), Register, March, 2000, No. 531, eff. 4−1−00.

Comm 51.245 Smoke detectors. **(1)** GENERAL REQUIREMENTS. All smoke detectors shall be approved by the department and shall comply with the provisions of NFPA 72.

(2) INSTALLATION. (a) Unless otherwise specified in this code, all smoke detectors and smoke alarms shall be installed in accordance with NFPA 72.

(b) Smoke detectors installed in ducts shall follow the provisions of NFPA 72 and NFPA 90A.

(3) MAINTENANCE. (a) All smoke detectors and system components shall be inspected, tested and maintained in accordance with NFPA 72 and all of the following requirements.

(b) The owner shall be responsible for maintaining the smoke detectors and the smoke detection system in good working order.

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(c) Tenants shall be responsible for informing the owner, in writing, of any smoke detector malfunction, including the need for a new battery.

(d) The owner shall have 5 days upon receipt of notice from the tenant to repair or replace the smoke detector or replace the battery.

(e) The owner shall furnish to the tenant written notice of the responsibilities of the tenant and the obligations of the owner regarding smoke detector maintenance.

(f) The requirements of pars. (a) to (e) also apply to all buildings in existence on the effective date of this section.

History: Cr. Register, December, 1981, No. 312, eff. 1−1−82; am. (2) and (3) (c), Register, October, 1982, No. 322, eff. 11−1−82; am. (1) and (2) (a) Register, December, 1983, No. 336, eff. 1−1−84; r. and recr. (3), Register, April, 1990, No. 412, eff. 5−1−90; am. (1) and (2), Register, January, 1994, No. 457, eff. 2−1−94; correction in (2) (b) made under s. 13.93 (2m) (b) 7., Stats., Register, October, 1996, No. 409; am. (1), r. and recr. (2) (a) and (3) (intro.), Register, February, 1999, No. 518, eff. 3−1−99; r. and recr. (2), renum. (3) (a) to (d) to be (3) (b) to (e), renum. and am. (3) (intro.) to be (3) (a) and cr. (3) (f), Register, March, 2000, No. 531, eff. 4−1−00.

Comm 51.25 Incorporation of standards by reference. (1) CONSENT. Pursuant to s. 227.21, Stats., the attorney general and the revisor of statutes have consented to the incorporation by reference of the standards listed in sub. (3).

Note: Copies of the adopted standards are on file in the offices of the department, the secretary of state and the revisor of statutes. Copies of the standards may be purchased through the respective organizations listed in sub. (3).

(2) ALTERNATE STANDARDS. (a) Alternate standards that are equivalent to or more stringent than the standards incorporated by reference in this code may be used in lieu of incorporated standards when approved by the department or if written approval is issued by the department in accordance with par. (b).

(b) 1. a. Upon receipt of a fee and a written request, the department may issue an approval for the use of the alternate standard.

b. The department shall review and make a determination on an application for approval within 40 business days of receipt of all forms, fees, and documents required to complete the review.

2. Determination of approval shall be based on an analysis of the alternate standard and the incorporated standard, prepared by a qualified independent third party or the organization that published the incorporated standard.

3. The department may include specific conditions in issuing an approval, including an expiration date for the approval. Violations of the conditions under which an approval is issued shall constitute a violation of this code.

4. If the department determines that the alternate standard is not equivalent to or more stringent than the standards incorporated by reference, the request for approval shall be denied in writing.

5. The department may revoke an approval for any false statements or misrepresentations of facts on which the approval was based. The department may re−examine an approved alternate standard and issue a revised approval at any time.

6. Fees for review of standards under this paragraph shall be submitted in accordance with ch. Comm 2.

(3) ADOPTION OF STANDARDS. The standards referenced in Tables 51.25−1 to 51.25−21 are hereby incorporated by reference into this chapter.

Note: The tables in this section provide a comprehensive listing of all of the standards adopted by reference in this code. For requirements or limitations in how these standards are to be applied, refer to the code section that requires compliance with the standard.

Table 51.25−1

AA	Aluminum Association 900 19th Street NW Washington, D.C. 20006
Standard Reference Number	Title
SAS−30	Specifications for Aluminum Structures Aluminum Construction Manual, Section 1, 1986.

Table 51.25−2

ACI	American Concrete Institute P.O. Box 19150 Detroit, Michigan 48219
Standard Reference Number	Title
1. 318−89 (Revised 1992)	Building Code Requirements for Reinforced Concrete.
2. 318.1−89 (Revised 1992)	Building Code Requirements for Structural Plain Concrete.
3. 530−88/ASCE 5−88	Building Code Requirements for Masonry Structures.
4. 530.1−88/ASCE 6−88	Specifications for Masonry Structures.

Table 51.25−3

AIA	The American Institute of Architects Order Department 9 Jay Gould Court P.O. Box 753 Waldorf, MD 20601
Standard Reference Number	Title
R673	Guidelines for Construction and Equipment of Hospital and Medical Facilities, 1987 edition.

Table 51.25−4

AISC	American Institute of Steel Construction 400 North Michigan Avenue Chicago, IL 60611
Standard Reference Number	Title
S326	Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings, with Commentary, November 1, 1978, with supplement #1.

Table 51.25−5

AITC	American Institute of Timber Construction 11818 S.E. Mill Plain Blvd., Suite 415 Vancouver, Washington 98684
Standard Reference Number	Title
1. 117−87	Design Standard Specifications for Structural Glued Laminated Timber of Softwood Species
2. 119−85	Standard Specifications for Hardwood Glued Laminated Timber

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Table 51.25−6

AISI	American Iron and Steel Institute 1133 15th Street, N.W., Suite 300 Washington, D.C. 20005
Standard Reference Number	Title
1. SG−671	Specification for the Design of Cold−formed Steel Structural Members, August, 1986.
2.	Manual For Structural Applications of Steel Cables For Buildings, 1973.

Table 51.25−7

ANSI	American National Standards Institute, Incorporated 1430 Broadway New York, New York 10018
Standard Reference Number	Title
1. Z21.10.1−1993	Gas Water Heaters, Volume I, Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less.
2. Z21.10.3−1993	Gas Water Heaters, Volume III, Storage, with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous Water Heaters.
3. Z21.47−1993	Gas−Fired Central Furnaces (except Direct−Vent Central Furnaces).
4. Z83.4−1991, with Z83.4a−1992 Addendum	Direct Gas−Fired Make−up Air Heaters
5. Z83.8−1990, with Z83.8a−1990 and Z83.8b−1992 Addendum	Gas Unit Heaters.
6. Z83.9−1990	Gas−Fired Duct Furnaces
7. Z83.18−1990, with Z83.18a−1991 Addendum	Direct Gas−Fired Industrial Air Heaters.
8. Z97.10−1994	Safety Glazing Materials Used in Buildings.
9. 101−93	ANSI/AAMA Aluminum Poly (Vinyl Chloride) (PVC) Prime Windows and Glass Doors.
10. I.S.2−87	ANSI/NWWDA Wood Windows.
11. I.S.3−88	ANSI/NWWDA Wood Sliding Patio Doors.

Table 51.25−8

APA	American Plywood Association P.O. Box 11700 7011 South 19th Street Tacoma, Washington 98460
Standard Reference Number	Title
1. PS 1−83U.S.	Product Standard for Construction and Industrial Plywood, Revised October, 1988.

Table 51.25−9

ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. 1791 Tullie Circle, NE Atlanta, Georgia 30329
Standard Reference Number	Title
1. 81850	Handbook of Fundamentals, 1993.
2. 52−76	Methods of Testing Air−Cleaning Devices Used in General Ventilation for Removing Particulate Matter.
3. 90.1−1989	Energy Efficient Design of New Buildings Except Low Rise Residential Buildings.

Table 51.25−10

ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, Pennsylvania 19103
Standard Reference Number	Title
1. A6−87d	General requirements for rolled steel plates, shapes, sheet piling and bars for structural use.
2. A36−87	Structural steel.
3. A82−85	Plain steel wire for concrete reinforcement.
4. A116−87	Zinc−coated (galvanized) steel woven wire fence fabric.
5. A153−82 (1987)	Zinc coating (hot−dip) on iron and steel hardware.
6. A615−87a	Deformed and plain billet−steel bars for concrete reinforcement.
7. A616−87	Rail−steel deformed and plain bars for concrete reinforcement.
8. A617−87	Axle−steel deformed and plain bars for concrete reinforcement.
9. C22−83	Gypsum.
10. C25−88	Chemical analysis of limestone, quicklime, and hydrated lime.
11. C34−84	Structural clay load−bearing wall tile.
11a. C36−91	Specification for gypsum wallboard.
12. C39−86	Compressive strength of cylindrical concrete specimens.
13. C42−84a	Obtaining and testing drilled cores and sawed beams of concrete.
14. C50−86	Sampling, inspection, packing, and marking of lime and limestone products.
15. C55−85	Concrete building brick.
16. C56−71 (1986)	Structural clay non−load−bearing tile.
17. C57−57 (1983)	Structural clay floor tile.
18. C62−87	Building brick (solid masonry units made from clay or shale).
19. C67−87	Sampling and testing brick and structural clay tile.
20. C90−85	Hollow load−bearing concrete masonry units.

21. C91−87a Masonry cement.

Table 51.25−10 − Continued

ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, Pennsylvania 19103
Standard Reference Number	Title
22. C97−83	Absorption and bulk specific gravity of natural building stone.
23. C99−87	Modulus of rupture of natural building stone.
24. C110−87	Physical testing of quicklime, hydrated lime, and limestone.
25. C140−75 (1980)	Sampling and testing concrete masonry units.
26. C144−87	Aggregate for masonry mortar.
27. C145−75 (1981)	Solid load−bearing concrete masonry units.
28. C150−86	Portland cement.
29. C170−87	Compressive strength of natural building stone.
30. C177−85	Test method for steady−state heat flux measurements and thermal transmission properties by means of the guarded−hot−plate apparatus.
31. C207−79 (1984)	Hydrated lime for masonry purposes.
32. C236−87	Test method for steady−state thermal performance of building assemblies by means of a guarded hot box.
33. C270−88	Mortar for unit masonry.
34. C317−87	Gypsum concrete.
35. C335−84	Test method for steady state heat transfer properties of horizontal pipe insulations.
36. C457−82a	Microscopical determination of air−void content and parameters of the air−void system in hardened concrete.
37. C471−87	Chemical analysis of gypsum and gypsum products.
38. C472−84	Physical testing of gypsum plasters and gypsum concrete.
39. C473−87a	Physical testing of gypsum board products and gypsum lath.
40. C476−83	Grout for reinforced and nonreinforced masonry.
41. C518−85	Test method for steady−state heat flux measurements and thermal transmission properties by means of the heat flow meter apparatus
42. C652−87a	Hollow brick (hollow masonry units made from clay or shale).
43. C666−84	Resistance of concrete to rapid freezing and thawing.

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Table 51.25−10 − Continued

ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, Pennsylvania 19103
Standard Reference Number	Title
44. C952−86	Bond strength of mortar to masonry units.
45. C956−81 (1986)	Installation of cast−in−place reinforced gypsum concrete.
46. C976−82	Test method for thermal performance of building assemblies by means of a calibrated hot box.
47. D245−81	Establishing structural grades and related allowable properties for visually graded lumber.
48. D635−81	Rate of burning and/or extent and time of burning of self−supporting plastics in a horizontal position.
49. D1037−87	Evaluating the properties of wood−base fiber and particle panel materials.
50. D1143−81 (1987)	Testing piles under static axial compressive load.
51. D1929−77 (1985)	Ignition properties of plastics.
52. D2843−77	Density of smoke from the burning or decomposition of plastics.
53. D4099−87	Specification for polyvinyl chloride (PVC) prime windows.
54. E72−80	Conducting strength tests of panels for building construction.
55. E84−87	Surface burning characteristics of building materials.
56. E108−87	Fire tests of roof coverings.
57. E119−88	Fire tests of building construction and materials.
58. E136−82	Behavior of materials in a vertical tube furnace at 750°C.
59. E283−84	Rate of air leakage through exterior windows, curtain walls and doors.
60. E447−84	Compressive strength of masonry prisms.
61. E648−88	Critical radiant flux of floor covering systems using a radiant heat energy source.
62. E814−94b	Standard Test Method for Fire Tests of Through−Penetration Fire stops.

Table 51.25−11

AWS	American Welding Society P.O. Box 351040 Miami, Florida 33135
Standard Reference Number	Title
1. D1.1−88	Structural Welding Code−Steel
2. D1.3−89	Structural Welding Code−Sheet Steel

Table 51.25−12

AWPA	American Wood Preservers Association P.O. Box 286 Woodstock, Maryland 21163−0286
Standard Reference Number	Title
1. C1−1993	All Timber Products
2. C2−1988	Lumber, Timbers, Bridge Ties and Mine Ties—Preservative Treatment by Pressure Processes
3. C4−1989	Poles—Preservative Treatment by Pressure Processes
4. C9−1993	Plywood

Table 51.25−13

AWPB	American Wood Preservers Bureau P.O. Box 5283 Springfield, Virginia 22150
Standard Reference Number	Title
1. LP−2 1988	Standards for Softwood Lumber, Timber and Plywood Pressure Treated with Water−Borne Preservatives for Above Ground Use.
2. LP−22 1988	Standards for Softwood Lumber, Timber and Plywood Pressure Treated with Water−Borne Preservatives for Ground Contact Use.
3. FDN 1988	Quality Control Program For Softwood Lumber, Timber and Plywood Pressure Treated with Water−Borne Preservatives, for Ground Contact Use in Residential and Light Commercial Foundations.

Table 51.25−13M

DOE	U.S. Department of Energy U.S. Government Printing Office Washington, DC 20585 Telephone: 202/512−1800
Standard Reference Number	Title
1. 21 CFR, Section 1002.10 (1994)	None
2. 47 CFR, Part 5 (1993)	Experimental Radio Services

Table 51.25−14

FM	Factory Mutual Research Corporation 1151 Boston−Providence Turnpike Norwood, Mass. 02062
Standard Reference Number	Title
4450, Revised Aug. 5, 1977	Approval Standard for Class I Insulated Steel Deck Roofs.

Table 51.25−15

GA	Gypsum Association 810 First Street NE, #510 Washington, DC 20002
Standard Reference Number	Title
GA−600−88	Fire Resistance Design Manual

Table 51.25−16

NiDI	Nickel Development Institute 15 Toronto Street, Suite 402 Toronto, Ontario, Canada M5C 2E3
Standard Reference Number	Title
9023	Stainless Steel Cold−Formed Structural Design Manual, 1974 edition

Table 51.25−17

NFPA	National Fire Protection Association One Batterymarch Park P.O. Box 9101 Quincy, Massachusetts 02269−9101
Standard Reference Number	Title
1. 10−1998	Standard for portable fire extinguishers.
2. 11−1998	Standard for Low−Expansion Foam.
3. 11A−1999	Standard for Medium− and High−Expansion Foam Systems.
4. 12−1998	Standard on Carbon Dioxide Extinguishing Systems.
5. 12A−1997	Standard on Halon 1301 Fire Extinguishing Systems.
6. 13−1999	Standard for the installation of sprinkler systems.
7. 13R−1999	Standard for the installation of sprinkler systems in residential occupancies up to and including four stories in height.
8. 14−1996	Standard for the Installation of Standpipe and Hose Systems.
9. 15−1996	Standard for water spray fixed systems for fire protection.
10. 16−1999	Standard for the Installation of Foam−Water Sprinkler and Foam−Water Spray Systems.
11. 17−1998	Standard for Dry Chemical Extinguishing Systems.
12. 17A−1998	Standard for Wet Chemical Extinguishing Systems.
13. 20−1999	Standard for the installation of centrifugal fire pumps.
14. 22−1998	Standard for water tanks for private fire protection.
15. 24−1995	Standard for the installation of private fire service mains and their appurtenances.
16. 25−1998	Standard for the inspection, testing, and maintenance of water−based fire protection systems.
17. 30−1996	Flammable and Combustible Liquids Code.
18. 30A−1996	Automotive and Marine Service Station Code.
19. 30B−1998	Manufacture and Storage of Aerosol Products.
20. 31−1997	Standard for the installation of oil−burning equipment.
21. 33−1995	Standard for Spray Application Using Flammable or Combustible Materials.

Table 51.25−17 − Continued

NFPA	National Fire Protection Association One Batterymarch Park P.O. Box 9101 Quincy, Massachusetts 02269−9101
Standard Reference Number	Title
22. 34−1995	Standard for Dipping and Coating Processes Using Flammable or Combustible Liquids.
23. 45−1996	Fire Protection for Laboratories Using Chemicals.
24. 51−1997	Standard for the Design and Installation of Oxygen−Fuel Gas Systems for Welding, Cutting, and Allied Processes.
25. 54−1999	National Fuel Gas Code.
26. 72−1999	National Fire Alarm Code.
27. 80−1999	Standard for Fire Doors and Fire Windows.
28. 90A−1999	Standard for the Installation of Air Conditioning and Ventilating Systems.
29. 96−1998	Standard for the Installation of Equipment for the Removal of Smoke and Grease−Laden Vapors from Commercial Cooking Equipment.
30. 211−1996	Standard for Chimneys, Fireplaces, Vents and Solid Fuel−Burning Appliances.
31. 230−1999	Standard for the Fire Protection of Storage.
32. 430−1995	Code for the Storage of Liquid and Solid Oxidizers.
33. 432−1997	Code for the Storage of Organic Peroxide Formulations.
34. 495−1996	Explosive Materials Code.
35. 701−1999	Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

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36. 750−1996	Standard on Water Mist Fire Protection Systems.
37. 2001−1996	Standard on Clean Agent Fire Extinguishing Systems.

Table 51.25−17M

NFRC	National Fenestration Rating Council 962 Wayne Ave., Suite 750 Silver Spring, Maryland 29010
Standard Reference Number	Title
1. 100−91	Procedure for Determining Fenestration Product Thermal Properties
2. LAP1−92, PCP1−92 and CAP1−92	Fenestration Thermal Performance Rating Certification and Labeling Program.

Table 51.25−18

NFoPA	National Forest Products Association 1250 Connecticut Avenue, N.W., #200 Washington, DC 20036
Standard Reference Number	Title
1. NDS	National Design Specification for Wood Construction, 1991 Edition, including Design Values for Wood Construction, a 1991 supplement to the 1991 Edition of National Design Specification for Wood Construction.
2. Technical Report No.7	The Permanent Wood Foundation System, Basic Requirements, Revised January, 1987.

Table 51.25−18M

SMACNA	Sheet Metal and Air Conditioning Contractors National Association Vienna, Virginia 22180
Standard Reference Number	Title
	HVAC Duct Leakage Test Manual, 1st Edition, 1985.

Table 51.25−19

SJI	Steel Joist Institute Suite A 1205 48th Ave., North Myrtle Beach, South Carolina 29577
Standard Reference Number	Title
	Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders, 1988.

Table 51.25−20

TPI	Truss Plate Institute, Inc. 583 D'Onofrio Dr., Suite 200 Madison, Wisconsin 53719
Standard Reference Number	Title
TPI−85	Design Specification for Metal Plate Connected Wood Trusses, including 1987 Supplement and Errata Addendum Sheet.

Table 51.25−21

UL	Underwriters Laboratories, Inc. Publication Stock 333 Pfingsten Road Northbrook, Illinois 60062
Standard Reference Number	Title
1. 181−1981	Factory−Made Air Ducts and Connectors, including revisions dated March 19, 1994.
2. 1256−1985	Fire Test of Roof Deck Constructions.

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