

Table 51.08-2

Occupancies	Hazard Isolation		Exceptions See ch. ILHR 10 for flammable/combustible liquid requirements See exceptions in footnotes 1, 2, 4 and 5
	≤3 stories	> 3 stories	
Ch 54	2	2	1-hour isolation permitted for 1-story bldgs <3,000 sq. ft.
Ch 55 ≤ 750 occupants > 750 occupants	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	See Footnote 3
Ch 58 Health care Detention	2	3	N/A
Ch 59 Storage ≤ 500 sq ft Repair ≤ 500 sq ft Storage > 500 sq ft Repair > 500 sq ft	2	2	N/A
Ch 60	1	2	N/A
Ch 61	N/A	N/A	N/A
Ch 62 Open parking structures	2	2	N/A
Ch 62 Assembly seating facilities	2	2	N/A
Ch. 62 Greenhouses	1	N/A	
Ch. 62 Ministorage Buildings	2	2	1-hour isolation permitted for 1-story bldgs <3,000 sq ft

<sup>1</sup>Fuel-Fired Heating Equipment. All gas- and oil-fired boilers, furnaces and water heaters shall be provided with a 1-hour fire-resistive-rated enclosure. Solid fuel burning equipment shall be provided with a 2-hour fire-resistive-rated enclosure. All openings in the enclosure shall be protected as specified in ss. ILHR 51.047 and ILHR 64.42. Use of hold open devices is prohibited. All fire-rated construction shall comply with ss. ILHR 51.04 to 51.049.

<sup>2</sup>Combustible and Flammable Liquids. Combustible and flammable liquids shall be isolated in accordance with ch. ILHR 10.

<sup>3</sup>Clothes Dryers. All gas, oil, or electric clothes dryers shall be isolated by 2-hour construction except as follows:

- Up to 2 co-located residential clothes dryers that each have a rated capacity of 37,000 Btu/hour or less, may be used without a fire-resistive-rated enclosure, provided that any associated gas piping includes a full-flow automatic shut-off valve.
- Isolation of clothes dryers is not required where automatic fire sprinkler protection is provided for the clothes dryer and a full-flow automatic shut-off valve is provided for any associated gas piping.

<sup>4</sup>Standby Emergency Generators. Fuel-fired emergency generators shall be isolated by 2-hour fire-resistive construction. Emergency generators required by Comm Table 16.46 (referenced by s. ILHR 52.20) shall be located separately in a 2-hour fire-resistive rated room with no other equipment or electrical service equipment which is not a part of the emergency and standby power system.

<sup>5</sup>Fire-resistive ratings may be reduced as per s. ILHR 51.02 (22).

(2) Hazards shall be enclosed in accordance with Table 51.08-2.

(3) Openings in occupancy separations or hazard enclosures shall be protected by fire-door assemblies as specified in s. ILHR 51.047 or by fire-window assemblies as specified in s. ILHR 51.048 or as specified in s. ILHR 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.

**ILHR 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-empt 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. ILHR 51.065 (5) or (6).

(b) **Sloped glazing.** All glazing installed more than 15° 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 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. 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. ILHR 51.048.

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

**ILHR 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. ILHR 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-resistant buildings, or parts of fire-resistant 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. ILHR 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. ILHR 55.

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

(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. ILHR 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 s. ILHR 52.04 shall have the width of at least one single door increased to 2 feet 8 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  $\frac{3}{4}$  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. ILHR 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. ILHR 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.

**ILHR 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. ILHR 54 to 62 for acceptable types of exits and exit accesses and exceptions.

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

**ILHR 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.

**ILHR 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. ILHR 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. ILHR 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. ILHR 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. Open risers 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: Round or smooth nosings are recommended as they are not difficult to negotiate for individuals with restrictions in the knee, ankle or hip, or with artificial legs or long leg braces.

(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. ILHR 54.03 (1) (b), 55.09 (3) (b) 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. ILHR 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. ILHR 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. ILHR 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. ILHR 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. (3) 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) (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.

**ILHR 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 s. ILHR 52.04 (7) (c) for handrail requirements for ramps used to provide barrier free access.

(h) On fire escapes as specified in s. ILHR 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. ILHR 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 1½ 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.** The handgrip portion of a handrail serving a stairway or ramp may not be less than 1¼ inches nor more than 2 inches in any horizontal cross sectional dimension or any other shape with a perimeter dimension of at least 4 inches but not greater than 6¼ inches and with the largest cross-sectional dimension not exceeding 2¼ inches.

**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.

**ILHR 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. ILHR 62.77;

(c) On open parking structures as specified in s. ILHR 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.

**ILHR 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. ILHR 57.07 (3) for requirements pertaining to stairways within individual living units.

History: Cr. Register, January, 1980, No. 289, eff. 2-1-80; am. Register, December, 1983, No. 336, eff. 1-1-84.

**ILHR 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.

**ILHR 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.

**ILHR 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.

Note: See ss. ILHR 54.14, 55.29, 56.15, 57.14, 58.24, 58.62, 59.21, 60.25, 60.37, 62.32 for additional requirements.

(2) **GARAGES.** (a) Occupancies within the scope of ch. ILHR 54 may exit through storage garages.

(b) Occupancies within the scope of ch. ILHR 54 may not exit through repair garages.

(c) Occupancies within the scope of chs. ILHR 55-62 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 employe 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.

**ILHR 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. ILHR 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. ILHR 51.047.

(3) Each balcony shall be open on at least one side, with a railing not less than 3'6" 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 rec. (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.

**ILHR 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 specified in ss. ILHR 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 passage-ways 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. ILHR 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. ILHR 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 rec. (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 rec. (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 rec., Register, December, 1981, No. 312, eff. 1-1-82.

**ILHR 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. ILHR 51.08.

(2) **PROTECTION OF OPENINGS.** Openings used in connection with horizontal exits shall be protected by fire-resistive doors as specified in s. ILHR 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: The department will accept detectors installed in accordance with the Standard on Automatic Fire Detectors, NFPA No. 72B. See Table 51.25-17.

(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.

(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. ILHR 51.047 and 51.048.

History: 1-2-56; am. (2) and (4), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (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 rec. Register, December, 1978, No. 276, eff. 1-1-79; am. (1) and (3), r. (2) (a) 1. a., renun. (2) (a) 1. b. to (2) (a) 1. a., Register, January, 1980, No. 289, eff. 2-1-80.

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

(a) Every fire escape shall be placed against a blank wall if possible. If such a location is not possible then every wall opening which is less than 6 feet distant horizontally from any tread or platform of the fire escape shall be protected by a fire-resistive window for moderate fire exposure or by a fire-resistive door as specified in ss. ILHR 51.047 and 51.048.

(2) **EXITS TO FIRE ESCAPES.** Every fire escape shall be accessible from a public passageway or shall be directly accessible from each occupied room. Exits to fire escapes shall be standard exit doors as specified in s. ILHR 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. ILHR 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  $\frac{1}{4}$  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  $\frac{3}{8}$  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  $1 \times \frac{1}{4}$  inch, but not less than  $1\frac{1}{4} \times \frac{1}{4}$  inch where bolts and separators are used except that platforms and treads constructed of flat bars on edge may be made of material  $\frac{3}{16}$  inch in thickness provided the material is galvanized after fabrication. Bars shall not be spaced more than  $1\frac{1}{4}$  inches, center to center.

(b)  $\frac{1}{2}$  inch or  $\frac{5}{8}$  inch square bars with sharp edge up, not more than  $1\frac{1}{2}$  inches, center to center.

(c)  $\frac{5}{8}$  inch round bars, not more than  $1\frac{1}{2}$  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  $2 \times \frac{3}{8}$  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  $\frac{1}{4}$  inch above platform bars, except around the outside of platform.

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

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

(5) **BRACKETS.** Brackets for a 28 inch or 30 inch platform, when spaced not more than 4 feet apart, shall be made of not less than  $\frac{7}{8}$  inch square bars or  $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{4}$  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  $\frac{7}{8}$  inch diameter), nut, and washer (at least 4 inch diameter). The slope of the lower bracket bar shall be not less than  $30^\circ$  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  $2 \times 2 \times \frac{1}{4}$  inch or larger.

3. Two flat bars  $2 \times \frac{3}{8}$  inch or larger.

4. One flat bar  $6 \times \frac{1}{4}$  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  $1\frac{1}{2} \times 1\frac{1}{2} \times \frac{1}{4}$  inch angles or tees, or  $1\frac{1}{4}$  inch pipe; top rail not less than  $1\frac{1}{4} \times 1\frac{1}{4} \times \frac{1}{4}$  inch angle or equivalent; center rail not less than  $1\frac{1}{4} \times \frac{3}{16}$  flat bar or equivalent. All connections shall be such as to make the railing stiff; 2 bolts ( $\frac{3}{8}$  inch or larger) shall be used at the foot of each post wherever possible, or at least one  $\frac{1}{2}$  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  $\frac{5}{8}$  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  $1\frac{1}{4}$  inch pipe, or not less than  $2 \times \frac{3}{8}$  inch flat bars, at least 16 inches apart in the clear. The rungs shall be not less than  $\frac{1}{2}$  inch square or  $\frac{3}{4}$  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  $3\frac{1}{2}$  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.

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

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

(2) CLASSES OF SERVICE. (a) *Class I—Fire department standpipes.* For use by fire departments and those trained in handling heavy fire streams from a  $2\frac{1}{2}$ -inch hose.

(b) *Class II—First-aid standpipes.* For use primarily by occupants of a building until the arrival of the fire department ( $1\frac{1}{2}$ -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  $2\frac{1}{2}$ -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  $2\frac{1}{2}$ -inch hose valve, a  $2\frac{1}{2}$ -inch by  $1\frac{1}{2}$ -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.

(i) *Fire department connection.* An approved fire department connection shall be installed on a 4-inch or larger pipe connection with each standpipe system. The connection shall be marked "Standpipe". If automatic fire sprinklers are also supplied by the hose connection, the sign shall read "Standpipe and Automatic Sprinkler". The elevation of the connection may 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 as close as possible to and within 150 feet of any fire hydrant.

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

1. Public waterworks system where pressure and discharge capacity are adequate;
2. Approved automatic fire pump (or pumps);
3. Pressure tank;
4. Gravity tank;



5. Approved manually controlled fire pump operated by remote control devices at each hose outlet; 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 2½ inches in diameter for buildings exceeding 4 stories or 50 feet in height.

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

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

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

*Note:* 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 1½-inch outlets with a hose and 2½-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. ILHR 54 to 62.

*Note:* See ss. ILHR 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 (i).

(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 2½-inch hose outlets of the standpipes used by the fire department. The combined system shall comply with the automatic sprinkler requirements of s. ILHR 51.23 and the standpipe and hose requirements of s. ILHR 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 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.** Standpipe systems and equipment, whether required by this code or not, shall be maintained in an operable condition.

(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. ILHR 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. ILHR 82.20 (1).

(b) Cross connection control devices shall be tested in accordance with s. ILHR 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.

**ILHR 51.22 Fire extinguishers.** (1) **GENERAL.** All required fire extinguishers shall comply with the provisions of NFPA No. 10.

(2) **INSTALLATION.** Fire extinguishers as specified in chs. ILHR 54-62 shall be installed as specified in NFPA No. 10.

(3) **MAINTENANCE.** All portable fire extinguishers, whether required by chs. ILHR 54-62 or not, shall be maintained in operable condition as specified in NFPA No. 10.

*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.

**ILHR 51.23 Automatic sprinklers.** (1) **GENERAL REQUIREMENTS.** (a) All automatic fire sprinkler systems shall be designed and installed in accordance with NFPA No. 13 except as permitted in chs. ILHR 54 to 62.

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

1. City water main;
2. Gravity or pressure tank;
3. Ground storage reservoir; or
4. Natural bodies of water approved by the department (lakes, rivers, streams, etc.).

(b) If the water supply has inadequate pressure, an approved fire pump or tank shall be provided. The design and installation of water supply facilities for gravity tanks, fire pumps, reservoirs or pressure tanks, and underground piping shall conform to NFPA No. 22, NFPA No. 20, and NFPA No. 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. ILHR 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. ILHR 82.20 (1).

2. Cross connection control devices shall be tested in accordance with s. ILHR 82.21 (3).

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

(4) FIRE DEPARTMENT CONNECTION. Except as provided in s. ILHR 57.016 (1) (a), 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) All installed automatic sprinkler systems, whether required by this code or not, shall be properly maintained for efficient service pursuant to NFPA 25. Owners or operators shall be responsible for the condition of their sprinkler system and shall use due diligence in keeping 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 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 apply to all buildings in existence on the effective date of this section and to those buildings constructed thereafter.

(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 ILHR 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.

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 and a check valve;

(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

Note: See ch. ILHR 82 for requirements pertaining to cross connections.

(e) A pressure gauge and test valve are provided to facilitate the testing and maintenance of the system in accordance with sub. (6).

(8) SUBSTITUTE AUTOMATIC FIRE SUPPRESSION SYSTEMS. When approved by the department, substitute automatic fire suppression systems may be used in lieu of an automatic fire sprinkler system in areas where the use of water could cause unusual damage to equipment, or where water may have a limited effect or may be hazardous to use because of the nature of processes involved.

(9) SYSTEM SUPERVISION AND MONITORING. The height limitations and fire resistive ratings in s. ILHR 51.02 (21) and (22) and the unlimited area buildings specified in chs. ILHR 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. ILHR 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. ILHR 82.20 (1).

(b) Cross connection control devices shall be tested in accordance with s. ILHR 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.

**ILHR 51.24 Fire alarm systems.** Interior fire alarm systems required under ss. ILHR 54.17, 56.19 and 57.17 shall be designed and constructed in conformity with the following requirements:

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

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

(2) Every fire alarm system shall be electrically operated or activated by non-combustible, nontoxic gas. Electrically operated systems shall be operated on closed circuit current under constant electrical supervision, so arranged that upon a circuit opening and remaining open or in case of a ground or short circuit in the 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. ILHR 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  $\frac{3}{16}$ " in diameter which will withstand a bursting pressure of not less than 500 pounds per square inch shall be used. The maximum length of  $\frac{3}{16}$ " 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. All fire alarm systems, whether required by this code or not, shall be maintained in an operable condition.

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.

**ILHR 51.245 Smoke detectors.** (1) GENERAL REQUIREMENTS. All required smoke detectors shall be approved by the department and shall comply with the provisions of NFPA 72E or NFPA 74.

(2) INSTALLATION. (a) Smoke detectors and smoke detector systems shall be installed in accordance with the provisions of NFPA 72E or NFPA 74 and in accordance with the manufacturer's directions and specifications.

(b) Except as provided in s. ILHR 57.16 (2) (b), all smoke detectors interconnected with each other or with the manual fire alarm system shall be installed in accordance with the provisions of NFPA 72. Where smoke detectors are interconnected with the manual fire alarm system, the smoke detectors shall be wired in accordance with the provisions specified in s. Comm 16.34.

(3) MAINTENANCE. Smoke detectors shall be maintained as follows, except as noted in s. ILHR 57.16:

(a) The owner shall be responsible for maintaining the smoke detectors and the smoke detection system in good working order;

(b) Tenants shall be responsible for informing the owner, in writing, of any smoke detector malfunction, including the need for a new battery;

(c) The owner shall have 5 days upon receipt of notice from the tenant to repair or replace the smoke detector or replace the battery; and

(d) 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.

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.

**ILHR 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. (4).

(2) COPIES. 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 Tables 51.25-1 to 51.25-21.

(3) INTERIM AMENDMENTS. Interim amendments of the adopted standards shall have no effect in the state until such time as this section is correspondingly revised to reflect the changes.

(4) 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 I, 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

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. Z21.64-1990	Direct Vent Central Furnaces.
5. Z83.4-1991, with Z83.4a-1992 Addendum	Direct Gas-Fired Make-up Air Heaters.
6. Z83.8-1989, with Z83.8a-1990 and Z83.8b-1992 Addenda	Gas Unit Heaters.
7. Z83.9-1990, with 83.9a-1992 Addendum	Gas-Fired Duct Furnaces.
8. Z83.18-1990, with Z83.18a-1991 and Z83.18b-1992 Addendum	Direct Gas-Fired Industrial Air Heaters.
9. Z97.1-1994	Safety Glazing Materials Used in Buildings.
10. 101-93	ANSI/AAMA Aluminum Prime Windows and Sliding Glass Doors.
11. I.S.2-87	ANSI/NWWDA Wood Window Units.
12. I.S.3-88	ANSI/NWWDA Wood Sliding Patio Doors.

Table 51.25-8

Standard Reference Number	Title
1. PS 1-83	U.S. Product Standard for Construction and Industrial Plywood, Revised October, 1988.

Table 51.25-9

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

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.

Table 51.25-10 (continued)

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.
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).

Table 51.25-10 (continued)

43. C666-84	Resistance of concrete to rapid freezing and thawing.
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. E152-81a	Fire tests of door assemblies.
60. E163-84	Fire tests of window assemblies.
61. E283-84	Rate of air leakage through exterior windows, curtain walls and doors.
62. E447-84	Compressive strength of masonry prisms.
63. E648-88	Critical radiant flux of floor covering systems using a radiant heat energy source.

Table 51.25-11

AWS	American Welding Society P.O. Box 351040 550 NW LeJeune Road 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
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 Quincy, Massachusetts 02269
Standard Reference Number	Title
1. 10-1988	Standard for portable fire extinguishers.
2. 13-1994	Standard for the installation of sprinkler systems.
3. 13R-1994	Standard for the installation of sprinkler systems in residential occupancies up to and including four stories in height.
4. 15-1990	Standard for water spray fixed systems for fire protection.
5. 20-1987	Standard for the installation of centrifugal fire pumps.
6. 22-1987	Standard for water tanks for private fire protection.
7. 24-1987	Standard for the installation of private fire service mains and their appurtenances.
8. 25-1992	Standard for the inspection, testing, and maintenance of water-based fire protection systems.
9. 31-1987	Standard for the installation of oil-burning equipment.
10. 54-1992	National fuel gas code.
11. 71-1987	Standard for the installation, maintenance and use of signaling systems for central station service.
12. 72-1990	Standard for the installation, maintenance and use of protective signaling systems.
13. 72E-1987	Standard on automatic fire detectors.

Table 51.25-17 (continued)

14. 74-1989	Standard for the installation, maintenance and use of household fire warning equipment.
15. 90A-1985	Standard for the installation of air conditioning and ventilating systems.
16. 96-1991	Standard for the installation of equipment for the removal of smoke and grease-laden vapors from commercial cooking equipment.
17. 211-1988	Standard for chimneys, fireplaces, vents and solid fuel burning appliances.
18. 231-1990	Standard for general storage.
19. 231C-1991	Rack storage for materials.

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 4021 Lafayette Center Road Chantilly, Virginia 22021
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, 1984.
2. 1256-1985	Fire Test of Roof Deck Constructions.

History: Cr. Register, October, 1967, No. 142, eff. 11-1-67; cr. (88) to (93), Register, February, 1971, No. 182, eff. 7-1-71; r. (88) to (93) eff. 8-1-71 and recr. (88) to (93) eff. 1-1-72, Register, July, 1971, No. 187; r. and recr., Register, July, 1974, No. 223, eff. 1-1-75; am. (43), Register, December, 1978, No. 276, eff. 1-1-79; cr. (55), Register, May, 1980, No. 293, eff. 6-1-80; am. Register, December, 1981, No. 312, eff. 1-1-82; cr. (43a), (45a) and (45b), am. (47), Register, December, 1983, No. 336, eff. 1-1-84; am. Register, August, 1985, No. 356, eff. 1-1-86; r. and recr. Register, March, 1991, No. 423, eff. 4-1-91; am. tables 2, 15, 17, 18 and 20, Register, January, 1994, No. 457, eff. 2-1-94; am. Tables 10, 12 and 17, Register, March, 1995, No. 471, eff. 4-1-95; r. and recr. Table 51.25-7, Table 51.25-10, am. Table 51.25-9, Table 51.25-17, cr. Table 51.25-13M, Table 51.25-17M, Table 51.25-18M, Register, December, 1995, No. 480, eff. 4-1-96.

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