

## Chapter Ind 60

### GENERAL ORDERS ON EXISTING BUILDINGS

#### Definitions and General Requirements

Ind 60.001	Buildings affected by these orders	Ind 60.19	Balanced stairway
Ind 60.01	Local regulations	Ind 60.20	Railings
Ind 60.02	Fire-resistive construction	Ind 60.21	Ladder to roof
Ind 60.03	MHl construction	Ind 60.22	Standpipe
Ind 60.04	Ordinary construction	Ind 60.23	Other types of fire escape
Ind 60.05	Frame construction	Ind 60.24	Standard exit doors
Ind 60.06	Basement; first floor; number of stories	Ind 60.25	Location and maintenance of exits
Ind 60.07	Fire-retardant roof covering	Ind 60.26	First aid standpipe
Ind 60.08	Fire-resistive enclosure or partition	Ind 60.27	Fire extinguishers
Ind 60.09	Fire-resistive door	Ind 60.28	Automatic sprinklers
Ind 60.10	Fire-resistive window	Ind 60.29	Fire alarm systems
Ind 60.11	One-hour fire resistive ceiling	Ind 60.30	Boilers, furnaces and stoves
Ind 60.12	Horizontal exit	Ind 60.31	Protection of walls and ceiling; repair; fireplaces
Ind 60.13	Fire escapes, location	Ind 60.32	Smoke pipes
Ind 60.14	Exits to fire escapes	Ind 60.33	Hot air pipes
Ind 60.15	Material and strength	Ind 60.34	Chimneys
Ind 60.16	Platforms	Ind 60.35	Gas and oil lamps; gas service
Ind 60.17	Brackets	Ind 60.36	Electrical work
Ind 60.18	Stairway	Ind 60.37	Combustible drapes, decorations

Ind 60.001 Buildings affected by these orders. (1) These orders shall apply to all buildings and structures erected prior to the effective date of the first building code (October 9, 1914) except (a) Private residences, and outbuildings in connection therewith such as barns, garages, etc.

(b) Flat buildings used as the residence of two families only, provided not more than two persons are accommodated who are not members of the family.

(c) Buildings used for agricultural purposes which are not within the corporate limits of a city or village.

(d) Temporary buildings or sheds used for construction purposes only.

(2) Provided, however, that if any building or structure, whether above exempted or not, is especially liable to fire, and is so situated as to endanger other buildings or property; or contains any combustible or explosive material dangerous to the safety of any building or premises or the occupants thereof, or endangering or hindering firemen in case of fire; then such building or structure shall be subject to these orders so far as may be necessary to protect adjoining or other buildings and their occupants, and firemen.

(3) Provided further, that in the case of buildings which are subject to the requirements of the state building code, the requirements of the building code shall govern.

**Ind 60.01 Local regulations.** These orders shall not be understood to limit the power of cities, villages and towns to make or enforce additional or more stringent regulations, provided the same do not conflict with these orders, or with any other order of the industrial commission.

**Ind 60.02 Fire-resistive construction.** A building is of fire-resistive construction if all the walls, partitions, piers, columns, floors, ceilings, roof and stairs are built of incombustible material, except as herein-after provided, and if all metallic structural members are protected by an incombustible fire-resistive covering.

*Note:* See section Ind 51.001 of the Wisconsin state building code for detailed requirements for fire-resistive construction.

**Ind 60.03 Mill construction.** A building is of mill construction if all walls are of four-hour fire-resistive construction as specified in section Ind 51.01 of the state building code; all wood girders and joists are at least 5½ inches thick; wood columns and posts are at least 7½ x 7½ inches; floors are at least 3 inches thick; the roof has an incombustible roof covering, and there are no concealed air spaces except such as are enclosed by incombustible material.

**Ind 60.04 Ordinary construction.** A building is of ordinary construction if all walls consist of incombustible material, the roof has a fire-retardant covering, but other requirements for fire-resistive or mill construction are not complied with.

**Ind 60.05 Frame construction.** A building is of frame construction if the structural parts and enclosing walls consist of wood. If such enclosing walls are veneered, encased or faced with stone, brick, tile, concrete, plaster, or metal, whose stability or rigidity depends upon the frame wall, the building is also termed a frame building.

**Ind 60.06 Basement; first floor; number of stories.** A basement is a story whose floor line is below the grade at any entrance or exit and whose ceiling is not more than 5 feet above such grade. The first floor is the floor next above the basement, or the lowest floor if there is no basement. The number of stories of a building includes all stories except the basement.

**Ind 60.07 Fire retardant roof covering.** A roof covering is considered fire retardant if made of 3 thicknesses of roofing felt with tar and gravel or asphalt or if made of tin, corrugated iron, galvanized iron, or other approved fire-resistive material.

**Ind 60.08 Fire-resistive enclosure or partition.** A fire-resistive enclosure or partition shall be of four-hour, three-hour, two-hour, or one-hour construction as may be required by this code under occupancy requirements and as described in section Ind 51.05 of the state building code.

**Ind 60.09 Fire-resistive door.** A fire-resistive door shall consist of a wooden core not less than 1½ inches thick encased with metal, using locked seam joints, or shall be entirely of metal and of a design approved by the industrial commission. The door frame shall be of metal or shall be metal covered. The door shall close automatically in case of fire.

**Ind 60.10 Fire-resistive window.** A fire-resistive window shall have a metal frame, metal sash and wired glass, of a design approved by the industrial commission. No pane shall be less than  $\frac{1}{4}$  inch thick nor of greater area than 720 square inches. The window shall be fixed or shall close automatically in case of fire.

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

**Ind 60.11 One-hour fire-resistive ceiling.** A one-hour fire-resistive ceiling shall be constructed of not less than  $1\frac{1}{2}$  inch joists, spaced not more than 16 inches center to center, protected on the under side by metal or wire lath and  $\frac{3}{4}$  inch of gypsum or Portland cement plaster or by  $\frac{3}{8}$  inch perforated gypsum lath and  $\frac{1}{2}$  inch of gypsum plaster, the joints of the lath to be reinforced with 3 inch wide strips of metal lath. Other materials and methods of construction having an equivalent fire-resistive rating may be used if approved by the industrial commission, as specified under section Ind 50.12 of the state building code.

**Ind 60.12 Horizontal exit.** (1) A horizontal exit is either (a) an opening through a fire-resistive wall or partition, (section Ind 60.08) which separates two buildings or two divisions of a building; every such opening shall be protected by a fire-resistive door on each side of the wall; or,

(b) an exterior balcony or bridge which connects two buildings or two divisions of a building. Every such balcony or bridge, including its railings, its supporting brackets or beams, and the exits thereto, shall be constructed the same as specified for fire escapes, (section Ind 60.14-Ind 60.22); but a bridge may be built of wood if it is enclosed by walls and a roof and if it is separated from each building by a fire-resistive door. The floor shall not have a slope of more than one foot in five.

(2) If a horizontal exit takes the place of an "A" type standard fire escape, it shall be at least 2 feet 4 inches wide; if it takes the place of a "B" type standard fire escape, it shall be at least 3 feet 4 inches wide.

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

**Ind 60.13 Fire escapes. Location.** Every fire escape shall be so located as to lead directly to a street, alley, or open court connected with the street. Every fire escape shall be placed against a blank wall if possible.

**Ind 60.14 Exits to fire escapes.** Every fire escape shall be accessible from a public passageway or shall be directly accessible from each occupied room. Each exit to a "B" type fire escape shall be a standard exit door (section Ind 60.24) at least 3 feet 4 inches in width, and the door sill shall be flush with the floor inside. Each exit to an "A" type fire escape shall be a standard exit door at least 2 feet 6 inches in width and the door sill shall be not more than 8 inches above the inside floor level, unless a stair leads from the floor to the sill, or windows may be used in place of such door if approved by the industrial commission.

**Ind 60.15 Material and strength.** (1) No other material than wrought iron or soft or medium steel shall be used for any part of a fire escape except for weights, separators, and ornaments.

(2) 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. All bolts and rivets, except for ornamental work, shall be not less than  $\frac{3}{8}$  inch in diameter.

(3) 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. The minimum sections and sizes specified below shall be increased whenever necessary so that under full load the unit stresses will not exceed three-fourths of the allowable unit stresses specified in section Ind-53:24 of the state building code.

*2*  
*53:16*

**Ind 60.16 Platforms.** (1) Each platform of an "A" type fire escape shall be at least 28 inches wide; each platform of a "B" type 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 openings. 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.

(2) 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; bars shall be not 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.

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

(4) 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.

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

(6) Platforms shall not be more than 8 inches below the door sill, or not more than 18 inches below the sill of exit windows; see section Ind 60.14.

**Ind 60.17 Brackets.** (1) 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 degrees with the horizontal. The lower bar shall have a washer or shoulder to give sufficient bearing against the wall.

*Note:* In applying the requirements of the building code to the design of a bracket, the lower bracket bar must be designed according to the column formula. According to this formula (for example), brackets made of 1 inch square wrought iron, 4 feet apart, carrying a 3 feet 4 inches platform, are just within the limit of stiffness. If the brackets were over 4 feet apart, a heavier bar or an angle would have to be used.

(2) 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.

**Ind 60.18 Stairways.** (1) Each stairway of an "A" type 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.

(2) Each stairway of a "B" type 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.

*Note:* 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.

(3) Stairway stringers shall consist of either

- (a) A 5 inch channel or larger.
- (b) Two angles 2 x 2 x  $\frac{1}{4}$  inch or larger.
- (c) Two flat bars 2 x  $\frac{3}{8}$  inch or larger.
- (d) One flat bar 6 x  $\frac{1}{4}$  inch or larger.

(4) If two angles or two 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.

(5) 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 six square bars or seven flat bars. A "B" tread shall consist of at least seven square bars or eight 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.

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

**Ind 60.19 Balanced stairway.** (1) All "B" type fire escapes, and all fire escapes on schools, theaters, and assembly halls, either shall reach to the ground or shall have a balanced stairway reaching to the ground. "A" type fire escapes which are not on schools, theaters, or assembly halls, may terminate on a platform at least 3 feet long, located not more than 10 feet above the ground.

(2) Every balanced stairway shall conform to the requirements for other stairways except that the stringers and the top rail may be lighter if they are properly trussed. The counterbalancing device shall be attached to both sides of the stairway equally, or a special attachment shall be used to prevent warping or twisting. The counterbalancing device shall operate gradually and easily as the live load is applied.

*Note:* The use of cables and sheaves will be permitted only under exceptional conditions, as rust is almost sure to interfere with their proper operation. In such cases the sheaves shall turn on a brass pin or in brass bearings and shall be protected from the weather at the top and on all sides.

(3) Treads for "A" type balanced stairways may be made as follows: two  $1\frac{1}{4}$  x  $1\frac{1}{4}$  x  $\frac{1}{4}$  inch angles at front and back; two  $1\frac{1}{4}$  x  $\frac{1}{4}$  inch bars between, lying flatwise; one inch space between bars. Treads for "B" type balanced stairways may be made as follows: two  $1\frac{1}{2}$  x  $1\frac{1}{2}$  x  $\frac{1}{4}$  inch angles at front and back; two  $1\frac{1}{2}$  x  $\frac{1}{4}$  inch bars between, lying flatwise; one inch space between bars. All such treads shall be strongly fastened together with cross bars not more than 14 inches apart.

**Ind 60.20 Railings.** (1) Railings shall be provided on all open sides of platforms and stairways, and on both sides of balanced stairways. Either a railing or a handrail fastened to wall shall be provided on each side of all "B" type fire escape stairways. Railings shall be at least 3 feet high, measuring vertically from floor of platform or from nose of step.

(2) Every railing shall have posts, not more than 5 feet apart, made of not less than  $1\frac{1}{2}$  x  $1\frac{1}{2}$  x  $\frac{1}{4}$  inch angles or tees, or  $1\frac{1}{4}$  inch pipe; top rail not less than  $1\frac{1}{4}$  x  $1\frac{1}{4}$  x  $\frac{1}{4}$  inch angle or equivalent; center rail not less than  $1\frac{1}{4}$  x  $5/16$  flat bar or equivalent. All connections shall be such as to make the railing stiff; two 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. Railings shall be continuous. No projections on the inside of the railing shall be permitted. Where a railing returns to the wall, it shall be fastened thereto with a through bolt (at least  $\frac{3}{8}$  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.

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

**Ind 60.21 Ladder to roof.** (1) 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 of not less than  $1\frac{1}{4}$  inch pipe, or not less than 2 x  $\frac{3}{8}$  inch flat bars, at least 17 inches apart in the clear. The rungs shall be not less than  $\frac{1}{2}$  inch square or  $\frac{3}{8}$  inch round bars, 14 inches center to center. The stringers shall be securely tied together at intervals no greater than every fifth rung.

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

**Ind 60.22 Standpipe.** (1) A standpipe shall be attached to every fire escape on every building of more than three stories not having an automatic sprinkler system; except that buildings requiring more than one fire escape on any side thereof, shall be provided with at least one standpipe on each side.

(2) Every standpipe shall extend from a point within 5 feet of the ground to a point 3 feet above the roof or cornice, and shall be securely fastened to and accessible from each platform. The standpipe shall be made of not less than 3 inch wrought iron pipe, with 2½ inch outlet hose valve at each floor and at roof, and a double Siamese valve at the base of the pipe. All connections shall conform to the size and patterns used by the local fire department, and the entire standpipe shall conform to all requirements of such department.

**Ind 60.23 Other types of fire escape.** Sliding or chute fire escapes may be used, upon the approval of the industrial commission, in place of "A" type or "B" type fire escapes. Every sliding fire escape shall be provided with a ladder constructed as in section Ind 60.21, extending from 5 feet above grade, to 4 feet above the roof coping.

**Ind 60.24 Standard exit doors.** (1) Every door which serves as a required exit from a public passageway, stairway or building, or which forms a horizontal exit, shall be a standard exit door. See also sections Ind 61.06, 62.06, 63.04, 64.07.

(2) Every standard exit door shall swing outward or toward the natural means of egress (except as below and as in section Ind 64.07). It 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 (unless collapsible) and no sliding door, (except where it opens onto a stairway enclosure, or serves as a horizontal exit) shall be considered as a standard exit door. Where revolving doors are used, they shall be of a type and make approved by the industrial commission.

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

*Note:* For theaters, schools, large factories and hotels, etc., the "panic bolt" which operates by pressure against a bar or plate is recommended.

(4) An approved type, illuminated, transparent exit sign shall be provided and operated over all exit doors in accordance with sections Ind 61.06, 62.14 and 64.08. Exit lights shall be installed as required by the Wisconsin state electrical code.

**Ind 60.25 Location and maintenance of exits.** Every required exit (including stairways, fire escapes, horizontal exits, and doors) shall lead to a street, alley or open court connected with a street. All such exits, and all passageways leading to and from the same, shall be kept in good repair and unobstructed at all times.

**Ind 60.26 First aid standpipes.** (1) For the number and location of first aid standpipes required in buildings of various classes, see sections Ind 61.09, 63.07.

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

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

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

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

**Ind 60.27 Fire extinguishers.** (1) Where fire extinguishers are required, they shall be of a type approved by the industrial commission. All fire extinguishers shall be charged in accordance with the instructions of the manufacturer.

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

*Note:* The industrial commission will ordinarily approve any installation which is approved by the National Board of Fire Underwriters.

**Ind 60.28 Automatic sprinklers.** (1) Required automatic sprinkler systems shall be designed and constructed in conformity with good established practice. Only materials and devices approved by the industrial commission may be used. Re-installation of used sprinkler heads is prohibited, and other second hand devices may be installed by special permission only.

(2) Where an automatic sprinkler system is required throughout a building, supply shall be from a city water main, or from a gravity or pressure tank. If the city water supply is inadequate in either pressure or volume, a tank of not less than 5,000 gallons capacity shall be provided. The bottom of a gravity tank shall be not less than 35 feet above the under side of the roof.

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

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

(5) Every sprinkler system shall have a suitable audible alarm and an approved Siamese connection marked "To Automatic Sprinklers".

*Note:* The industrial commission will ordinarily approve any installation which is approved by the National Board of Fire Underwriters.

**Ind 60.29 Fire alarm systems.** (1) Interior fire alarm systems required under sections Ind 61.11, 63.08 and 64.18 shall be designed and constructed in conformity with the following requirements.

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

(3) Every fire alarm system shall be electrically operated except as stated in section Ind 63.08 and shall be operated on closed circuit current under constant electrical supervision, so arranged that upon a circuit opening and remaining open, or in case of a ground or short circuit in the ungrounded conductor, audible trouble signals will be given instantly.

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

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

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

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

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

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

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

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

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

**Ind 60.30 Boilers, furnaces and stoves.** (1) **PROTECTION OF FLOOR.** Except as provided in sections Ind 61.13, 62.31, 63.09 and 64.20, every existing boiler, furnace or oven shall be placed on a fire-resistive floor projecting at least 2 feet on all sides. Such floor shall also be provided for every coal, wood, or oil stove or range which is more than 16 square feet in horizontal area or which has a flame at the bottom. If any such floor rests on or is in contact with any combustible material, then the fire-resistive floor layer shall be at least 3 inches thick and shall be hollow, with air spaces running horizontally through the same. The air spaces shall be open at both ends and shall be so placed that air can circulate through them; their horizontal area shall equal at least one-half the horizontal area of the fire-resistive slab.

*Note:* The purpose of these air spaces is to permit air to circulate through the fire-resistive slab and keep down its temperature. When a range or a heater rests on a solid layer of brick or concrete, it has been found that after several months the heat strikes through to the wood below. Many fires have been caused in this way.

(2) **AIR SPACES.** The air spaces may be secured by using hollow tile placed end to end; or by imbedding wrought or sheet iron pipes (say 3 inch diameter or larger) in a layer of concrete. The air spaces should run parallel to the short dimension of the slab.

(3) **FIRE-RESISTIVE FLOOR LAYER.** If the stove, range, etc., is raised at least 6 inches above the floor and such air space is not enclosed, then the fire-resistive floor layer may be reduced to not less than 2 inch solid thickness, without air spaces, provided it is covered with sheet metal.

(4) **COAL, WOOD, OIL STOVE.** Every coal, wood or oil stove or range not more than 16 square feet in horizontal area and not having a flame at the bottom shall, if placed on a combustible floor, be raised at least 6 inches above the floor, and such air space shall not be enclosed. Such floor shall be protected with a stove board of sheet metal or asbestos, projecting at least one foot on all sides.

(5) **GAS STOVE.** Gas stoves shall be protected as above specified, except that

(a) A three inch solid fire-resistive floor layer, projecting at least 6 inches on all sides shall be sufficient protection if the stove has a false bottom at least 3 inches above such fire-resistive floor; and

(b) If the stove is less than 16 square feet in horizontal area and has a false bottom at least 5 inches above the floor, no fire-resistive floor shall be required.

**Ind 60.31 Protection of walls and ceiling; repair; fireplaces.** (1) Except as otherwise provided in section Ind 60.30, every combustible wall, partition or ceiling which is less than 24 inches distant from a boiler, furnace, oven, stove, or range, shall be protected with at least  $\frac{1}{4}$  inch asbestos board covered with galvanized sheet metal, or with equivalent protection as specified in section Ind 60.11, or shall be protected with a metal shield with at least 4 inches air space behind the same, except as provided below. If the wall, partition, or ceiling is less than 12 inches distant from the boiler, furnace, oven, stove or range, then the woodwork and studs shall be cut away and replaced with incombustible material; or shall be otherwise protected as required by the industrial commission or the fire department.

(2) The above distances may be reduced one-half in the case of stoves and ranges less than 16 square feet in area, and also in the case of gas ranges of greater area if proper insulation is incorporated in the back of the range.

(3) The top of every boiler, furnace or oven, shall be covered with asbestos, sand, or other heat resisting material, or the required distance above same shall be increased 100 per cent.

(4) All cracked, broken or otherwise defective stoves, furnaces and boilers, shall be repaired forthwith, and made safe, or shall be replaced with new ones.

(5) All open fireplaces shall be protected by substantial wire screens.

**Ind 60.32 Smoke pipes.** (1) No smoke pipe shall pass through any floor, outside window or door, nor through any combustible roof or combustible outside wall, nor through any closet, attic or similarly concealed space.

(2) Every smoke pipe passing through a non-fire-resistive partition shall be encased with incombustible material at least 4 inches thick or with a double safety thimble made of two concentric rings of sheet metal with at least one inch open air space between and with outer ring covered with at least  $\frac{1}{4}$  inch asbestos.

*Note:* The double thimble is of no value unless it is kept free from dirt. The best protection is a casing of solid masonry, with  $\frac{1}{4}$  inch space between the masonry and the pipe.

(3) No part of any smoke pipe shall be placed nearer to any combustible partition or wall than the diameter of the pipe, nor nearer to any combustible ceiling than one and one-half times the diameter; but the above distances may be reduced by one-half, if the wall or ceiling is covered with not less than  $\frac{1}{4}$  inch asbestos board covered with galvanized sheet metal, or with equivalent protection as specified in section Ind 60.11.

**Ind 60.33 Hot air pipes.** Every hot air pipe contained in or passing through a combustible partition or floor, shall be covered with asbestos, or all wood within 2 inches of such pipe shall be protected with asbestos covered with sheet metal, unless such hot air pipe is double.

**Ind 60.34 Chimneys.** (1) No chimney shall rest upon a flooring of wood, nor shall any wood or other combustible material be built into or left in contact with any chimney.

(2) All chimneys which are defective by reason of settling, cracking, disintegrating of mortar, or from any other cause, shall be repaired or rebuilt forthwith and made safe.

(3) All chimneys constructed of tile, terra cotta, or brick on edge, shall be replaced by a substantial brick chimney.

(4) All chimneys shall be thoroughly cleaned at least once each year.

*Note:* For requirements applying to the construction, remodeling and repair of chimneys, see the state building code issued by the industrial commission.

**Ind 60.35 Gas and oil lamps; gas service.** (1) Gas and oil lamps shall not be used where electricity is available.

(2) Gas and oil lamps shall be placed at least 6 feet above the floor level, at least 6 inches from any combustible partition or wall, and at least 2 feet (measured from top of flame) below any combustible ceiling unless properly protected by a metal shield with at least 2 inches of air space above. Swinging brackets shall be provided with a guard or stop so that the light cannot come nearer to the partition or wall than one foot. In aisles and public passageways, every such light shall be protected by an incombustible guard unless the light is at least 7 feet above the floor. Gas and oil lights shall be kept at least 2 feet from any drape or window curtain.

(3) Every gas supply main shall have a service cock outside of the building, so placed and maintained that it can be shut off at any time without entering the building.

**Ind 60.36 Electrical work.** (1) All new electrical work shall conform to the Wisconsin state electrical code of the industrial commission.

(2) All electrical wiring and installation which by reason of insufficient supports, defective insulation, contact with combustible materials, or with conductors of electricity, deterioration, faulty materials or from any other cause, is liable to cause fire, shall forthwith be overhauled, repaired or replaced, and made safe, and all such repair work shall be done as required by said Wisconsin state electrical code.

(3) Electric cords shall not be hung on or be fastened with or come in contact with nails, staples, hooks, gas or water pipes, machinery or other metal supports.

(4) Pendant lamps must be free from contact with furniture, machinery, posts or other fixtures.

(5) Where portable electric lights must be used, the same shall be equipped with socket of non-combustible, non-absorbent insulating

material, large handle of non-absorbent insulating material, basket guard, proper reflector and special heavy duty cord of the reinforced or similar type.

*Note:* For fire prevention requirements, see general orders on fire prevention issued by the industrial commission.

**Ind 60.37 Combustible drapes, decorations.** (1) No drapes, curtains or decorations (except within a private apartment or a hotel guest room) of paper, cotton, cloth or any other combustible material shall be used in any building covered by this code unless effectively flame-proofed in an approved manner.

**Exception.** This requirement does not apply to drapes and decorations on display in retail establishments.

(2) Where drapes, curtains or decorations are of a permanent or semi-permanent nature, there shall be affixed thereto a tag or other indication stating the date on which the flame-proofing was done and signed by the firm or person doing the work.

*Note:* The ordinary methods of flame-proofing are only effective for a period of from 6 months to a year and for this reason the flame-proofing treatment must be renewed within this period.