

## APPENDIX A

The following notes, bearing the same number as the text of the building and heating, ventilating and air conditioning code to which they apply, contain useful explanatory material to clarify the referenced definitions and rules.

A-51.01 (12) BUILDING. The intent was to consider permanent awnings as part of a building.

A-51.01 (42) FAMILY. The intent of this definition is to clarify the use of the word "family" in reference to subsection Ind 57.001 (2) (a); it is not intended as a variance to requirements stated under Ind 57.001 (2) (b).

A-51.01 (87a) HABITABLE ROOM. It is the intent that rooms designated as recreation, study, den, family room, office, etc. and providing the only space for living and/or sleeping are considered habitable rooms.

A-51.01 (115) SETBACK. The intent was to not include gutters, downspouts, outdoor lighting fixtures, signs and similar attachments as parts of a building.

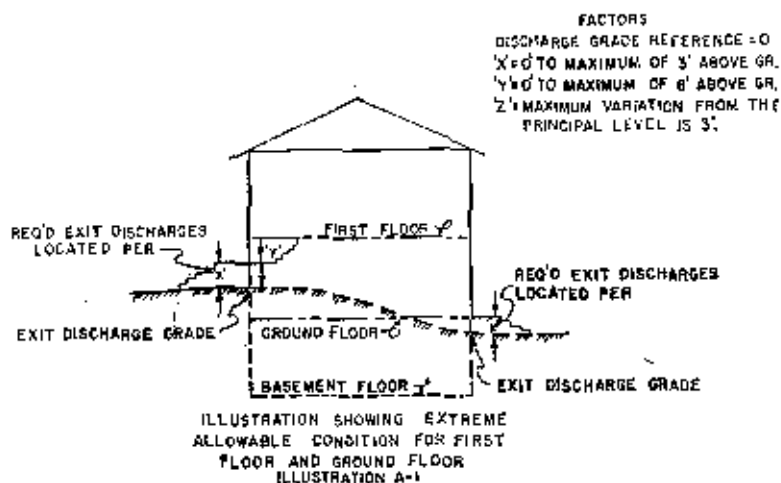
A-51.01 (121) STORIES, NUMBER OF. For further clarification, refer to A-51.02 (14).

A-51.01 (144) WALL (DIVISION).

(a) Building division wall is intended to denote a wall constructed in a manner sufficient to meet requirements for a party wall [see "Wall (Party)"] and is acceptable as a dividing wall or enclosing wall when determining the volume of a building as referred to in sections Ind 50.10, 52.001 and 59.29. Also see Chapter A-E 2 of Wis. Adm. Code—Examining Board of Architects, Professional Engineers, Designers and Land Surveyors.

(b) Fire division wall is intended to relate to construction that provides separation between portions of a building to satisfy allowable floor area limitations, separation between 2 classes of construction, or separation of hazardous occupancies. For other separations, see "occupancy separations" and isolation of hazardous sections of this code.

A-51.02 (14) DETERMINATION OF NUMBER OF STORIES. The following illustrations are provided to give visual aid to this rule and the definition of Ind 51.01 (121) Stories, Number of.



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## INTRODUCTION

### Purpose and Structure

The legislature, by section 35.93 and chapter 227, Wis. Stats., 1955, directed the publication of the rules of administrative agencies having rule-making authority in a loose-leaf, continual revision system known as the WISCONSIN ADMINISTRATIVE CODE. The code is kept current by means of new and replacement pages. The pages are issued monthly, together with notices of hearings on proposed rules, emergency rules, new rules, instructions for insertion of new material, and other pertinent information. This monthly service is called the WISCONSIN ADMINISTRATIVE REGISTER, and comes to the subscriber after the 25th of each month.

### Availability

The complete code and the upkeep service are distributed to the county law libraries; to the libraries of the University of Wisconsin Law School and Marquette University Law School; to the State Historical Society; to the Legislative Reference Bureau and to the State Law Library, and to certain designated public libraries throughout the state.

The sale and distribution of the code and of its parts is handled by Department of Administration, Document Sales and Distribution, 202 S. Thornton Ave., Madison, Wisconsin 53702.

### History Notes

Each page of the code as it was originally filed and printed pursuant to the 1955 legislation, is dated "1-2-56". A rule which is amended or created subsequent to the original printing date is followed by a history note indicating the date and number of the REGISTER in which it was published and the date on which the amendment or the rule became effective. The absence of a history note at the end of a section indicates that the rule has remained unchanged since the original printing in 1956. The date line at the bottom of the page indicates the month in which the page was released.

In some instances an entire code has been repealed and recreated subsequent to the original printing date. When this occurs a history note has been placed at the beginning of the chapter to contain this information. A separate history note appears after each section indicating the date when the revision became effective.

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Chapter Ind 50

SCOPE OF BUILDING CODE

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Ind 50.001 Purpose of code. The purpose of this code is to promote the health, safety and welfare of the public by establishing performance minimums contained therein for design, construction, alteration, use and occupancy of buildings and parts thereof.

Note 1: The purpose as stated can be traced to the terms used in the "Safe Place statutes" of the state of Wisconsin, chapter 101, Wis. Stats.

Note 2: This code is intended for the protection of the public and not intended as a design manual, a text book nor a construction manual.

SPECIAL NOTE

AN ASTERISK (\*) FOLLOWING THE SECTION OR SUBSECTION NUMBER OR LETTER INDICATES EXPLANATORY MATERIAL ON THAT PARAGRAPH IN APPENDIX A. EXAMPLE: IND 51.01 (12)\*—SEE A-51.01 (12) IN APPENDIX A.

History: Cr. Register, December, 1970, No. 180, eff. 1-1-71.

Ind 50.002 Application. (1) NEW BUILDINGS AND ADDITIONS. This code shall apply to all new buildings, structures, and also to additions to existing buildings and structures, except as in Wis. Adm. Code, section Ind 50.03.

(2) GENERAL ORDERS ON EXISTING BUILDINGS. Buildings and structures erected prior to the effective date of the first building code (October 9, 1914) shall comply with the general orders on existing buildings, issued by the department of industry, labor and human relations.

History: 1-2-56; renum. from Ind 50.001 to be Ind 50.002, Register, December, 1970, No. 180, eff. 1-1-71; am. (2) Register, June, 1972, No. 182, eff. 7-1-72.

Ind 50.01 Alterations. This code shall apply to all alterations in any building or structure which affects the structural strength, fire hazard, exits or lighting of any new or existing building or structure. This code does not apply to ordinary non-structural changes or minor repairs necessary for the maintenance of any building or structure.

History: 1-3-58; am. Register, December, 1962, No. 84, eff. 1-1-63.

Ind 50.02 Change of use. (1) When the use of a building or structure is changed and the requirements for the new use are more stringent than those for the previous use then such building or structure shall be made to comply with the requirements for the new use as provided in this code.

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(2) If, upon an inspection of a building or structure, it is found that its use was changed since the effective date of the first building code (October 9, 1914) and that it does not comply with the requirements of the building code in effect at the time of such change, it shall then be made to comply with the code requirements in effect at the time of change in use.

**Ind 50.03 Exemption from code requirements.** This code does not apply to the following buildings:

- (1) Dwellings, and outbuildings in connection therewith, such as barns and private garages.
- (2) Apartment buildings used exclusively as the residence of not more than 2 families.
- (3) Buildings used exclusively for agricultural purposes which are not within the limits of a city or an incorporated village.
- (4) Temporary buildings or sheds used exclusively for construction purposes, not exceeding 2 stories in height, and not used for living quarters.

**Ind 50.04 Local regulations.** This code shall not limit the power of cities, villages and towns to make, or enforce, additional or more stringent regulations, provided the same do not conflict with this code or with any other rule of the department of industry, labor and human relations.

#### Enforcement

**Ind 50.10 Approval of plans and specifications.** (1) Complete plans and specifications for all buildings and structures in the following classifications shall be submitted to the department of industry, labor and human relations for approval before letting contracts or commencing work.

- (a) Theaters and assembly halls.
- (b) Schools and other places of instruction.
- (c) Apartment buildings, hotels and places of detention.
- (d) Hazardous occupancies.
- (e) Factories, office and mercantile buildings.

**Note:** Every building, structure, fill, or development placed or maintained within any flood plain is required to satisfy local or state regulations according to section 87.30, Wis. Stats.

Every architect and every engineer submitting plans for the construction of any structure using public funds shall, prior to the letting of final bids on such structures, submit a written report, indicating whether such structures meets or does not meet federal fallout shelter engineering standards, to the contracting agency according to section 101.045, Wis. Stats.

(2) The submission of plans and specifications for factories, office and mercantile buildings containing less than 25,000 cubic feet total volume is waived, providing they have no floor or roof spans greater than 80 feet and are not more than 2 stories high. Buildings for which the submission of plans and specifications is waived shall comply with the requirements of this code.

(3) All plans shall be submitted in triplicate and work shall not be started until plans are approved. The plans submitted shall be

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prints that are clear, legible and permanent. Complete foundation and footing plans may be submitted for approval prior to submitting the building plans if the plot plan, itemized structural loads, complete foundation or footing design calculations and schematic floor plans are included showing exits, windows and other pertinent information. The following data shall be a part of or shall accompany all plans submitted for approval. Items (h) and (i) need not accompany foundation and footing plans submitted prior to final building plans.

- (a) The location and grades of adjoining streets, alleys, lot lines and any other buildings on the same lot or property.
- (b) Name of owner.
- (c) Intended use or uses of all rooms, and the number of persons to be accommodated therein.
- (d) Assumed bearing value of soil.
- (e) Assumed live loads.
- (f) Assumed dead loads, itemized.
- (g) Assumed unit stresses for structural materials.
- (h) Stress diagrams for all trusses.
- (i) Typical calculations for slabs, beams, girders and columns.
- (j) Diagram indicating bracing and stability of the structure and components in rigid frames and other open type buildings.

Note: Diagrams are intended to apply to the appropriate final designs of buildings regardless of materials of construction. For job bracing of buildings see Wis. Adm. Code chapter 35, Safety in Construction.

- (k) Schematic diagrams showing exiting arrangements.

Note: Diagrams should show normal paths of egress based on intended use of any area of the building.

- (l) Known special hazards to occupants shall be noted, e.g. flammable and combustible liquids, explosives, toxic gases and chemicals, and radioactive materials.

Note: For pit depth and overhead clearance requirements applicable to design of elevator hoistways, see Wis. Adm. Code chapter 4, Elevator.

- (4) Complete structural calculations shall be furnished upon request of the department of industry, labor and human relations or other authorized approving official. All plans and specifications shall be sealed or stamped by a registered architect or registered professional engineer except that plans for buildings having a total volume of less than 50,000 cubic feet shall be signed by the designer.

- (5) This section shall apply to additions and alterations, as well as to new buildings, and shall also apply to all cases where there is a change of occupancy or use of a building.

- (6) Drawings, specifications and calculations for buildings and structures to be constructed within the city limits of Milwaukee shall be submitted to the Inspector of Buildings, Milwaukee, for examination and approval according to requirements of this code.

- (7) Drawings, specifications and calculations for buildings containing less than 50,000 cubic feet of volume and alterations to buildings containing less than 100,000 cubic feet of volume shall be submitted

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to the following cities for examination and approval according to requirements of this code:

|             |            |                  |
|-------------|------------|------------------|
| Appleton    | Janesville | Stevens Point    |
| Beloit      | Kaukauna   | Superior         |
| Brookfield  | Kenosha    | Two Rivers       |
| Cudahy      | La Crosse  | Watertown        |
| Eau Claire  | Madison    | Waukesha         |
| Fond du Lac | Manitowoc  | Wausau           |
| Glendale    | Muskego    | West Allis       |
| Green Bay   | Racine     | West Bend        |
| Greendale   | Sheboygan  | Wisconsin Rapids |
| Greenfield  |            |                  |

**Note:** Materials submitted to said cities for examination and approval need not be submitted to the department.

(8) This section shall not apply to sanitary appliances, such as water supply and sewage disposal systems, chemical and septic toilets and similar equipment which shall be submitted for approval and installed in accordance with the regulations of the state board of health.

(9) After being approved, plans and specifications shall not be changed in any respect which may involve any provisions of this code, except with the written consent of the approving official.

(a) The approval of a plan or specification is not to be construed as the assumption of any responsibility for the design.

**History:** 1-2-56, am. Register, December, 1962, No. 34, eff. 1-1-63; r. and rec. (2), Register, February, 1967, No. 134, eff. 3-1-67; cr. (3) (j), (k), and (l), Register, February, 1971, No. 182, eff. 3-1-71; am. (3) (intro. par.), cr. NOTE in (3) (L), r. and rec. (6), renum. (7) and (8) to be (6) and (9), cr. (7), Register, March, 1972, No. 196, eff. 4-1-72; am. (7), Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 50.11 Evidence of approval.** The architect, professional engineer, builder or owner shall keep at the building one set of plans bearing the stamp of approval.

**Ind 50.12 Approval of materials, methods and devices.** All materials, methods of construction and devices designed for use in the construction, alteration or equipment of buildings or structures under this code and not specifically mentioned in this code shall not be so used until approved in writing by the department of industry, labor and human relations, except sanitary appliances, which shall be approved in accordance with the state plumbing code issued by the state board of health. The data, tests and other evidence necessary to prove the merits of such material, method of construction or device shall be determined by the department of industry, labor and human relations.

## Chapter Ind 51

### DEFINITIONS AND STANDARDS

|            |                                                          |           |                                   |
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| Ind 51.046 | Calculation method                                       | Ind 51.23 | Automatic sprinklers              |
| Ind 51.047 | Openings in fire rated construction                      | Ind 51.24 | Fire alarm systems                |
| Ind 51.048 | Roof coverings                                           | Ind 51.25 | Specifications cited in this code |
|            |                                                          | Ind 51.26 | Specifications cited in this code |

Ind 51.001 Fire resistive construction. History: 1-2-56; am. (2); (2) (a); (3); (3) (a); Register, June, 1956, No. 6, eff. 7-1-56; am. (2) Intro. par. (3) (a), (4), (7) and (8); Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (2) Intro. par. (3) (a), (4), (7) and (8), eff. 8-1-71 and expiring 1-1-72; or. (2) Intro. par. (3) (a), (4), (7) and (8) eff. 1-1-72, Register, July, 1971, No. 187; r. and rec. (2), eff. 7-1-72; repeal and recreate Ind 51.001, renum. 51.015, eff. 1-1-73, Register, June, 1973, No. 198.

Ind 51.01 Mill construction. History: 1-2-56; am. (3); (2) (a); Register, June, 1956, No. 6, eff. 7-1-56; r. and rec. Register, September, 1959, No. 46, eff. 10-1-59; am. (2) Intro. par. (7) and (8), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (2) Intro. par. (7) and (8) eff. 8-1-71 and exp. 1-1-72; and or. (2) Intro. par. (7) and (8) eff. 1-1-72, Register, July, 1971, No. 187; r. and rec.; Register, June, 1973, No. 198, eff. 1-1-73.

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

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

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

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

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

(5) AREA (NET). The occupied or usable floor area in a building but

\* See Appendix A for further explanatory material.

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not including space occupied by columns, walls, partitions, mechanical shafts or ducts.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

\* See Appendix A for further explanatory material.

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

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

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

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

Note: See line 20 of Table 51.03-A.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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- (38) **EXIT DISCHARGE GRADE.** See "Grade (exit discharge)."
- (39) **EXIT (VERTICAL).** See "Vertical Exit."
- (40) **EXTERIOR BALCONY.** See "Balcony (exterior)."
- (41) **EXTERIOR WALL.** See "Wall (exterior)."
- (42) **FAMILY.\*** Means 2 or more individuals who are related to each other by blood, marriage, adoption or legal guardianship. For purposes of this code a group of not more than 4 persons not necessarily related by blood or marriage, living together in a single living unit will be considered equivalent to a single family.
- (43) **FIRE DOOR.** A door so constructed as to give protection against the passage of fire.
- (44) **FIRE DOOR ASSEMBLY.** The assembly of fire door and its accessories, including all hardware, frames, closing devices and their anchors, so constructed as to give protection against the passage of fire.
- (45) **FIRE DOOR CLOSING DEVICE.** See "Closing Device (fire door)."
- (46) **FIRE RESISTANCE AND FIRE-RESISTIVE MATERIAL.** Having the property to withstand fire or give protection from it. As applied to elements of building, it is characterized by the ability to confine a fire or to continue to perform a given structural function, or both.
- (47) **FIRE-RESISTIVE CLASSIFICATION.** Fire-resistive classification is the time in hours during which a material or assembly continues to exhibit fire resistance under conditions of tests and performance as specified in ASTM E-119, ASTM E-152 and ASTM E-183.
- (48) **FIRE-RESISTIVE PROTECTION.** An insulating material applied directly, attached to, or suspended from a structural assembly, to maintain the structural integrity of a member or system for the specified time rating.
- (49) **FIRE-RESISTIVE PROTECTION, DIRECTLY APPLIED.** A coating material applied directly to the structural element for the purpose of fire protection.
- (50) **FIRE-RESISTIVE RATING.** Refer to fire-resistive classification.
- (51) **FIRE-RETARDANT ROOF COVERINGS.** Roof coverings shall be classified on the basis of protection provided against fire originating outside the building or structure on which they have been installed.
- (a) Class A roof coverings are those which are effective against severe fire exposures (meeting the 3 methods for fire tests of class A roof coverings [ASTM Standard E-108]) and possess no flying brand hazard.
- (b) Class B roof coverings are those which are effective against moderate fire exposures (meeting the 3 methods for fire tests of class B roof coverings [ASTM Standard E-108]) and possess no flying brand hazard.
- (c) Class C roof coverings are those which are effective against light fire exposures (meeting the 3 methods for fire tests of class C roof coverings [ASTM Standard E-108]) and possess no flying brand hazard.

\* See Appendix A for further explanatory material.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

\* See Appendix A for further explanatory material.

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

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

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

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

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

(70) HEIGHT (BUILDING). Height of a building is measured from the average of the exit discharge grade elevation of all required first story exits to the top of a level roof or to a point  $\frac{1}{2}$  of the distance between the intersection of the exterior wall surface (extended) with the roof surface, and the highest part of the roof but not to include penthouses.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

\* See Appendix A for further explanatory material.

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- (83) **NET AREA.** See "Area (net)."
- (84) **NONBEARING WALL.** Refer to "Wall (exterior)" or "Partition."
- (85) **NONCOMBUSTIBLE CONSTRUCTION.** An assembly such as a wall, floor or roof having components of noncombustible material.
- (86) **NONCOMBUSTIBLE MATERIAL.** A noncombustible material is one which, in the form in which it is used, meets one of the requirements (a), (b) or (c) listed below. Materials used adjacent to or in contact with heat-producing appliances, warm air ducts, plenums and chimneys shall be classified as noncombustible only on the basis of requirement (a). Non-combustible does not apply to the flame-spread characteristics of interior finish or trim materials. No material shall be classed as noncombustible building construction material which is subject to increase in combustibility or flame-spread classification (FSC) beyond the limits herein established through the effects of age, moisture or other atmospheric conditions.
- (a) Materials which pass the test procedure of ASTM E-136 for defining noncombustibility of elementary materials when exposed to a furnace temperature of 1,382 degrees F. for a minimum period of 5 minutes, and do not cause a temperature rise of the surface or interior thermocouples in excess of 54 degrees F. above the furnace air temperature at the beginning of the test and which do not flame after an exposure of 30 seconds.
- (b) Materials having a structural base of noncombustible material as defined in paragraph (a), with a surfacing not more than 1/8 inch thick which has a flame-spread classification (FSC) not greater than 50 when tested in accordance with the method of test for surface burning characteristics of building materials (ASTM E-84).
- (c) Materials other than defined in paragraphs (a) and (b), having a flame-spread classification (FSC) not greater than 25 without evidence of continued progressive combustion, and of such composition that surfaces that would be exposed by cutting through the material in any way would not have a flame-spread classification (FSC) greater than 25 when tested in accordance with the method of test for surface burning characteristics of building materials (ASTM E-84).
- (87) **OCCUPANCY OR USE.** The purpose for which a building, structure, equipment, materials, or premises, or part thereof, is used or intended to be used as regulated in this code.
- (88) **OCCUPIED.** Refers to any room or enclosure used by one or more persons for other than incidental maintenance.
- (89) **OPEN SPACES.** Front (setback), rear and side yards, exit courts, outer courts, and outer lot line courts on the same property with a building as regulated by this code.
- (90) **OUTDOOR OPENINGS.** May be doors, windows or skylights located in outside walls or roof and can be opened to provide natural ventilation to the occupied space.
- (91) **OUTER COURT.** See "Court (outer)."
- (92) **OUTER LOT LINE COURT.** See "Court (outer lot line)."

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(109) **RETURN (OR EXHAUST OPENING).** Any opening, the sole pur-

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pose of which is to remove air from any space being heated, ventilated or air conditioned.

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

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

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

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

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

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

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

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

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

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

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

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

(122) **STORY.** The space in a building between the surfaces of any floor and the floor next above or below, or roof next above, or any space not defined as basement, ground floor, mezzanine, balcony, penthouse or attic. (Also see "Stories, Number of.")

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

(124) **STREET.** Any legally established public thoroughfare 30 feet or more in width whether designated or not by name or number such

\* See Appendix A for further explanatory material.

as avenue, boulevard, circle, court, drive, lane, place, road or way. All-weather hard-surfaced areas 30 feet or more in width and extending at least 50% of the length of that side of building and accessible to fire-fighting equipment will be acceptable in lieu of streets.

(125) **STRUCTURE.** An assembly of materials forming a construction for occupancy or use (including, among others, buildings, stadiums, gospel or circus tents, reviewing stands, platforms, stagings, observation towers, radio and television towers, water tanks, trestles, piers, wharves, open sheds, coal bins, sheeters, fences, and display signs).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

\* See Appendix A for further explanatory material.

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

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

(144) **WALL (DIVISION)\***.

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

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

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

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

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

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

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

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

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

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

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

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

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

*History: Cr. Register, June, 1972, No. 195, eff. 1-1-73; renum. (1) to be (1a), r. and rec. (10), (54), (67) and (121), cr. (1), (5a), (22a), (56a), (57a), (57a), (78a), (100a) and (148a), Register, September, 1973, No. 213, eff. 10-1-73.*

**Standards for Classes of Construction**

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

*History: Cr. Register, June, 1972, No. 195, eff. 1-1-73; renum. Register, September, 1973, No. 213, eff. 10-1-73.*

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Ind 51.02 Ordinary construction. History: 1-2-56; r. and recr. Register, September, 1959, No. 45, eff. 10-1-59; am. (1), (3) and (5), and cr. (6), Register, February, 1971, No. 182, eff. 3-1-71; r. (6) and r. and recr. (1), (3) and (5) eff. 8-1-71 and expiring 1-1-72, and cr. (1), (3), (5) and (6) eff. 1-1-72, Register, July, 1971, No. 187; r. and recr. Register, June, 1972, No. 192, eff. 1-1-72.

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

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

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

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

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

(4) Exterior wall construction:

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

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

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

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

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

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

2. Openings shall be protected by approved fire door or fire window assemblies as specified in section Ind 51.047, or fire damper or fire door assemblies as specified in section Ind 59.69.

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

(6) Roof coverings, skylights and skydomes:

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

(b) Where combustible plastic is used in roof openings it shall not

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exceed an area greater than 20% of the roof area except as permitted under occupancy sections.

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

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

(7) Building locations:

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

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

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

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

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

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

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

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

(a) In buildings with 3 floor levels, the stairways in the upper 2 levels may be left open provided all stairways leading to the lowest level are separated from the upper levels with fire-resistive rated construction as specified in Table 51.03-A or better.

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

(12) PARAPET WALLS: (a) Parapet walls not less than 8 inches in thickness and 2 feet in height shall be provided on all exterior walls of masonry or concrete, where such walls connect with roofs other than roofs that are of noncombustible construction throughout; but this section shall not apply to:

1. Buildings where type No. 7 and No. 8 construction would be permitted under the provisions of this code;

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2. Walls which face streets or alleys;
3. Walls where not less than 10 feet of vacant space is maintained between the wall and the property line;
4. Walls which are not less than 10 feet from other buildings on the same property.

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

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

- (a) The wall shall extend 3 feet above the roof.
- (b) The wall shall connect and make tight contact with roof decks of at least 2-hour fire-resistive noncombustible construction on both sides of the wall.
- (c) The wall shall connect and make tight contact with roofs of noncombustible construction on both sides of the wall and shall be noncontinuous at the wall.

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

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

1. Is the lowest floor having one or more required exits for that floor and for any floor(s) above or below.
  - a. If condition stated in 1. is not satisfied, the highest floor level shall be considered the first floor.
2. The elevation of the first floor shall be at or not more than 6 feet above an exit discharge grade.
3. The door sill of all required exit discharges from the first floor shall be at or not more than 3 feet above exit discharge grade.

(b) An interior balcony or mezzanine floor which exceeds 25,000 square feet or one third (1/3), whichever is least, of the net area enclosed within exterior walls and/or fire division walls shall be counted as a story.

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

(d) Construction according to subsection Ind 51.02 (3) (b) 1. b. shall also be counted as a story(ies).

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

1. Floor levels satisfying the definition of basement(s), ground floor(s), attic, interior balcony(ies) and/or mezzanine floor(s), unless otherwise stated, shall not be counted as a story(ies). For exception, see Appendix A-51.02 (14), Illustration No. 4.

History: Cr. Register, June, 1972, No. 198, eff. 1-1-73; r. (8) and (10), renum. (3) to be (4), (4), (5), (6), (7), (8) to be (6), (7), (8), (9), (10), am. (3) (a), cr. (3), (5), (11), (12), (13) and (14), Register, September, 1973, No. 213, eff. 10-1-73.

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| BUILDING ELEMENT<br> |                                                                     | MODIFYING CONDITIONS                                     |                        |                       | TYPES OF CONSTRUCTION  |                        |                                                    |                     |                         |                       |                        |                                           | APPLICABLE NOTES |
|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|----------------------------------------------------------|------------------------|-----------------------|------------------------|------------------------|----------------------------------------------------|---------------------|-------------------------|-----------------------|------------------------|-------------------------------------------|------------------|
|                                                                                                       |                                                                     | SEE NOTES ①②                                             | BEARING OR NON-BEARING | FIRE RESISTIVE TYPE A | FIRE RESISTIVE TYPE B  | METAL FRAME PROTECTED  | HEAVY TIMBER                                       | EXTERIOR MASONRY    | METAL FRAME UNPROTECTED | WOOD FRAME PROTECTED  | WOOD FRAME UNPROTECTED |                                           |                  |
|                                                                                                       | NUMBER OF STORIES                                                   | BLOCK SET BACK DIS TO P/L OR TO OTHER BLOCK ON SAME PROP |                        | NO. 1                 | NO. 2                  | NO. 3                  | NO. 4                                              | NO. 5               | NO. 6                   | NO. 7                 | NO. 8                  | SEE IND. 51.03 FOR CONSTRUCTION STANDARDS |                  |
| 1.                                                                                                    | INTERIOR SUPPORTS (COLUMNS, PIERS, FRAME LEGS, POSTS)               | OVER 8 STORIES OR MORE THAN 85' IN HEIGHT                |                        | NC-4                  | NP                     | NP                     | NP                                                 | NP                  | NP                      | NP                    | NP                     | ①②                                        |                  |
| 2.                                                                                                    |                                                                     | 8 STORIES OR 85' IN HEIGHT OR LESS                       |                        | NC-3                  | NC-2                   | SEE IND. 51.05(3) NC-1 | SEE IND. 51.02(4) H.T. OR 1                        | SEE IND. 51.03(5) 0 | SEE IND. 51.03(6) NC-0  | SEE IND. 51.03(7) 3/4 | SEE IND. 51.03(8) 0    | ②③④                                       |                  |
| 3.                                                                                                    | FLOOR FRAMING (BEAMS, GIRDERS, JOISTS, SLABS, DECK)                 | MORE THAN 2 STORIES                                      |                        | NC-3                  | NC-2                   | SEE IND. 51.05(3) NC-1 | SEE IND. 51.03(4) H.T. OR 1                        | SEE IND. 51.03(5) 0 | SEE IND. 51.03(6) NC-0  | NP                    | NP                     | ①                                         |                  |
| 4.                                                                                                    |                                                                     | 2 STORIES OR LESS                                        |                        | NC-2                  | NC-1                   | NC-1                   | SEE IND. 51.03(4) H.T. OR 1<br>1.5" MIN. H.T. OR 0 | 0                   | SEE IND. 51.03(6) NC-0  | 3/4                   | 0                      | ②③                                        |                  |
| 5.                                                                                                    | ROOF FRAMING                                                        | OVER 8 STORIES OR MORE THAN 85' IN HEIGHT                |                        | NC-2                  | NP                     | NP                     | NP                                                 | NP                  | NP                      | NP                    | NP                     | ②                                         |                  |
| 6.                                                                                                    | (TRUSSES, BEAMS, GIRDERS, JOISTS, FRAME RAFTERS, PURLINS, DECK)     | 3 TO 8 STORIES OR 85' IN HEIGHT OR LESS                  |                        | NC-2                  | NC-1 1/2               | SEE IND. 51.05(3) NC-1 | SEE IND. 51.02(4) H.T. OR 1                        | SEE IND. 51.03(5) 0 | SEE IND. 51.03(6) NC-0  | NP                    | NP                     | ①                                         |                  |
| 7.                                                                                                    |                                                                     | 2 STORIES OR UNDER 36' IN HEIGHT                         |                        | NC-1                  | NC-1                   | NC-1                   | SEE IND. 51.03(4) H.T. OR 1                        | SEE IND. 51.03(5) 0 | NC-0                    | SEE IND. 51.03(7) 3/4 | 0                      | ②③                                        |                  |
| 8.                                                                                                    |                                                                     | 1 STORY - ROOF FRAMING MORE THAN 20' ABOVE PL.           |                        | NC-0                  | SEE IND. 51.03(2) NC-0 | NC-0                   | SEE IND. 51.03(4) H.T. OR 1                        | 0                   | 0                       | 0                     | 0                      | ③                                         |                  |
| 9.                                                                                                    |                                                                     | 1 STORY - ROOF FRAMING 20' OR LESS ABOVE PL.             |                        | NC-1                  | NC-1                   | NC-1                   | SEE IND. 51.02(4) H.T. OR 1                        | 0                   | 0                       | SEE IND. 51.03(7) 3/4 | 0                      | ②③                                        |                  |
| 10.                                                                                                   | ROOF COVERING                                                       | OVER 8 STORIES OR MORE THAN 85' IN HEIGHT                |                        | CLASS A               | NP                     | NP                     | NP                                                 | NP                  | NP                      | NP                    | NP                     | ②                                         |                  |
| 11.                                                                                                   |                                                                     | 8 STORIES OR 85' IN HEIGHT OR LESS                       |                        | CLASS A               | CLASS A                | CLASS A                | CLASS B                                            | CLASS B             | CLASS C                 | CLASS C               | CLASS C                | ②                                         |                  |
| 12.                                                                                                   | EXTERIOR WALLS & COURT WALLS                                        | LESS THAN 10 FT.                                         | BEARING                | NC-4                  | NC-3                   | NC-2                   | NC-2                                               | NC-2                | NC-2                    | NP                    | NP                     | ③④⑤⑥                                      |                  |
| 13.                                                                                                   | (NOT INCLUDING INTERIOR FURRING ATTACHED TO INSIDE SURFACE OF WALL) | 10 FT. TO 30 FT. INCLUSIVE                               | BEARING                | NC-3                  | NC-2                   | NC-3/4                 | 1                                                  | NC-1                | NC-0                    | 3/4                   | 0                      | ③④⑤⑥⑦⑧                                    |                  |
| 14.                                                                                                   |                                                                     | OVER 30 FT.                                              | BEARING                | NC-2                  | NC-1                   | NC-0                   | 1                                                  | NC-1                | NC-0                    | 3/4                   | 0                      | ③④⑤⑥⑦⑧                                    |                  |
| 15.                                                                                                   |                                                                     | LESS THAN 10 FT.                                         | NON-BEARING            | NC-2                  | NC-2                   | NC-1                   | NC-1                                               | NC-1                | NC-1                    | NP                    | NP                     | ③④⑤⑥                                      |                  |
| 16.                                                                                                   |                                                                     | 10 FT. TO 30 FT. INCLUSIVE                               | NON-BEARING            | NC-1                  | NC-1                   | NC-0                   | 1                                                  | NC-1                | NC-0                    | 3/4                   | 0                      | ③④⑤⑥⑦⑧                                    |                  |
| 17.                                                                                                   |                                                                     | OVER 30 FT.                                              | NON-BEARING            | NC-0                  | NC-0                   | NC-0                   | 3/4                                                | NC-0                | NC-0                    | 3/4                   | 0                      | ③④⑤⑥⑦⑧                                    |                  |
| 18.                                                                                                   | INTERIOR WALLS BEARING                                              |                                                          |                        | NC-3                  | NC-2                   | NC-1                   | 1                                                  | 1                   | NC-0                    | 3/4                   | 0                      | ③④⑤                                       |                  |
| 19.                                                                                                   | PARTITIONS                                                          |                                                          |                        | NC-0                  | NC-0                   | NC-0                   | 0                                                  | 0                   | 0                       | 0                     | 0                      | ①①                                        |                  |
| 20.                                                                                                   | REQUIRED EXIT CORRIDOR ENCLOS.                                      |                                                          |                        | NC-2                  | NC-2                   | NC-1                   | 1                                                  | 1                   | 1                       | 3/4                   | 3/4                    | ③⑥                                        |                  |
| 21.                                                                                                   | FIRE ENCLOSURE (STAIRWAYS, ELEVATORS, VERTICAL SHAFTS)              | 3 STORIES OR MORE<br>3 OR MORE FLOOR LEVELS              |                        | NC-2                  | NC-2                   | NC-1                   | 1                                                  | 1                   | 1                       | NP<br>3/4             | NP<br>3/4              | ③⑦                                        |                  |
| 22.                                                                                                   | PENTHOUSE WALLS                                                     |                                                          |                        | NC-0                  | NC-0                   | NC-0                   | 0                                                  | NC-0                | 0                       | 0                     | 0                      | ③                                         |                  |
| 23.                                                                                                   | PENTHOUSE ROOF                                                      |                                                          |                        | NC-0                  | NC-0                   | NC-0                   | 0                                                  | 0                   | 0                       | 0                     | 0                      | ③③                                        |                  |

#### KEY TO ABBREVIATIONS :

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

KEY EXAMPLE TO BEADING CURVE :

- ① - SEE OCCUPANCY SECTIONS OF THE CODE FOR OTHER BASIC REQUIREMENTS AND MORE RESTRICTIVE LIMITATIONS.
- ② - ROOF COVERING SAME AS FOR MAIN BUILDING.
- ③ - WALLS OF SOLID WOOD 4" IN THICKNESS ARE ACCEPTABLE AS EQUAL TO ONE HOUR FIRE-RESISTIVE RATING.
- ④ - FIRE RESISTIVE REQUIREMENTS ALSO APPLY FOR THOSE BRACING MEMBERS REQUIRED FOR GRAVITY LOADING.
- ⑤ - REFER TO TABLE 51.03-B FOR ALLOWABLE AREAS FOR WINDOWS AND OTHER OPENINGS IN EXTERIOR WALLS.
- ⑥ - FOR EXCEPTIONS REFER TO IND. 51.02
- ⑦ - SETBACKS AND DISTANCES TO P/L OR OTHER BLDGS. ON SAME PROPERTY DO NOT APPLY TO P/L ALONG STREETS.
- ⑧ - APPROVED FIRE-RETARDANT TREATED WOOD SATISFYING THE DEFINITION FOR "NONCOMBUSTIBLE" (IND. 51.01(10)(C)) WILL BE ACCEPTED IN PLACE OF THE WOOD FIRE-RESISTIVE RATING.

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TABLE 51.03-B  
 MAXIMUM TOTAL ALLOWABLE AREA OF WINDOWS OR OTHER WALL OPENINGS  
 WITHOUT FIRE PROTECTION IN PERCENT OF TOTAL EXPOSED EXTERIOR WALL SURFACE

| Setback from Property Line, or Other Walls<br>on Same Property*                            | Class of Construction                                                                                                |                           |                               |                            |                              |
|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------|----------------------------|------------------------------|
|                                                                                            | 1. Fire-Resistive "A"<br>2. Fire-Resistive "B"<br>3. Metal Frame Protected<br>4. Heavy Timber<br>5. Exterior Masonry |                           | 6. Metal Frame<br>Unprotected | 7. Wood Frame<br>Protected | 8. Wood Frame<br>Unprotected |
|                                                                                            | Bearing Wall                                                                                                         | Nonbearing Wall           |                               |                            |                              |
| Less than 5'                                                                               | No Openings                                                                                                          | No Openings               | No Openings                   | Not Permitted              | Not Permitted                |
| 5' to less than 10'                                                                        | 20%—Fire<br>window reqd.†                                                                                            | 30%—Fire<br>window reqd.† | 30%                           | Not Permitted              | Not Permitted                |
| 10' to less than 30'                                                                       | 40%                                                                                                                  | 40%                       | 40%                           | 40%                        | 40%                          |
| 30' or over                                                                                | 40%                                                                                                                  | No Limit                  | No Limit                      | No Limit                   | No Limit                     |
| Openings with approved automatic-closing, 3 hour fire door or shutter assemblies—No Limit. |                                                                                                                      |                           |                               |                            |                              |
| Tabulated percentage of openings shall be applied to each 100 lineal feet of wall.         |                                                                                                                      |                           |                               |                            |                              |

\*Does not apply to property lines along streets.

†Fire windows shall be as required for moderate fire exposure—see Ind 51.047.

This tabulation will not allow wing walls or high parapets, etc., to be used to increase exposed wall areas and thereby increase allowable total area of openings.

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

\* See Appendix A for further explanatory material.

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Ind 51.02: Frame construction, History: 1-2-56: cr. (2), Register, February, 1971, No. 182, eff. 7-1-71; r. (2), eff. 8-1-71; cr. (2) eff. 1-1-72, Register, July, 1971, No. 187; r. and 2000, Register, June, 1972, No. 198, eff. 1-1-73.

Ind 51.03 Classes of construction standards. (1) FIRE RESISTIVE TYPE A (NO. 1):

(a) A building is of fire-resistive construction if all the walls, partitions, piers, columns, floors, ceilings, roof and stairs are built of noncombustible material, with a fire-resistive rating as specified in table 51.03-A.

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

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

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

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

1. Doors leading into main public corridors shall be noncombustible or quality certified glued solid wood core flush doors unless otherwise specified above.

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

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

(f) Mansards shall be of noncombustible construction.

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

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

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

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

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

\* See Appendix A for further explanatory material.

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(2) FIRE-RESISTIVE TYPE B (NO. 2):

(a) A building is of fire-resistive construction if all the walls, partitions, piers, columns, floors, ceilings, roof and stairs are built of noncombustible material, with a fire-resistive rating as specified in table 51.03-A.

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

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

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

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

3. Approved 1½ inch thick plywood with exterior glue, tongue and groove with all end joints staggered and butting on centers of beams spaced not over 4 feet apart; or

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

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

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

1. Doors leading into main public corridors shall be noncombustible or quality certified glued solid wood core flush doors unless otherwise specified above.

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

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

(g) Mansards shall be of noncombustible construction.

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

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

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

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

(3) METAL FRAME—PROTECTED (NO. 3):

(a) A building is of metal frame protected construction if the structural parts and enclosing walls are of metal, or metal in combi-

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nation with other noncombustible materials, with time resistance ratings as set forth in table 51.03-A.

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

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

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

(e) Mansards shall be of noncombustible construction.

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

(4) HEAVY TIMBER (No. 4):

(a) A building is of heavy timber construction if the structural frame consists of heavy timber or heavy timber in combination with metal, reinforced concrete or masonry. The structural and enclosing wall shall be as set forth in table 51.03-A.

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

(c) Columns:

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

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

NOTE: See structure chapter Ind 53 for design requirements.

(d) Floor framing:

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

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

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

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

(e) Roof framing:

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

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

\* See Appendix A for further explanatory material.

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underside of the members. Splice plates shall be not less than 3 inches, nominal, in thickness.

(f) Floors:

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

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

(h) Roofs. Roof decks shall be:

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

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

3. Approved 1½ inch thick plywood with exterior glue, tongue and groove with all end joints staggered and butting on centers of beams spaced not over 4 feet apart; or

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

(5) EXTERIOR MASONRY (NO. 5):

(a) A building is of exterior masonry construction if all enclosing walls are constructed of masonry or reinforced concrete with fire-resistive ratings as set forth in table 51.03-A.

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

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

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

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

(f) Bays, oriels and similar exterior projections from the walls shall be constructed of material with fire-resistive ratings as required for exterior walls or approved fire-retardant treated wood satisfying the definition for "noncombustible" [Ind 51.01 (86) (c)].

(g) Where exterior overhangs are closer than 20 feet to the adjoining property line or other building on the same property, exterior wood siding, trim and shingles of projecting canopies, cornices, roof overhangs, dormers and mansard roofs may be used if the construction complies with the following:

1. All exposed material shall be noncombustible material or fire-retardant treated wood satisfying the definition for "noncombustible" [Ind 51.01 (86) (c)].

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

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

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

**(6) METAL FRAME--UNPROTECTED (NO. 6):**

(a) A building is of metal frame unprotected construction if the enclosing walls are of unprotected metal or unprotected metal in combination with other noncombustible materials and the other building elements are as set forth in Table 51.03-A unless otherwise exempted.

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

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

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

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

**(7) WOOD FRAME--PROTECTED (NO. 7):**

(a) A building is of wood frame protected construction if the structural parts and enclosing walls are of protected wood, or protected wood in combination with other materials, with fire-resistive ratings as set forth in table 51.03-A. If such enclosing walls are veneered, encased or faced with stone, brick, tile, concrete, plaster or metal, the building is also termed a wood frame protected building.

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

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

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

**(8) WOOD FRAME--UNPROTECTED (NO. 8):**

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

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

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

History: Cr. Register, June, 1972, No. 198, eff. 1-1-73; am. (1) (d), renum. (1) (e) 1. to be (f), (1) (f) 1. a. to be (1) (f) 1., (1) (f) (g) (h) (1) to be (1) (g) (h) (1) (j), (2) (f) 1. to be (2) (g), (2) (g) 1. a. to be (2) (g) 1., (2) (g) (h) (i) to be (2) (h) (1) (j), (3) (d) 1. to be (e), (3) (e) 1. a. to (3) (e) 1., (7) (b) to be (c), (7) (c) to be (b), am. (2) (e), r. (4) (e) 3., r. and recr. (6) (a), cr. (7) (d), Register, September, 1973, No. 213, eff. 10-1-73.

Ind 51.04 History: 1-2-56; r. Register, February, 1971, No. 182, eff. 7-1-71; cr. Register, July, 1971, No. 187, eff. 6-1-71 and expiring 1-1-72.

Fire-Resistive Standards  
for  
Materials of Construction

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

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

Ind 51.041 History: Cr. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71, and recr. eff. 1-1-72, Register, July, 1971, No. 187; r. Register, June, 1972, No. 198, eff. 1-1-73.

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

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

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

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

(5)\* The heat transmission requirements of ASTM E-119 (25b), with the exception of high hazard areas, penal and health care facilities and warehouses for combustible materials, may be reduced to one-half ( $\frac{1}{2}$ ) of the hourly rating required by this code, but not less than one hour.

NOTE: For ASTM E-119 Standard adopted see Ind 51.25 (50).

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

\* See Appendix A for further explanatory material.

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

NOTE: Definition of owner—see 101.01 (13), Wis. Stats.

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

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

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

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

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

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

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

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

TABLE 1

| Name of Recognized Laboratories                     | ASTM Standard Tests |       |       |       |       |       |
|-----------------------------------------------------|---------------------|-------|-------|-------|-------|-------|
|                                                     | E-84                | E-103 | E-119 | E-136 | E-162 | E-163 |
| Forest Prod. Lab., Madison, Wis.*                   |                     |       | X     |       | X     |       |
| Natl. Bureau of Std., Washington, D.C.              |                     |       | X     | X     |       |       |
| Ohio State Univ., Columbus, Ohio                    |                     |       | X     | X     | X     | X     |
| Portland Cement Assoc., Skokie, Ill.                |                     |       | X     |       |       |       |
| Southwest Research Inst., San Antonio, Tex.         | X                   |       |       |       |       |       |
| Underwriters' Lab., Inc., Chicago, Ill.             | X                   | X     | X     |       | X     | X     |
| Underwriters' Lab., Inc., Scarborough, Ont., Canada | X                   | X     | X     | X     | X     | X     |
| Univ. of Calif., Berkeley, Calif.                   |                     | X     | X     |       |       | X     |

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

NOTE: For column identification and specific standards adopted, see subsections Ind 51.25 (38) thru (43).

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

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

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

\* See Appendix A for further explanatory material.

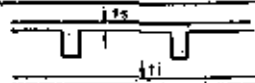
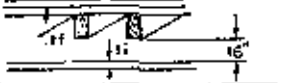
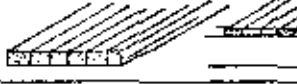
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# TYPICAL EXAMPLES OF FIRE RESISTIVE STRUCTURAL COMPONENTS, TABL 2

| TYPE OF CONSTRUCTION                      |                                                                            | ROW NO. | STRUCTURAL COMPONENTS                                                                    | SKETCHES | INSULATING MATERIAL                                            | DESCRIP-TION                                 | MINIMUM REQUIREMENTS                         |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |                                              |
|-------------------------------------------|----------------------------------------------------------------------------|---------|------------------------------------------------------------------------------------------|----------|----------------------------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------|
|                                           |                                                                            |         |                                                                                          |          |                                                                |                                              | 4 HR.                                        | 3 HR.                                        |                                              |                                              | 2 HR.                                        |                                              |                                              | 1 HR.                                        |                                              |                                              |                                              |                                              |
| COMPONENTS WITHOUT APPLIED PROTECTION     | CONCRETE CAST IN PLACE AND PRECAST                                         | 1.      | COLUMNS                                                                                  |          | CONCRETE TYPE I II & III<br>(B)(C)                             | REINF. COVER MIN. DIM. & AREA-SQ. IN.        | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             |
|                                           |                                                                            | 2.      | GIRDERS AND BEAMS                                                                        |          | CONCRETE TYPE I II & III<br>(B)(C)(D)                          | REINF. COVER                                 | 2 2 2<br>2 2 2<br>2 2 2                      | 2 2 2<br>2 2 2<br>2 2 2                      | 2 2 2<br>2 2 2<br>2 2 2                      | 2 2 2<br>2 2 2<br>2 2 2                      | 2 2 2<br>2 2 2<br>2 2 2                      | 2 2 2<br>2 2 2<br>2 2 2                      | 2 2 2<br>2 2 2<br>2 2 2                      | 2 2 2<br>2 2 2<br>2 2 2                      | 2 2 2<br>2 2 2<br>2 2 2                      | 2 2 2<br>2 2 2<br>2 2 2                      | 2 2 2<br>2 2 2<br>2 2 2                      | 2 2 2<br>2 2 2<br>2 2 2                      |
|                                           |                                                                            | 3.      | JOISTS & WAFFLES WITHOUT FILLERS OR PARTIAL FILLERS OF TYPE I OR II MASONRY OR CLAY TILE |          | CONCRETE TYPE I II & III<br>(B)(C)(D)(E)(F)(G)(H)              | REINF. COVER                                 | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      |
|                                           |                                                                            | 4.      | SLABS OR JOISTS & WAFFLES WITH TYPE I OR II MASONRY OR CLAY TILE FILLER                  |          | CONCRETE TYPE I II & III<br>(B)(C)(D)(E)(F)(G)(H)              | REINF. COVER                                 | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      |
|                                           |                                                                            | 5.      | WALLS AND PARTITIONS BR'G. & NON-BR'G.                                                   |          | CONCRETE TYPE I II & III<br>(B)(C)(D)                          | REINF. COVER                                 | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      |
|                                           | CONCRETE PRECAST & CAST IN PLACE POST-TENSIONED OR PRESTRESSED SIMPLE SPAN | 6.      | GIRDERS AND BEAMS                                                                        |          | CONCRETE TYPE I II & III<br>(B)(C)(D)                          | AVE. COVER (w)                               | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      |
|                                           |                                                                            | 7.      | JOISTS AND WAFFLES                                                                       |          | CONCRETE TYPE I II & III<br>(B)(C)(D)(E)(F)(G)(H)              | AVE. COVER                                   | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      |
|                                           |                                                                            | 8.      | SINGLE TEE                                                                               |          | CONCRETE TYPE I II & III<br>(B)(C)(D)(E)(F)(G)(H)              | AVE. COVER                                   | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      |
|                                           |                                                                            | 9.      | MULTI-TEE UNITS                                                                          |          | CONCRETE TYPE I II & III<br>(B)(C)(D)(E)(F)(G)(H)              | AVE. COVER                                   | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      |
|                                           |                                                                            | 10.     | SOLID & CORED SLABS                                                                      |          | CONCRETE TYPE I II & III<br>(B)(C)(D)(E)(F)(G)(H)              | 1 OR 1/2 AVE. COVER                          | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      | 1 1 1<br>1 1 1<br>1 1 1                      |
|                                           | MASONRY BEARING AND NON BEARING                                            | 11.     | UNREINFORCED CONCRETE WALLS & PARTITIONS                                                 |          | CONCRETE TYPE I II & III<br>(B)(C)                             | WALL TH. (t)                                 | 6 6 6<br>6 6 6<br>6 6 6                      | 6 6 6<br>6 6 6<br>6 6 6                      | 6 6 6<br>6 6 6<br>6 6 6                      | 6 6 6<br>6 6 6<br>6 6 6                      | 6 6 6<br>6 6 6<br>6 6 6                      | 6 6 6<br>6 6 6<br>6 6 6                      | 6 6 6<br>6 6 6<br>6 6 6                      | 6 6 6<br>6 6 6<br>6 6 6                      | 6 6 6<br>6 6 6<br>6 6 6                      | 6 6 6<br>6 6 6<br>6 6 6                      | 6 6 6<br>6 6 6<br>6 6 6                      | 6 6 6<br>6 6 6<br>6 6 6                      |
|                                           |                                                                            | 12.     | HOLLOW MASONRY WALLS & PARTITIONS...BLOCK TILE CORED BRICKS CAVITY WALLS                 |          | MASONRY TYPE I<br>MASONRY TYPE II (F)(G)(H)                    | EQUIV. THICK'S                               | 5.7<br>5.7<br>5.7                            | 5.7<br>5.7<br>5.7                            | 5.7<br>5.7<br>5.7                            | 5.7<br>5.7<br>5.7                            | 5.7<br>5.7<br>5.7                            | 5.7<br>5.7<br>5.7                            | 5.7<br>5.7<br>5.7                            | 5.7<br>5.7<br>5.7                            | 5.7<br>5.7<br>5.7                            | 5.7<br>5.7<br>5.7                            | 5.7<br>5.7<br>5.7                            | 5.7<br>5.7<br>5.7                            |
|                                           |                                                                            | 13.     | SOLID MASONRY BRICK BLOCK...CLAY TILE WITH LESS THAN 25% VOIDS OR WITH THE CORES FILLED  |          | MASONRY TYPE I & II<br>CLAY, SHALE, CONCRETE, SAND OR LIME (D) | WALL TH. (t)                                 | 8"<br>8"<br>8"                               | 8"<br>8"<br>8"                               | 8"<br>8"<br>8"                               | 8"<br>8"<br>8"                               | 8"<br>8"<br>8"                               | 8"<br>8"<br>8"                               | 8"<br>8"<br>8"                               | 8"<br>8"<br>8"                               | 8"<br>8"<br>8"                               | 8"<br>8"<br>8"                               | 8"<br>8"<br>8"                               | 8"<br>8"<br>8"                               |
| COMPONENTS WITH DIRECT APPLIED PROTECTION | STEEL                                                                      | 14.     | COLUMNS                                                                                  |          | CONCRETE TYPE I II & III (B)(C)<br>SOLID MASONRY (I)           | THICKNESS OF (t) PROTECTION                  | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             |
|                                           |                                                                            | 15.     | GIRDERS...BEAMS...TRUSSES                                                                |          | CONCRETE TYPE I II & III (B)(C)                                | THICKNESS OF (t) PROTECTION                  | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             | I 2 2 2<br>II 2 2 2<br>III 2 2 2             |
|                                           |                                                                            | 16.     | COLUMNS...BEAMS...GIRDERS...TRUSSES...JOISTS & STEEL FLOOR UNITS                         |          | SPRAYED FIBER...CEMENTITIOUS MIXTURE...INTUMESCENT PAINTS      | BY TESTS OR LISTING BY APPROVED TESTING LAB. | BY TESTS OR LISTING BY APPROVED TESTING LAB. | BY TESTS OR LISTING BY APPROVED TESTING LAB. | BY TESTS OR LISTING BY APPROVED TESTING LAB. | BY TESTS OR LISTING BY APPROVED TESTING LAB. | BY TESTS OR LISTING BY APPROVED TESTING LAB. | BY TESTS OR LISTING BY APPROVED TESTING LAB. | BY TESTS OR LISTING BY APPROVED TESTING LAB. | BY TESTS OR LISTING BY APPROVED TESTING LAB. | BY TESTS OR LISTING BY APPROVED TESTING LAB. | BY TESTS OR LISTING BY APPROVED TESTING LAB. | BY TESTS OR LISTING BY APPROVED TESTING LAB. | BY TESTS OR LISTING BY APPROVED TESTING LAB. |

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# TYPICAL EXAMPLES OF FIRE RESISTIVE STRUCTURAL COMPONENTS, TABLE 2 (CON'T.)

| TYPE OF CONSTRUCTION                             | ROW NO. | STRUCTURAL COMPONENTS | SKETCHES                                                                                                                          | INSULATING MATERIAL                                                                 | DESCRIPTION                                                                                                                                                             | MINIMUM REQUIREMENTS                               |                                        |                                                |                                                                        |
|--------------------------------------------------|---------|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|----------------------------------------|------------------------------------------------|------------------------------------------------------------------------|
|                                                  |         |                       |                                                                                                                                   |                                                                                     |                                                                                                                                                                         | 4 HR.                                              | 3 HR.                                  | 2 HR.                                          | 1 HR.                                                                  |
| COMPONENTS WITH SUSPENDED OR ATTACHED PROTECTION | 17.     | CONC.                 | CONCRETE JOISTS OR WAFFLE                                                                                                         |    | ⑥ ③ ④ CONCRETE TYPE I, II OR III<br>3/4" COVER<br>VERMICULITE...GYPSUM...OR PERLITE<br>GYPSUM ON METAL LATH                                                             | 1/2" THICK OF SLAB<br>1" THICK OF INSULATION       | 3"<br>1"                               | 2"<br>3/4"                                     |                                                                        |
|                                                  | 18.     |                       | STEEL COLUMNS                                                                                                                     |    | TYPE I & II MASONRY ①<br>1 1/2" AIR SPACE ①                                                                                                                             | THICK OF INSULATION                                | 4" SOLID                               |                                                |                                                                        |
|                                                  | 19.     |                       | STEEL GIRDERS...BEAMS...<br>TRUSSES...JOISTS, COLUMNS<br>INDIVIDUALLY PROTECTED                                                   |    | SPRAYED FIBRE...CEMENTITIOUS<br>MIXTURE...LATH & PLASTER                                                                                                                |                                                    | BY TESTS...OR<br>APPROVED TESTING LAB. | LISTING                                        | BY                                                                     |
|                                                  | 20.     |                       | STEEL BEAMS, GIRDERS, TRUSSES &<br>JOISTS...W/CEILING PROTECTION &<br>MINIMUM 2 1/2" TH. TYPE I, II OR III<br>CONCRETE SLAB ⑥ ③ ④ |    | SPRAYED FIBRE...CEMENTITIOUS<br>MIXTURE...LATH & PLASTER<br>ACOUSTICAL TILE                                                                                             |                                                    | BY TESTS...OR<br>APPROVED TESTING LAB. | LISTING                                        | BY                                                                     |
|                                                  | 21.     |                       | STEEL STUD PARTITION<br>NON BEARING                                                                                               |    | GYPSUM...PERLITE PLASTER ON PER-<br>FORATED GYP. LATH...2 1/2" STUD<br>GYPSUM WALL BOARD...3 5/8" STUD                                                                  | 1" PLASTER<br>1" LATH<br>NO. LAYERS<br>THICK, EACH |                                        | 3/4" / 3/8"<br>TWO 5/8"                        | 1/2" / 3/8"<br>ONE 5/8"                                                |
|                                                  | 22.     |                       | WOOD JOISTS MIN. 2" X 10",<br>WOOD FLOOR<br>ATTACHED CEILING                                                                      |    | GYPSUM WALL BOARD...2-2" X 10"<br>4'-0" 1/8" PLYWOOD FLOORING<br>GYR WALL BOARD...2" X 10" 16" 1/2"<br>1/2" PLYWOOD OR 1" X 6" T.B.G. SUB-FLOOR                         | 1" INSUL.<br>1" INSUL.<br>1" FLOORING              |                                        |                                                | 5/8"<br>5/8" PLYWOOD<br>OR 1" X 3" T.B.G.                              |
|                                                  | 23.     |                       | WOOD JOISTS MIN. 2" X 10",<br>WOOD FLOOR<br>SUSPENDED CEILING                                                                     |    | NON COMBUSTIBLE 2" X 10" 16" 1/2"<br>ACOUSTICAL TILE W/ 5/8" PLYWOOD<br>OR 1" X 4" T.B.G. SUB FLOORING                                                                  | 1" INSUL.<br>1" FLOORING                           |                                        |                                                | 5/8"<br>1/2" PLYWD<br>OR<br>1" X 6" T.B.G.                             |
|                                                  | 24.     |                       | WOOD STUD PARTITION<br>MIN. 2" X 4" STUD                                                                                          |    | GYPSUM WALLBOARD<br>GYPSUM PERLITE PLASTER ON<br>3/8" GYPSUM LATH<br>GYPSUM & SAND PLASTER ON U.L.<br>LISTED WIRE LATH<br>GYPSUM & VERMICULITE PLASTER<br>ON METAL LATH | NO LAYERS /<br>TH. OF EACH<br>1"<br>1"<br>1"       |                                        | TWO 5/8"<br>1" PLASTER<br>W/ 1/2" HEX.<br>MESH | TWO 3/8"<br>9/16"<br>3/4"<br>3/4"                                      |
| ② HEAVY TIMBER CONSTRUCTION TABLE                |         |                       |                                                                                                                                   |                                                                                     |                                                                                                                                                                         |                                                    |                                        |                                                |                                                                        |
| HEAVY<br>TIMBER<br>SOLID OR<br>LAMINATED         | 25.     |                       | COLUMNS                                                                                                                           |  | WOOD ALL SPECIES                                                                                                                                                        | FLOOR WIDTH X<br>DEPTH<br>MIN. NOM.                |                                        |                                                | 8" X 8"                                                                |
|                                                  | 26.     |                       | GIRDERS & BEAMS                                                                                                                   |  | WOOD ALL SPECIES                                                                                                                                                        | MIN. WIDTH X<br>DEPTH (NOM.)                       |                                        |                                                | 6" X 8"                                                                |
|                                                  | 27.     |                       | ARCH & TRUSS<br>FOR ROOF ONLY                                                                                                     |  | WOOD ALL SPECIES                                                                                                                                                        | MIN. WIDTH X<br>DEPTH EACH<br>MEMBER               |                                        |                                                | 4" X 6"                                                                |
|                                                  | 28.     |                       | FLOOR & ROOF DECK                                                                                                                 |  | WOOD ALL SPECIES                                                                                                                                                        | ROOF<br>FLOOR                                      |                                        |                                                | 2" Y & G.<br>OR<br>3" SOLID<br>3" T.B.G. +<br>1" T.B.G.<br>OR 4" SOLID |

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(a) Types of concrete.

1. Type I—normal weight concrete with limestone, calcareous gravel and air-cooled slag aggregate.

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

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

(b) Cover on reinforcing steel is for sides and bottoms. Where tensile reinforcing elements have different cover, the tabulated cover is the average of the minimum values of the individual elements. The cover of an individual element shall not be less than  $\frac{1}{4}$  the tabulated value. Top cover to be a minimum of  $\frac{3}{4}$  inch.

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

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

NOTE: For ASTM E-119 standard adopted see Ind 51.36 (30).

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

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

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

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

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

(j)  $1\frac{1}{2}$  inch space between column and masonry unit—no fill required.

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

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

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

\* See Appendix A for further explanatory material.

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

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

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

History: Cr. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71, and rec. eff. 1-1-72, Register, July, 1971, No. 187; am. (1) (f), Register, March, 1972, No. 185, eff. 4-1-72.

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

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

1. Time-temperature relationship ASTM E-119.

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

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

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

NOTE: 1. For ASTM E-119 standard adopted see Ind 51.26 (90).

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

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

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

Ind 51.047 Openings in fire rated construction. (1) Openings in fire-rated construction, where permitted by other sections of the code, shall satisfy the following appropriate requirements unless otherwise exempted.

(a) Fire door assemblies. 1. Openings. a. All openings in 3- and 4-hour fire-resistive walls shall be protected with not less than 3-hour rated doors.

b. All openings in 2-hour fire-resistive walls shall be protected with not less than 1½-hour rated doors.

c. All openings in one-hour fire-resistive walls, including openings to exterior fire escapes, shall be protected with not less than ¾-hour rated doors.

d. All openings in ¾-hour fire-resistive walls shall be protected with not less than ¾-hour rated doors.

Note: Door assemblies with glued solid wood core flush doors, 1½-inches thick, quality certified as meeting National Woodwork Manufacturers Association industry standard NS-1-69, and in addition possessing no core voids, may be used with one-hour fire-resistive walls where the occupancy chapters of this code permit.

\* See Appendix A for further explanatory material.

Register, September, 1973, No. 213  
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2. The door assemblies shall be installed with frame, hinges, latches, closing devices and counterweights in accordance with methods and standards approved by the department.

3. Methods of securing door frame to adjacent construction shall be illustrated on the plans submitted to the department for approval.

NOTE: The department will accept recommended practices for installation covered in "Standard for Fire Door and Windows" N.F.P.A. No. 80.

4. The maximum swinging door clearances to frame shall be  $\frac{1}{8}$  inch on sides and top and  $\frac{1}{4}$  inch at bottom between sill or floor.

5. All labeled fire doors where required shall be equipped with an approved closing device.

a. Doors with self-closing device shall remain in a closed position except when in use.

NOTE: The intent was to accept normal usage of door but not permit doors with this device to be blocked open at any time.

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

NOTE: For type of closing device permitted please refer to chapters for classes of construction and/or occupancy.

6. Adequate clearance shall be maintained to permit free operation of fire doors.

NOTE: 1. See section Ind 51.15 for exit door requirements.

2. Transoms, vision panels and/or louvers may be incorporated if tested in accordance with ASTM E-152 standard method.

(b) Fire window assemblies.\* 1. Openings. Where openings are permitted in fire rated walls protected with fire window assemblies they shall be time rated as  $\frac{1}{2}$  hour by an approved laboratory and tested in accordance with ASTM E-163 standard method.

NOTE: For ASTM E-163 standard adopted see section Ind 51.25 (93).

2. Size. The fire window assembly size shall not exceed size tested. Windows combined in multiple assemblies shall be separated by approved nonbearing metal mullions.

3. Wired Glass. Labeled wired glass  $\frac{1}{4}$  inch thick shall be installed in a fire window assembly.

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

4. Installation.\* a. Frames shall be securely fastened to the construction and be capable of resisting all wind stresses and other stresses to which they are likely to be subjected.

b. The wired glass shall be well bedded in approved glazing compound and all exposed joints between the metal shall be struck and painted. The clearance between the edges of the glass and metal framing shall not exceed  $\frac{1}{8}$  inch.

NOTE: The department will accept recommended practices for installation covered in "Standard for Fire Doors and Windows" N.F.P.A. No. 80.

(c) Glass block. 1. Openings. Where openings are permitted in fire rated walls protected with glass block they shall be time rated as  $\frac{1}{2}$  hour by an approved laboratory and tested in accordance with ASTM E-163 standard method.

NOTE: For ASTM E-163 standard adopted see section Ind 51.25 (93).

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2. *Size of opening.* Glass blocks are suitable for openings not exceeding 120 square feet in area, with neither the width nor height exceeding 12 feet.

3. *Installation.*

NOTE: The department will accept recommended practices for installation covered in "Standard for Fire Doors and Windows" N.F.P.A. No. 80.

(d) *Labels.* 1. The label shall identify the time rating for fire door assemblies and class of fire window assemblies and glass block.

2. The label shall identify the testing laboratory, listing agency and manufacturer.

3. The label shall be securely attached and located to permit visual inspection after installation.

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

2. Duct openings in required fire-resistive rated floor and wall assemblies shall be protected as specified under section Ind 59.69 (13).

History: Cr. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71 and recr. eff. 1-1-72, Register, July, 1971, No. 187; am. (1) (Intro.), r. and recr. (1) (a) 1., Register, September, 1973, No. 213, eff. 10-1-73.

Ind 51.048 *Roof coverings.* (1) Roof coverings of class A, B, C or unclassified shall be provided as specified under "Classes of Construction" or under the specific occupancy requirements.

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

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

Ind 51.05 *History:* 1-2-56; r. Register, February, 1971, No. 182, eff. 7-1-71; cr. Register, July, 1971, No. 187, eff. 8-1-71 and expiring 1-1-72.

Ind 51.06 *History:* 3-2-58; r. Register, February, 1971, No. 182, eff. 7-1-71; cr. Register, July, 1971, No. 187, eff. 8-1-71, expiring 1-1-72.

Ind 51.07 *History:* 1-2-56; r. Register, February, 1971, No. 182, eff. 7-1-71; cr. Register, July, 1971, No. 187, eff. 8-1-71, expiring 1-1-72.

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

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

(a) An absolute occupancy separation shall have no openings therein and shall have walls and floors of not less than 4-hour fire-resistive construction as specified in section Ind 51.04.

(b) A special occupancy separation shall have walls and floors of not less than 3-hour fire-resistive construction as specified in section Ind 51.04. All openings in walls forming such separation shall be protected on each side thereof by self-closing fire-resistive

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doors as specified in section Ind 51.047, and such doors shall be kept normally closed. The total width of all openings in any such separating wall in any one story shall not exceed 25% of the length of the wall in that story and no single opening shall have an area greater than 120 square feet.

1. All openings in floors forming this type of separation shall be protected by vertical enclosures extending above and below such openings. The walls of such vertical enclosures shall be of not less than 2-hour fire-resistive construction as specified in section Ind 51.04 and all openings therein shall be protected on one side thereof by self-closing 1-hour fire-resistive doors as specified in section Ind 51.047 and such doors shall be kept normally closed.

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

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

Ind 51.00 History: 1-2-56; r. and rear, Register, September, 1959, No. 45, eff. 10-1-59; am. Register, December, 1962, No. 81, eff. 1-1-63; am. (2) Register, December, 1967, No. 144, eff. 1-1-68; r. Register, February, 1971, No. 182, eff. 7-1-71; cr. eff. 8-1-71 and expiring 1-1-72, Register, July, 1971, No. 187.

Ind 51.10 History: 1-2-56; r. Register, February, 1971, No. 182, eff. 7-1-71; cr. eff. 8-1-71 and expiring 1-1-72, Register, July, 1971, No. 187.

Ind 51.11 History: 1-2-56; r. Register, February, 1971, No. 182, eff. 7-1-71; cr. eff. 8-1-71 and expiring 1-1-72, Register, July, 1971, No. 187.

Ind 51.12 History: 1-2-56; r. Register, June, 1972, No. 198, eff. 1-1-73.

Ind 51.13 History: 1-2-56; r. and rear, Register, February, 1971, No. 182, eff. 7-1-71; r. Register, June, 1972, No. 198, eff. 1-1-73.

Ind 51.14 History: 1-2-56; r. Register, June, 1972, No. 198, eff. 1-1-73.

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

Note: For required exits see Wis. Adm. Code sections Ind 54.06, 55.10, 56.08 and 57.05.

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

(3) A standard exit door shall have such fastenings or hardware that it can be opened from the inside by pushing against a single bar or plate or turning a single knob or handle.

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- (a) The use of a key for opening door from the inside is prohibited.
- (b) The door shall not be barred, bolted or chained at any time.
- (4) A standard exit doorway shall not be less than 6 feet 4 inches high by 3 feet 4 inches wide, except where especially provided under occupancy classifications and in Wis. Adm. Code section Ind 51.20. Where double doors are provided with or without mullions, the width of each single door may be reduced to 2 feet 6 inches.
- (5) All exit doors, unless otherwise exempted by the occupancy requirements of this code, shall be plainly marked by a red illuminated translucent exit sign bearing the word EXIT or OUT in plain letters not less than 6 inches in height and in such other places as may be necessary to direct the occupants to exit doorways.
- (6) Doors, windows or other openings which are not exits but which give the appearance of exits shall be effectively guarded.
  - (a) *Glass doors.* All glass doors shall be provided with a push bar or plate inside and outside. The push bar or plate shall be within 32 inches to 44 inches above the floor.
  - (b) *Glass walls panels.* Glass wall panels having a curb or sill less than 24 inches in height shall be protected by a horizontal bar or rail at least 1½ inches wide and located within 3 feet 6 inches to 4 feet 6 inches above the floor. The bar or rail assembly shall be capable of withstanding a lateral force of 100 pounds applied at any point.
- (7) Safeguards for physically handicapped persons:
  - (a) Any place of employment or public building, the initial construction of which is commenced after July 1, 1970, shall be so designed and constructed as to provide reasonable means of ingress and egress by the physically handicapped with the exception of:
    - 1. Apartment houses with less than 20 living units, row houses and rooming houses;
    - 2. Convents and monasteries;
    - 3. Jails or other places of detention;
    - 4. Garages, hangars and boathouses;
    - 5. All buildings classified as hazardous occupancies;
    - 6. Warehouses, and
    - 7. State buildings specifically built for field service purposes such as but not limited to conservation fire towers, fish hatcheries, tree nursery buildings.
  - 8. University residence halls at universities which have at least three residence halls for men and three residence halls for women so constructed as to allow physically handicapped persons reasonable means of ingress and egress to such buildings.
  - (b) The requirements of section Ind 51.15 (7) (a) may be accomplished by at least one ground or street level entrance and exit without steps.

The entrance and exit shall be by:

- 1. Ramps with slopes not more than one foot of rise in 12 feet coated with a nonskid surface, or
- 2. By elevator or such other arrangements as may be reasonably appropriate under the circumstances and which meets with the ap-

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approval of the department of industry, labor and human relations or in lieu thereof with the approval of the municipality wherein the building is located.

3. Doors having a clear opening of at least 40 inches in width and shall otherwise conform to the department of industry, labor and human relations building code.

(c) If any ground or street level entrance or exit is not so designed or constructed a sign shall be placed at such entrance or exit indicating the location of the entrance or exit available for wheel chair service.

(d) Where requirements of section Ind 51.15 (7) (a) apply, there shall be reasonable means of access from a parking lot, if any, ancillary to such buildings and reasonable means of ingress and egress to at least one floor on which the primary business of such building is located.

(e) The ramp shall be at least 4 feet in width of which not more than 4 inches on each side may be occupied by a handrail.

(f) All ramps shall have a handrail on each side.

1. Handrail shall be not less than 2 feet 6 inches in height with an intermediate rail at mid height.

(g) The floor on the inside and outside of each ramp doorway shall be level for a distance of 6 feet from the door.

(h) Every ramp shall have at least 6 feet of level clearance at the bottom.

(i) All ramps shall have a level platform at 30 feet intervals and shall have a level platform at least 6 feet in length wherever they turn.

(j) The requirements of section Ind 51.15 (7) (a) through (i) shall apply to buildings presently exempt or existing should there be a change in occupancy of such building to that of a place of employment or public building not otherwise exempt after July 1, 1970.

Note: See section Ind 52.53 for further requirements.

History: 1-2-56; am. Register, December, 1962, No. 84, eff. 1-1-63; am. (5) and cr. (7), Register, November, 1963, No. 85, eff. 12-1-63; r. and rec., Register, October, 1967, No. 142, eff. 11-1-67; am. (7) (j), Register, May, 1968, No. 149, eff. 6-1-68; r. and rec. (7), Register, December, 1970, No. 187, eff. 1-1-71; r. and sec. (3), Register, February, 1971, No. 182, eff. 3-1-71; am. (7) (a) 1, Register, September, 1973, No. 213, eff. 10-1-73.

Ind 51.16 Stairways and elevated platforms. (1) DEFINITION. By a stairway is meant one or more flights of steps and the necessary platforms connecting them to form a continuous passage from one level to another within a building or structure, except as provided in subsection (3) (b).

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

(a) In apartment buildings not more than 2 stories in height and

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having not more than 2 living units on a floor, and in rooming houses, hospitals, hotels and similar buildings not more than 2 stories in height and having not more than 6 habitable rooms on a floor, such stairways shall not be less than 3 feet wide.

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

(3) **HANDRAILS.** All stairways and steps of more than 3 risers shall have at least one handrail. Stairways and steps 5 feet or more in width, or open on both sides, shall have a handrail on each side. Stairways and steps which are less than 5 feet in width shall have a handrail on the left hand side as one mounts the stairs and on the open side, if any.

(a) Stairways which are more than 8 feet wide shall be divided by center rails into widths not more than 8 feet nor less than 3 feet 8 inches. Rails shall be not less than 2 feet 6 inches above the nose of the treads or 3 feet 6 inches above the platform except as specified in Wis. Adm. Code section Ind 51.20. Railings on the open sides of stairways and platforms shall be provided with an intermediate member at midheight or with vertical members having a maximum spacing of 11 inches, or its equivalent in safety.

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

(c) Where an exit door leads to an outside stairway, platform or sidewalk, the level of the platform or sidewalk shall not be more than 7½ inches below the door sill except as provided in section Ind 51.20 (4) (g).

(4) **RISERS AND TREADS.** All stairways and steps required as exits by this code shall have a uniform rise of not more than 7½ inches and a uniform tread of not less than 9½ inches, measuring from tread to tread, and from riser to riser. No winders shall be used. There shall not be more than 18, nor less than 3 risers between platforms or between floor and platform and not more than 22 risers from floor to floor with no platform.

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

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

(5) **ELEVATED PLATFORMS.** Elevated platforms, walks and runways not otherwise mentioned, which are an integral part of a building or structure, shall have railings as required by this section.

(a) For stairways to elevated platforms, walks and runways in places of employment see Wis. Adm. Code, chapter 1, Safety.

**History:** 1-1-56; am. (2); (2) (a); (3) (b); Register, June, 1956, No. 6, eff. 7-1-56; r. and tech. Register, September, 1958, 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.

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**Ind 51.17 Smokeproof stair tower.** (1) A smokeproof stair tower shall be an enclosed stairway which is entirely cut off from the building and which is reached by means of open balconies or platforms. The stairways, landings, platforms and balconies shall be of non-combustible 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 section Ind 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 section Ind 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 recr. (1) and (2) eff. 8-1-71 and exp. 1-1-72, and cr. (1) and (2) eff. 1-1-72, Register, July, 1971, No. 187; am. (2), Register, June, 1972, No. 198, eff. 7-1-72.

**Ind 51.18 Interior enclosed stairway.** (1) An interior enclosed stairway shall be completely enclosed as specified in table 51.03-A, and all doors opening into such enclosure shall be as specified in section Ind 51.047.

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

(3) If windows are placed in any such enclosure they shall be fixed fire-resistive windows as specified in section Ind 51.047 except in outside walls.

History: 1-2-56; am. (1) and (3), Register, February, 1971, No. 182, eff. 7-1-71; r. and recr. (1) and (3), eff. 8-1-71 and exp. 1-1-72, and cr. (1) and (3), eff. 1-1-72, Register, July, 1971, No. 187; r. and recr. (1), Register, June, 1972, No. 198, eff. 1-1-73.

**Ind 51.19 Horizontal exit.** (1) A horizontal exit shall consist of one or more openings through or around an exterior wall or occupancy separation, or of one or more bridges or balconies connecting 2 buildings or parts of buildings entirely separated by occupancy separations as described in section Ind 51.03.

(2) Openings used in connection with horizontal exits shall be protected by fire-resistive doors as specified in section Ind 51.047. If swinging doors are installed in pairs, they shall be arranged to swing in opposite directions; with direction of travel indicated by signs, except that where the travel is in one direction only, both doors shall swing in that direction. Such doors shall be kept continuously unlocked whenever the building is occupied and be normally closed or be self-closing and equipped with fusible links.

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

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(4) All doors and windows within 10 feet of any balcony or bridge shall be fire-resistive windows for moderate fire exposure or fire-resistive doors as specified in section Ind 51.047, except that if such windows or doors are in the same plane, this requirement shall apply only to those within 5 feet of the balcony or bridge.

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

History: 1-2-56: am. (3) 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

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

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

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

(3) **DESIGN AND FABRICATION.** Each part of every fire escape (except counterweights for balanced stairways) shall be designed and constructed to carry a live load of 100 pounds per square foot of horizontal area over the entire fire escape. Each part of every fire escape shall be designed and constructed in accordance with the requirements of section Ind 53.16, except that the unit stresses therein specified shall be reduced by one-fourth. The minimum sections and sizes specified below shall be increased whenever necessary so that under full load the allowable unit stresses will not be exceeded.

(a) No other material than wrought iron, soft steel or medium steel shall be used for any part of a fire escape, except for weights, separators and ornaments. No bar material less than 1/2 inch thick shall be used in the construction of any fire escape, except for separators, ornaments, structural shapes over 3 inches and rigidly built up treads and platforms of approved design. In the fabrication of a fire escape, all connections or joints shall be made by riveting, bolting or welding in an approved manner. All bolts or rivets, except for ornamental work, shall be not less than 3/8 inch in diameter.

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

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(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  $\frac{1}{2}$  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  $\frac{3}{4}$  inch square bars with sharp edge up, not more than  $1\frac{1}{4}$  inches, center to center.

(c)  $\frac{3}{4}$  inch round bars, not more than  $1\frac{1}{4}$  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  $2 \times \frac{3}{4}$  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  $\frac{3}{4}$  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  $\frac{3}{4}$  inch diameter), nut, and washer (at least 4 inch diameter). The slope of the lower bracket bar shall be not less than 30 degrees with the horizontal. The lower bar shall have a washer or shoulder to give sufficient bearing against the wall.

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

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

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

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

(c) Stairway stringers shall consist of either:

1. A 5 inch channel or larger.

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2. Two angles 2 x 2 x  $\frac{1}{4}$  inch or larger.
3. Two flat bars 2 x  $\frac{3}{8}$  inch or larger.
4. One flat bar 6 x  $\frac{1}{4}$  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 and having 2 intermediate rails, uniformly spaced, measuring vertically from the floor of the platform, shall be provided on all open sides of platforms. Railings at least 36 inches in height, measuring vertically from the nose of the treads, shall be provided on the open sides of all stairways and on both sides of balanced stairways. Either a railing or a hand-rail fastened to the wall shall be provided on each side of all "B" fire escape stairways.

(a) Every railing shall have posts, not more than 5 feet apart made of not less than  $1\frac{1}{2}$  x  $1\frac{1}{2}$  x  $\frac{1}{4}$  inch angles or tees, or  $1\frac{1}{2}$  inch pipe; top rail not less than  $1\frac{1}{2}$  x  $1\frac{1}{2}$  x  $\frac{1}{4}$  inch angle or equivalent; center rail not less than  $1\frac{1}{2}$  x  $\frac{1}{2}$  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  $\frac{1}{2}$  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 8 feet vertically.

(b) All outside railings which are more than 60 feet above grade shall be at least 6 feet high, measuring vertically from floor of platform or from nose of step. Such railings shall be of special design approved by the department of industry, labor and human relations,

\* See Appendix A for further explanatory material.

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 1½ inch pipe, or not less than 2 x ½ inch flat bars, at least 17 inches apart in the clear. The rungs shall be not less than ½ inch square or ¾ inch round bars, 14 inches center to center. The stringers shall be securely tied together at intervals no greater than every fifth rung. The stringers of each ladder shall extend not less than 4 feet above the roof coping and return to within 2 feet of the roof, with the top rung of the ladder level with the coping.

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

**History:** 1-2-56; am. Register, December, 1965, No. 84, eff. 1-1-65; am. (1) (a), Register, February, 1971, No. 182, eff. 7-1-71; am. (7), Register, February, 1971, No. 182, eff. 8-1-71; 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.

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

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

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

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

(d) No required standpipes shall be less than 4 inches in diameter, and not less than 6 inches in diameter for buildings exceeding 75

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feet in height. Material shall be steel or wrought iron pipe with approved fittings, designed for a working pressure of 100 pounds in excess of the static pressure due to elevation. An approved 2½ inch hose valve shall be located at each story, not over 5 feet above the floor level. An approved pressure reducing device shall be installed at hose valves where the pressure would otherwise be in excess of 50 pounds. Where a standpipe is not normally under pressure, hose valves shall be equipped with a tight fitting cap on a chain and having lugs for a spanner wrench.

(e) An approved siamese connection with a check valve in each inlet shall be installed on a 4 inch pipe connecting with each standpipe system and shall be marked "To Standpipe". The elevation of the connection shall be not over 2 feet above the sidewalk or ground. An automatic drip valve shall be installed where necessary to prevent freezing. In buildings with several standpipes, more than one siamese connection may be required.

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

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

1. Connection to city water works system when providing required minimum volume and pressure.
2. Gravity tank of not less than 3,500 gallons capacity, elevated 50 feet above the top story.
3. Pressure tank of 5,250 gallons gross capacity (3,500 gallons water capacity).
4. Automatic pump or pumps, with combined effective capacity of 500 gallons per minute.

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

(3) **FIRST AID STANDPIPES.** (a) Standpipes shall be provided as required in sections Ind 54.14, 55.33, and 57.21.

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

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

(c) No required standpipe shall be less than 2 inches in diameter, and not less than 2½ inches in diameter for buildings 5 stories or more in height. Material shall be wrought iron or steel and pipe and fittings shall be of suitable weight for the pressure used. An ap-

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proved 1½ inch hose valve shall be located in each story, not more than 5 feet above the floor level; valves of the gate type shall be equipped with a suitable open drip connection. An approved pressure-reducing device shall be installed at hose valves where pressure would otherwise be over 50 pounds.

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

(e) Water supply shall be automatic, and be designed for 70 gallons per minute for 80 minutes with 25 pounds flowing pressure at the top outlet. Such supply may be from city connection, gravity tank, pressure tank or pump.

*Note:* Data on the design of standpipe systems can be found in the Standards of the National Board of Fire Underwriters for the Installation of Standpipe and Hose Systems. The department of industry, labor and human relations will ordinarily approve any installation which is approved by the Underwriters.

Ind 51.22 Fire extinguishers. (1) Where fire extinguishers are required, they shall be of a type approved by the department of industry, labor and human relations. All fire extinguishers shall be charged in accordance with the instructions of the manufacturer.

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

*Note:* The department of industry, labor and human relations will ordinarily approve any extinguisher which bears the Underwriters' label and which is of the size and suitable for the hazard for which it is intended. Consult the department of industry, labor and human relations for lists of approved extinguishers.

Ind 51.23 Automatic sprinklers. (1) Required automatic sprinkler systems shall be designed and constructed in conformity with good established practice. Only materials and devices approved by the department of industry, labor and human relations may be used. Reinstallation 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.

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

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

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

(1) All such alarm systems shall consist of operating stations on each floor of the building, including the basement, with bells, horns, or other approved sounding devices which are effective throughout the building. The system shall be so arranged that the operation of any one station will actuate all alarm devices connected to the system except in the case of a pre-signal 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.

(2) Every fire alarm system shall be electrically operated or activated by non-combustible, non-toxic gas except as provided in section Ind 56.19. Electrically operated systems shall be operated on closed circuit current under constant electrical supervision, so arranged that upon a circuit opening and remaining open or in case of a ground or short circuit in the undergrounded conductor, audible trouble signals will be given instantly. Gas activated systems shall be mechanically supervised and under constant gas pressure, so arranged that in case of a pressure drop an audible trouble signal will be given instantly. Means shall be provided for testing purposes.

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

*Exception:* (a) In apartment buildings, non-coded continuous sounding fire alarm systems under constant electrical or gas activated supervision will be approved.

(4) Operating stations shall be prominently located in an accessible position at all required exit doors and required exit stairways. Operating stations shall be of an approved type and shall be conspicuously identified. All such operating stations shall be of a type, which after being operated, will indicate that an alarm has been sent therefrom until reset by an authorized means. (Operating stations having a "Break Glass" panel will be acceptable. On coded systems having a device to permanently record the transmission of an alarm, "Open Door" type stations may be used). The fire alarm operating stations shall be mounted not less than 4 feet nor more than 5 feet above the finished floor as measured from the floor to the center of the box.

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

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

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

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

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

Note: The following sections are taken from the Wisconsin Administrative Electrical Code.

(10) The energy for the operation of electrical fire alarm systems shall be taken from sources suited to the design of the system. Batteries on systems of less than 110 volts shall not be used.

(11) A 3-wire 120-240 volt or 120-208 volt (3 phase 4 wire) service will be accepted for supervised systems provided the operating current is secured from one ungrounded conductor and the neutral, or ungrounded conductor, and the current for operating trouble signal or signals is secured from the other ungrounded conductor and the neutral or grounded conductor.

(12) Electrical wiring in connection with fire alarm systems shall be installed in rigid metal conduit, flexible metal conduit, electrical metallic tubing or surface metal raceways. Armored cable (metal) may be used where it can be fished in hollow spaces of walls or partitions in apartments or rooming houses not over 3 stories in height. Where the wiring is subject to excessive moisture or severe mechanical injury, rigid metal conduit shall be used. The smallest size conductor to be used in any fire alarm system in a building over 3 stories in height shall be No. 14 AWG or No. 16 AWG for buildings not over 3 stories in height. The wires shall be provided with insulation suitable for use on circuits not exceeding 600 volts. Fire alarm systems shall be connected to the line inside of the main service switch or to the emergency feeder through 2 single pole breakers or switches used for no other purpose and arranged so they can be locked in the "on" position, and under the supervision of a qualified person.

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The breaker or switches shall be identified by a red color. Two pole breakers shall not be used.

History: 1-1-55; am. (4) (a), Register, November, 1961, No. 95, s2. 12-1-61; am. Register, August, 1964, No. 194, s2. 5-1-64.

Ind 51.25 Specifications cited in this code. The specifications of the American Society for Testing and Materials referred to in this code are listed below.

- (1) CLAY BUILDING BRICK. (Solid masonry units made from clay or shale.) Part 12 ASTM Designation C 62-66.
- (2) SAND-LIME BUILDING BRICK. Part 12 ASTM Designation C 73-51 (1965).
- (3) CONCRETE BUILDING BRICK. Part 12 ASTM Designation C 55-66T.
- (4) SAMPLING AND TESTING BRICK. Part 12 ASTM Designation C 67-66.
- (5) STRUCTURAL CLAY LOAD-BEARING WALL TILE. Part 12 ASTM C 34-62.
- (6) SAMPLING AND TESTING STRUCTURAL CLAY TILE. Part 12 ASTM C 112-60.
- (7) SAMPLING AND TESTING CONCRETE MASONRY UNITS. Part 12 ASTM Designation C 140-65T.
- (8) STRUCTURAL CLAY NON-LOAD-BEARING TILE. Part 12 ASTM Designation C 56-62.
- (9) STRUCTURAL CLAY FLOOR TILE. Part 12 ASTM Designation C 57-57 (1965).
- (10) PORTLAND CEMENT. Part 10 ASTM Designation C 150-66.
- (11) AIR-ENTRAINING PORTLAND CEMENT. Part 10 ASTM Designation C 175-66.
- (12) PORTLAND BLAST-FURNACE SLAG CEMENT. Part 10 ASTM Designation C 205-64T.
- (13) MASONRY CEMENT. Part 9 ASTM Designation C 91-66.
- (14) QUICKLIME FOR STRUCTURAL PURPOSES. Part 9 ASTM Designation C 5-59.
- (15) HYDRATED LIME FOR MASONRY PURPOSES. Part 9 ASTM Designation C 207-49 (1961).
- (16) AGGREGATE FOR MASONRY MORTAR. Part 10 ASTM Designation C 144-66T.
- (17) AGGREGATES FOR MASONRY GROUT. Part 10 ASTM Designation C 404-61.
- (18) PORTLAND-POZZOLAN CEMENT. Part 9 ASTM Designation C 340-66T.
- (19) CONCRETE AGGREGATES. Part 10 ASTM Designation C 33-66.
- (20) LIGHTWEIGHT AGGREGATES FOR STRUCTURAL CONCRETE. Part 10 ASTM Designation C 330-64T.

\* See Appendix A for further explanatory material.

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(21) BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT. Part 4 ASTM Designation A15-66.

(22) RAIL-STEEL BARS FOR CONCRETE REINFORCEMENT. Part 4 ASTM Designation A 16-66.

(23) DEFORMED RAIL STEEL BARS FOR CONCRETE REINFORCEMENT WITH 60,000 P.S.I. MINIMUM YIELD STRENGTH. Part 4 ASTM Designation A 61-66.

(24) AXLE-STEEL BARS FOR CONCRETE REINFORCEMENT. Part 4 ASTM Designation A 160-66.

(25) SPECIAL LARGE SIZE DEFORMED BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT. Part 4 ASTM Designation A 408-66.

(26) HIGH-STRENGTH DEFORMED BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT WITH 75,000 P.S.I. MINIMUM YIELD STRENGTH. Part 4 ASTM Designation A 431-66.

(27) MINIMUM REQUIREMENTS FOR THE DEFORMATIONS OF DEFORMED STEEL BARS FOR CONCRETE REINFORCEMENT. Part 4 ASTM Designation A 305-65.

(28) BLEEDING OF CONCRETE. Part 10 ASTM Designation C 232-58 (1966).

(29) FABRICATED STEEL BAR OR ROD MATS FOR CONCRETE REINFORCEMENT. Part 4 ASTM Designation A 184-65.

(30) COLD-DRAWN STEEL WIRE FOR CONCRETE REINFORCEMENT. Part 4 ASTM Designation A 82-66.

(31) WELDED STEEL WIRE FABRIC FOR CONCRETE REINFORCEMENT. Part 4 ASTM Designation A 185-64.

(32) UNCOATED SEVEN-WIRE STRESS-RELIEVED STRAND FOR PRESTRESSED CONCRETE. Part 4 ASTM Designation A 416-64.

(33) UNCOATED STRESS-RELIEVED WIRE FOR PRESTRESSED CONCRETE. Part 4 ASTM Designation A 421-65.

(34) STEEL FOR BRIDGES AND BUILDINGS. Part 4 ASTM Designation A 7-66.

(35) STRUCTURAL STEEL. Part 4 ASTM Designation A 36-66.

(36) FLEXURAL STRENGTH OF CONCRETE (using simple beam with third-point loading). Part 10 ASTM Designation C 78-64.

(37) WELDED AND SEAMLESS STEEL PIPE. Part 1 ASTM Designation A 53-65.

(38) CAST IRON AND DUCTILE IRON PRESSURE PIPE. Part 2 ASTM Designation A 372-66.

(39) AIR-ENTRAINING ADMIXTURES FOR CONCRETE. Part 10 ASTM Designation C 260-66T.

(40) CHEMICAL ADMIXTURES FOR CONCRETE. Part 10 ASTM Designation C 494-65T.

(41) FLY ASH FOR USE AS AN ADMIXTURE IN PORTLAND CEMENT CONCRETE. Part 10 ASTM Designation C 550-65T.

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(42) RAW OR CALCINED NATURAL POZZOLANS FOR USE AS ADMIXTURES IN PORTLAND CEMENT CONCRETE. Part 10 ASTM Designation C 402-65T.

(43) METHODS AND DEFINITIONS FOR MECHANICAL TESTING OF STEEL PRODUCTS. Part 4 ASTM Designation A 370-65.

(44) DEFORMED BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT WITH 60,000 P.S.I. MINIMUM YIELD STRENGTH. Part 4 ASTM Designation A 432-66.

(45) MAKING AND CURING CONCRETE COMPRESSION AND FLEXURE TEST SPECIMENS IN THE FIELD. Part 10 ASTM Designation C 31-66.

(46) COMPRESSIVE STRENGTH OF MOLDED CONCRETE CYLINDERS. Part 10 ASTM Designation C 39-66.

(47) OBTAINING AND TESTING DRILLED CORES AND SAWED BEAMS OF CONCRETE. Part 10 ASTM Designation C 42-64.

(48) READY-MIXED CONCRETE. Part 10 ASTM Designation C 94-65.

(49) SAMPLING FRESH CONCRETE. Part 10 ASTM Designation C 172-54.

(50) MAKING AND CURING CONCRETE COMPRESSION AND FLEXURE TEST SPECIMENS IN THE LABORATORY. Part 10 ASTM Designation C 192-66.

(51) SPLITTING TENSILE STRENGTH OF MOLDED CONCRETE CYLINDERS. Part 10 ASTM Designation C 496-66.

(52) METHODS OF MECHANICAL TESTINGS. Part 31 ASTM Designation E 6-66.

(53) MILD STEEL, COVERED ARC-WELDING ELECTRODES. Part 4 ASTM Designation A 233-64T.

(54) RECOMMENDED PRACTICE FOR PROBABILITY SAMPLING OF MATERIALS. Part 30 ASTM Designation E 105-52.

(55) CALCIUM CHLORIDE. Part 10 ASTM Designation D 93-59.

(56) CHEMICAL ANALYSIS OF HYDRAULIC CEMENT. Part 9 ASTM Designation C 114-67.

(57) FINENESS OF PORTLAND CEMENT BY THE TURBIDIMETER. Part 9 ASTM Designation C 115-58.

(58) FINENESS OF PORTLAND CEMENT BY AIR PERMEABILITY APPARATUS. Part 9 ASTM Designation C 204-55.

(59) COMPRESSIVE STRENGTH OF HYDRAULIC CEMENT MORTARS (using 2-in. cube specimens). Part 9 ASTM Designation C 109-64.

(60) AUTOCLAVE EXPANSION OF PORTLAND CEMENT. Part 9 ASTM Designation C 151-66.

(61) SPECIFIC GRAVITY OF HYDRAULIC CEMENT. Part 9 ASTM Designation C 158-44 (1958).

(62) RESISTANCE TO ABRASION OF SMALL SIZE COARSE AGGREGATE BY USE OF THE LOS ANGELES MACHINE. Part 10 ASTM Designation C 131-66.

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(63) MATERIALS FINER THAN NO. 200 SIEVE IN MINERAL AGGREGATES BY WASHING. Part 10 ASTM Designation C 117-56.

(64) FRIABLE PARTICLES IN AGGREGATES. Part 10 ASTM Designation C 142-55T.

(65) LIGHTWEIGHT PIECES IN AGGREGATES. Part 10 ASTM Designation C 123-55.

(66) ORGANIC IMPURITIES IN SANDS FOR CONCRETE. Part 10 ASTM Designation C 40-54.

(67) SIEVE OR SCREEN ANALYSIS OF FINE AND COARSE AGGREGATES. Part 10 ASTM Designation C 136-53.

(68) SOUNDNESS OF AGGREGATES BY USE OF SODIUM SULFATE OR MAGNESIUM SULFATE. Part 10 ASTM Designation C 88-53.

(69) SPECIFIC GRAVITY AND ABSORPTION OF COARSE AGGREGATE. Part 10 ASTM Designation C 127-59.

(70) SPECIFIC GRAVITY AND ABSORPTION OF FINE AGGREGATE. Part 10 ASTM Designation C 128-59.

(71) SURFACE MOISTURE IN FINE AGGREGATE. Part 10 ASTM Designation C 70-55.

(72) UNIT WEIGHT OF AGGREGATE. Part 10 ASTM Designation C 29-50.

(73) VOIDS IN AGGREGATE FOR CONCRETE. Part 10 ASTM Designation C 30-37 (1954).

(74) EFFECT OF ORGANIC IMPURITIES IN FINE AGGREGATE ON STRENGTH OF MORTAR. Part 10 ASTM Designation C 87-53T.

(75) PETROGRAPHIC EXAMINATION OF AGGREGATES FOR CONCRETE. Part 10 ASTM Designation C 295-55.

(76) POTENTIAL REACTIVITY OF AGGREGATES (CHEMICAL METHOD). Part 10 ASTM Designation C 289-55.

(77) POTENTIAL ALKALI REACTIVITY OF CEMENT-AGGREGATE COMBINATIONS (MORTAR BAR METHOD). Part 10 ASTM Designation C 227-55.

(78) TERMS RELATING TO CONCRETE AND CONCRETE AGGREGATES. Part 10 ASTM Designation C 125-55.

(79) WEIGHT PER CUBIC FOOT, YIELD, AND AIR CONTENT (GRAVIMETRIC) OF CONCRETE. Part 10 ASTM Designation C 233-53.

(80) AIR CONTENT OF FRESHLY MIXED CONCRETE BY THE VOLUMETRIC METHOD. Part 10 ASTM Designation C 172-55.

(81) AIR CONTENT OF FRESHLY MIXED CONCRETE BY PRESSURE METHOD. Part 10 ASTM Designation C 231-52.

(82) SLUMP OF PORTLAND CEMENT CONCRETE. Part 10 ASTM Designation C 143-55.

(83) FLOW OF PORTLAND CEMENT CONCRETE BY USE OF THE FLOW TABLE. Part 10 ASTM Designation C 124-39 (1954).

(84) COMPRESSIVE STRENGTH OF CONCRETE USING PORTIONS OF BEAMS BROKEN IN FLEXURE. Part 10 ASTM Designation C 116-55T.

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(85) FUNDAMENTAL TRANSVERSE, LONGITUDINAL, AND TORSIONAL FREQUENCIES OF CONCRETE SPECIMENS, Part 10 ASTM Designation C 215-60.

(86) CEMENT CONTENT OF HARDENED PORTLAND CEMENT CONCRETE, Part 10 ASTM Designation C 83-66.

(87) LENGTH CHANGE OF CEMENT MORTAR AND CONCRETE, Part 10 ASTM Designation C 157-64T.

(88) SURFACE BURNING CHARACTERISTICS OF BUILDING MATERIALS, Part 14 ASTM Designation E 84-68.

(89) FIRE TESTS OF ROOF COVERINGS, Part 14 ASTM Designation E 108-70.

(90) FIRE TESTS OF BUILDING CONSTRUCTION AND MATERIALS, Part 14 ASTM Designation E 119-69.

(91) NONCOMBUSTIBILITY OF ELEMENTARY MATERIALS, Part 14 ASTM Designation E 136-65.

(92) FIRE TESTS OF DOOR ASSEMBLIES, Part 14 ASTM Designation E 152-66.

(93) FIRE TEST OF WINDOW ASSEMBLIES, Part 14 ASTM Designation E 163-65.

*Note:* The above standards may be obtained for personal use from American Society of Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103. They are available for inspection in the office of the department, the secretary of state and the revisor of statutes.

*History:* Cr. Register, October, 1967, No. 142, eff. 11-1-67; cr. (88), (89), (90), (91), (92), and (93), Register, February, 1971, No. 182, eff. 7-1-71; r. (88), (89), (90), (91), (92) and (93) eff. 8-1-71 and recr. (88), (89), (90), (91), (92) and (93) eff. 1-1-72, Register, July, 1971, No. 187.

**Ind 51.26 Specifications cited in this code. The specifications of the American Concrete Institute referred to in this code are listed below.**

(1) Building code requirements for reinforced concrete ACI 318-63.

(2) Minimum standard requirements for precast concrete floor and roof units ACI 512-67.

(3) Minimum requirements for thin-section precast concrete construction ACI 525-63.

*Note:* The above standards may be obtained for personal use from American Concrete Institute, 7100 Second Boulevard, Detroit, Michigan. They are available for inspection in the office of the department, the secretary of state and the revisor of statutes.

*History:* Cr. Register, October, 1967, No. 142, eff. 11-1-67.

\* See Appendix A for further explanatory material.

## Chapter Ind 52

### GENERAL REQUIREMENTS

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Ind 52.001 Design and supervision. (1) Every new building containing more than 50,000 cubic feet total volume, or addition to a building which by reason of such addition results in a building containing over 50,000 cubic feet total volume, or structural alteration to a building containing over 50,000 cubic feet total volume shall be designed by an architect or engineer in accordance with the provisions of this code; and shall be constructed under the supervision of an architect or engineer who shall be responsible for its erection in accordance with the plans and specifications of the designer. No change from the original plans and specifications shall be made except with the knowledge and consent of the designer, and as provided in Wis. Adm. Code section Ind 50.10.

(2) On completion of the construction, the supervising architect or engineer shall file a written statement with the department of industry, labor and human relations certifying that, to the best of his knowledge and belief, the construction has been performed in accordance with the plans and specifications approved by the department.

(3) No owner shall construct or alter any building, or portion of a building, or permit any building to be constructed or altered, except in accordance with the provisions of this section.

Note: By the term "architect" or "engineer" above is meant "registered architect" or "registered professional engineer", as defined in the Architects and Professional Engineers Registration Act, Section 101.31, Wis. Stats.

History: 1-2-56; cr. (2) Register, August, 1957, No. 24, eff. 3-1-57.

Ind 52.01. History: 1-2-56; am. (5) Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (5) eff. 3-1-71 and exp. 1-1-72; cr. (5) eff. 1-1-72, Register, July, 1971, No. 187; r. Register, June, 1972, No. 198, eff. 1-1-72.

Ind 52.02 Windows. (1) Every room in which one or more persons live, sleep, or are employed (except storage rooms or other rooms where the nature of the occupancy will not permit) shall be lighted

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by a window or windows opening directly upon a street or alley, or upon a court on the same lot with the building. The windows shall be so constructed and distributed as to afford light. Every building more than 40 feet deep (measuring at right angles to the windows) shall have windows on at least 2 sides.

**Note:** For windows and other outdoor openings used for natural ventilation, see Ind 59.24 (4) and Ind 57.19.

(a) The provisions for (1) may be waived for such occupancies as factory, office, mercantile, or educational facilities if provisions are made for artificial lighting as covered by Wis. Adm. Code Chapter Ind 19, Illumination.

1. Requirements applicable to schools or places of instruction shall be as stated in section Ind 56.05.

(2) Every building more than one story in height which does not have windows opening directly upon a street in each story above the first shall be provided with a suitable access for fire department use. Such access shall be a window or door opening through the wall on each floor above the first story. The opening shall be at least 36 inches in width and not less than 48 inches in height with the sill not more than 32 inches above the floor. The openings shall be so spaced that there will be one opening in each 100 feet of wall length in any accessible wall of the building. This requirement for access openings for fire department use shall not apply where a building is equipped throughout with an automatic sprinkler system approved for fire protection purposes.

**History:** 1-2-55: am. Register, December, 1962, No. 24, eff. 1-1-63; r. and rec. (1) (a). Register, October, 1967, No. 142, eff. 11-1-67; and (1) (a). Register, May, 1971, No. 135, eff. 6-1-71; r. and rec., Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 52.03 Window cleaning.** (1) Where the tops of windows to be cleaned are more than 20 feet above the floor, ground, flat roof, balcony, or permanent platform, one of the following means shall be provided to protect the window cleaners.

(a) Approved attachments for window cleaner safety belts to which belts may be fastened at each end. Said attachments shall be permanent devices that shall be firmly attached to the window frame, or to the building proper, and so designed that a standard safety belt may be attached thereto; or

(b) An approved portable platform that is projected through the window or supported from the ground, floor, roof or platform level, for the window cleaner to stand upon and that is designed, constructed, maintained and equipped with handrail and toeboard in compliance with the requirements of chapter Ind 1, rules on Safety.

(c) A suspended scaffold, swinging scaffold, awing chair scaffold, or boatswain's chair scaffold designed, constructed, equipped and maintained in compliance with the requirements of Wis. Adm. Code chapter Ind 35, rules on Safety in Construction, or

(d) Other equally effective devices.

(e) Where the window consists of a fixed panel not more than 24 inches in width alongside a removable panel, the fixed panel may be cleaned by reaching through the opening of the removable panel.

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Where the window consists of a fixed panel between 2 removable panels, the fixed panel may be cleaned by reaching through the openings if such fixed panel is not more than 36 inches in width.

(2) For cleaning the insides of skylights (the highest parts of which are more than 20 feet above the floor, ground, balcony or permanent platform), to which access cannot be gained by any of the means described in Wis. Adm. Code subsection Ind 1.16 (1), scaffolds as specified in chapter Ind 85, rules on Safety in Construction, shall be provided.

(3) All equipment, including building parts and attachments, used in connection with window cleaning, shall be maintained in reasonably safe condition while in use and shall be inspected at least once each month while in use, and within 30 days before their use. It shall be the responsibility of the owner of the individual safety devices or equipment to inspect and maintain the devices or equipment belonging to him so that each will comply with the requirements of this section.

(4) Where the attachments specified in subsection (1) (a) are relied upon for compliance with the provisions of this rule, said employer shall furnish or see that there is provided, an approved suitable safety belt for each employee while cleaning windows.

Note: It will be the policy of the department of industry, labor and human relations to accept anchors and safety belts which have been tested and approved by the Underwriters' Laboratories.

History: 1-2-56; am. Register, December, 1962, No. 84, eff. 1-1-63.

Ind 52.04 History: 1-2-56; r. Register, June, 1972, No. 198, eff. 1-1-73.

Ind 52.05 Size of courts. (1) In applying the following requirements, a building from 30 to 49 feet high shall be considered as having at least 3 stories, and each additional 13 feet shall be considered an additional story.

(2) Outer lot line courts shall be not less than 5 feet wide for a court 2 stories or less in height and 40 feet or less in length, measured from the lot line to the wall of the building. For each additional story in height, the width of such court shall be increased one foot; and for each additional 15 feet or fraction thereof in length, the width of such court shall be further increased one foot.

(3) Outer courts between wings or parts of the same building, or between different buildings on the same lot, shall be not less than 6 feet wide for a court 2 stories or less in height and 40 feet or less in length. For each additional story in height, the width of such court shall be increased one foot, and for each additional 10 feet or fraction thereof in length, the width of such court shall be further increased one foot.

(4) Where outer courts or outer lot line courts open at each end to a street or other open space not less than 15 feet wide, the above lengths may be doubled.

(5) Inner lot line courts one story high shall be not less than 6 feet wide and not less than 45 square feet in area. Inner lot line courts 2 stories high shall be not less than 6 feet wide and not less than 60 square feet in area. For every additional story, every such inner lot

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line court shall be increased by at least one lineal foot in length and one lineal foot in its width.

(6) Inner courts shall be not less than 10 feet in width nor less than 150 square feet in area for courts 2 stories or less in height; and for every additional story every such inner court shall be increased by at least one lineal foot in its length and one lineal foot in its width.

(7) Courts shall not be covered by a roof or skylight but the entire required area shall be open and unobstructed from the bottom thereof to the sky. No fire escape or stairway shall be constructed in any court unless the court be enlarged proportionately.

(8) Walls of inner courts whose least horizontal dimension is less than one-fourth the height, shall be faced with material with a permanent white surface or shall be painted white at least every 2 years.

(9) No buildings shall be altered or enlarged to encroach upon space reserved under this code for light and air on the lots or parcels of ground on which such building is erected.

History: 1-2-56; am. (2) and (5), Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 52.06 Ventilation of courts.** At the bottom of every shaft or inner court there shall be sufficient access to such shaft or court to enable it to be properly cleaned out. Every inner court which is required under Wis. Adm. Code section, Ind 52.02 and which is more than one story in height shall have an intake for fresh air, leading from the street or other open space. The area of such intake in square feet shall equal at least .002 of the number of cubic feet contained in said court, but such area need not be more than 50 square feet. Every intake shall be of not less than 2-hour fire-resistive construction and unless said intake is used as a passageway for persons, there shall be no openings into the same other than the inlet and outlet.

**Ind 52.10 Chimneys.** (1) The walls of all chimneys shall be built of brick or other approved fire-resistive material, except that a metal smokestack may be provided as specified in section Ind 52.11. No chimney shall rest upon a flooring of wood nor shall any wood be built into, or in contact with any chimney. Headers, beams, joists and studs shall not be less than 2 inches from the outside face of a chimney. The foundation of every chimney, flue, or stack, shall be designed and built in conformity with the requirements for foundations for buildings. In no case shall a chimney be corbeled out more than 8 inches from the wall and in every case the corbeling shall consist of at least 5 courses of brick. Chimneys shall extend at least 3 feet above flat roofs and not less than 2 feet above the ridge of gable and hip roofs, and lime-cement or cement mortar shall be used in the laying of chimney masonry above the roof line.

(2) Every masonry chimney shall have walls at least 8 inches in solid thickness, except that in a chimney with a flue not larger than 260 square inches where a fire clay or other suitable refractory clay flue lining is used for the full height of the chimney the walls shall not be less than 4 inches in solid thickness. No smoke flue shall have a cross sectional area less than 64 square inches, except that flue lin-

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ings 7 inches by 7 inches inside, or 8 inches in diameter inside, may be used.

(3) All flue linings shall be adapted to withstand reasonably high temperatures and flue gases and shall have a softening point not lower than 1800° F. Flue linings shall be not less than  $\frac{1}{4}$  inch in thickness and shall be built in as outer walls of the chimney are constructed. Flue linings shall start from a point not less than 3 inches below the bottom of the smokepipe intake and shall be continuous to a point not less than 4 inches above the enclosing walls.

(4) Where there is more than one smokepipe connected to a flue, the connections shall be at different levels. Two or more heating units or appliances may be connected to a common smokepipe or breeching if joined by Y fittings as close as practicable to the flue. In all such cases, the size of the breeching and the flue shall be sufficient to accommodate the total volume of flue gases.

(a) *Cleanout opening.* Every chimney shall be provided with a cleanout opening at the base. Such openings shall be equipped with metal doors and frames arranged to remain closed when not in use.

(5) Every chimney shall be designed to withstand the following wind pressure in pounds per square foot over the diametrical area:

|                        |    |
|------------------------|----|
| (a) Square chimneys    | 30 |
| (b) Polygonal chimneys | 25 |
| (c) Round chimneys     | 20 |

(6) Prefabricated chimneys complying with the requirements of Wis. Adm. Code section Ind 59.67 may be used in lieu of masonry chimneys if approved by the department of industry, labor and human relations and are provided with foundations as specified for masonry chimneys, or metal smokestacks or as otherwise approved.

*History:* 1-2-56; am. (1), r. and rec. (4), Register, August, 1957, No. 20, eff. 9-1-57; am. Register, December, 1961, No. 84, eff. 1-1-63; r. and rec. (6), Register, October, 1967, No. 142, eff. 11-1-67.

Ind 52.11 Metal smokestacks. (1) Steel or iron smokestacks may be used in place of masonry chimneys specified in section Ind 52.10, in which case the thickness of the metal shall be not less than 3/16 inch for heights up to 40 feet and  $\frac{1}{4}$  inch for greater heights. Such stacks when used for manufacturing, for high pressure boilers, furnaces or other similar heating or manufacturing appliances shall be lined with fire brick for a distance of not less than 25 feet from the place where the smoke pipe enters and shall be protected on the outside up to and through the roof of the building with 8 inches of masonry, or a metal shield which provides an 8 inch ventilated air space between such shield and the stack. All stacks shall be properly guyed when the height of the stack exceeds 15 times its least diameter.

*Exception:*

(a) Public utility or industrial power plants are exempted from the protection requirements of this paragraph if they are of type No. 1 or No. 2 construction as specified in section Ind 51.03.

(2) Smokestacks under 30 feet in height may be constructed of not less than No. 10 U. S. Gauge steel, with either welded or riveted joints, and may be mounted directly upon masonry chimneys or found-

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dations or upon industrial heating or power boilers provided all of which are designed to support the stack load. A clearance of not less than 6 inches shall be maintained at all times around such smokestack and any inflammable material within 12 inches of such smokestack shall be protected by  $\frac{1}{4}$  inch of asbestos covered by sheet metal.

History: 1-2-54; am. (1) (a), Register, June, 1972, No. 125, eff. 1-1-72.

**Ind 52.12 Smoke pipes.** (1) No smoke pipe or breeching serving boilers, furnaces or other similar heating appliances 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) Where necessary to pass through any partition of non-fire-resistive construction, every smoke pipe shall be encased with incombustible material at least 4 inches thick or with a double safety thimble made of 2 concentric rings of sheet metal with at least one inch open air space between and with the outer ring covered with at least  $\frac{1}{4}$  inch asbestos.

(3) No part of any smoke pipe shall be placed nearer to any non-fire-resistive partition or wall than the diameter of the pipe, nor nearer to any non-fire-resistive ceiling than  $1\frac{1}{2}$  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 sheet metal, or with equivalent protection.

**Ind 52.13 Steam and hot water pipes.** No steam pipe or pipe carrying hot water at a temperature exceeding 180 degrees shall be placed within one inch of any woodwork. Every such steam or hot water pipe passing through a combustible floor, ceiling or partition, shall be protected by a metal tube one inch larger in diameter than the pipe and shall be provided with a metal cap. All wooden boxes or casings enclosing steam or hot water pipes, or wooden covers to recesses in walls in which steam pipes are placed, shall be lined with metal.

**Ind 52.14 Ducts.** Every vertical shaft housing air ducts or a group of ducts in buildings in the theater, school, or hotel classification, shall be enclosed with incombustible material smoothly finished on the inside and having a fire-resistive rating as required for each specific situation.

History: 1-2-56; am. Register, December, 1962, No. 24, eff. 1-1-63.

**Ind 52.15.** History: 1-2-56; r. Register, December, 1962, No. 24, eff. 1-1-63.

**Ind 52.16 Floor protection.** (1) All stoves and ranges used for cooking, heating or laundry purposes using solid or liquid fuel, and which are more than 16 square feet in horizontal area or which have a flame at the bottom shall be placed on a fire-resistive floor projecting at least 2 feet on each side. If such floor rests on or is in contact with any combustible material, then the fire-resistive floor layer shall be at least 5 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; the horizontal area of the air spaces shall equal at least one-half the horizontal area of the slab.

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(2) The air spaces may be secured by using hollow tile placed end to end, or by embedding wrought or sheet iron pipes in a layer of concrete. The air spaces should parallel the short dimension of the slab.

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

(4) All stoves and ranges using solid or liquid fuel and which are 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 ranges, domestic hot water heaters and hot plates shall be supported at least 6 inches above any wood floor or other combustible material and, if less than 12 inches above the floor, the wood shall be protected by a metal shield, or such equipment may rest on a masonry support.

(a) The above dimension of 6 inches may be reduced to 3½ inches if the bottom is suitably protected with a metal shield.

Ind 52.17 Wall and ceiling protection. (1) All stoves and ranges used for cooking or laundry purposes and all domestic hot water heaters shall be placed at least 24 inches away from any combustible wall, partition or ceiling, except that such distance may be reduced to 12 inches if the wall, partition or ceiling is protected with at least ¼ inch asbestos board covered with sheet metal, or with an equivalent protection.

(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.

Ind 52.18 Gas vents. All gas ranges, except those for domestic use, hot water heaters, and other gas fired equipment shall be provided with vent pipes conforming to the requirements for smoke pipes as specified in Wis. Adm. Code section Ind 52.12.

Ind 52.19 Gas and oil lamps. (1) Gas and oil lamps shall not be used where electricity is available, except within living units of apartment buildings.

(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.

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(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.

History: 1-2-56; am. (1), Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 52.20 Electrical work.** All electrical work shall conform to the requirements of the Wisconsin state electrical code of the department of industry, labor and human relations.

Note: For the design requirements for transformer vaults, see chapter B 450 of the Wisconsin state electrical code.

History: 1-2-58; am. Register, January, 1961, No. 61, eff. 2-1-61.

**Ind 52.21 Location and maintenance of exits.** Every exit mentioned in Wis. Adm. Code sections Ind 51.14 to 51.19, inclusive, 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 52.22 Television and radio receiving antenna.** (1) The requirements of this section shall apply to the outdoor portion of all apparatus, more than 12 feet in height, used for receiving television or radio waves.

(2) All television and radio antenna systems, including the supporting tower or mast, shall be constructed of galvanized steel or other corrosive-resistant incombustible material. Where approved by the department of industry, labor and human relations, towers constructed of wood or wood poles set in the ground may be used to support antenna systems but no wood tower or wood pole may be mounted on the roof of any building or structure.

(3) The antenna and tower shall be designed to support the dead load of the structure plus an ice load at least 1/2 inch in radial thickness. The ice load shall be computed only upon the wires, cables, messengers and antenna.

(4) The tower or mast shall be braced or guyed and anchored to resist a horizontal wind pressure of not less than 30 pounds for every square foot (net area) of exposed surface. Guy wires shall not be anchored to a chimney or to any roof ventilator or vent pipe.

(4) Antenna systems installed on the roof of a building shall not be supported by or attached to a chimney. All such installations shall be mounted on an independent platform or base and anchored in place. The platform or base of the tower shall be large enough to distribute the weight of the structure over sufficient roof area so the roof construction will safely support the weight of the structure in addition to the required live and dead roof loads.

(5) All antenna systems shall be so installed that no part of the structure will be nearer to a street, or other public thoroughfare, than the height of the antenna as measured from its platform or base to the topmost point. No wires, cables, or guy wires shall extend over any street or other public thoroughfare or over any electric power or communication lines.

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(6) Poles used for electric power or for communication lines shall not be used for supporting or for guying any antenna system. Where antenna installations are so located that damage will be caused to adjacent power or communication lines by the falling of the antenna structure, a separate safety wire shall be attached to top of the tower and secured in a direction away from the power or communication line.

(7) Electrical installations in connection with antenna systems, including the grounding of the tower or mast, shall comply in all respects with the requirements of the Wisconsin state electrical code.

GENERAL SANITATION REQUIREMENTS

Ind 52.50 Toilet rooms required. (1) Every place of employment and public building shall have adequate toilet rooms as provided in the occupancy classifications of this code, completely enclosed and so arranged as to insure privacy.

(2) Separate toilet rooms shall be provided for employees and the general public where deemed necessary by the department of industry, labor and human relations or by the state board of health.

History: 1-2-56; am. Register, December, 1962, No. 34, eff. 1-1-63.

Ind 52.51 Toilet rooms for the two sexes. (1) Where the 2 sexes are accommodated, separate toilet rooms shall be provided except

(a) In apartment houses;

(b) If approved in writing by the department of industry, labor and human relations or the state board of health, or their authorized agents, in buildings accommodating not more than 5 persons of both sexes, provided the door of such toilet room is kept locked and the key is kept in a place accessible to all such persons. But whenever the number of such persons shall exceed 5, separate toilet rooms shall be provided.

(2) Entrances to toilet rooms for the 2 sexes shall be properly separated, by screens or otherwise, and shall, wherever possible, be at least 20 feet apart; except this requirement does not apply where the entrance doors to toilet rooms used by the 2 sexes are located in an exterior wall of the building.

Ind 52.52 Sex designated. Wherever women are employed or accommodated, each toilet room shall be distinctly marked with regard to the sex which uses it, and no person shall be allowed to use a toilet room assigned to the other sex, except as provided in section Ind 52.51. The door or room labels shall be the words MEN, or WOMEN, respectively, in letters not less than one inch in height.

History: 1-2-56; am. Register, September, 1973, No. 213, eff. 10-1-73.

Ind 52.53 Location, light and ventilation. (1) Every toilet or bathroom shall be so located as to open to outside light and air, by windows or skylights opening directly upon a street, alley or court, except as provided in Wis. Adm. Code section Ind 52.54.

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(2) The glass area for a toilet room containing one water closet or urinal shall be at least 4 square feet with at least 2 square feet openable.

(a) Bathrooms containing a water closet or urinal shall be considered as a toilet room.

(3) No toilet room shall have windows or ventilator openings in any elevator shaft or inner court that has windows of habitable rooms above.

(4) Every toilet room having more than one fixture (closets and urinals) shall be ventilated in accordance with the provisions of Wis. Adm. Code section Ind. 59.48 of the building and heating, ventilating and air conditioning Code issued by the department of industry, labor and human relations, except that this requirement shall not apply to chemical or septic toilets which are installed in accordance with the provisions of the chemical toilet code or the septic toilet code issued by the state board of health.

(a) The size of gravity vent ducts, if surmounted with effective siphon type hoods, may be determined as follows:  $\frac{A \times 2}{300} = \text{net cross sectional area of vent duct in square feet.}$

Where A = floor area in the toilet room in square feet.

History: 1-2-56; am. Register, December, 1962, No. 24, eff. 1-1-63; r. and rec. Register, October, 1967, No. 142, eff. 11-1-67; am. (3), Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 52.54 Location without outside windows; when permitted.** Toilet rooms will be permitted without windows if they are ventilated in accordance with the requirements of Wis. Adm. Code section Ind 59.48 of the building and heating, ventilating and air conditioning code issued by the department of industry, labor and human relations.

History: 1-2-56; r. and rec. Register, October, 1967, No. 142, eff. 11-1-67.

**Ind 52.55 Artificial light.** Every toilet room, except those within living units, shall be artificially lighted during the entire period that the building is occupied, wherever and whenever adequate natural light is not available, so that all parts of the room, especially the toilet compartments, shall be provided with artificial light intensity of not less than 2.5 footcandles at the floor level.

History: 1-2-56; am. Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 52.56 Size.** Every toilet room shall have at least 14 square feet of floor area with a minimum width of 3 feet, and at least 100 cubic feet of air space for each water-closet and each urinal in addition to the space required for lavatories if installed within the toilet room.

**Ind 52.57 Floor and base.** Every toilet room, except those within living units of apartment buildings, shall have the entire floor and the side walls to a height of not less than 6 inches made waterproof with ceramic tile, terrazzo, painted concrete, marble, slate, monolithic asphalt or other approved material impervious to water.

History: 1-2-56; am. Register, September, 1973, No. 213, eff. 10-1-73.

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**Ind 52.58 Walls and ceilings.** (1) The walls and ceilings of every toilet room shall be completely covered with smooth plaster, galvanized or enameled metal, gypsum wallboard  $\frac{1}{2}$  inch in thickness with taped joints, or constructed of brick, tile or other masonry units with flush joints or other equivalent smooth, non-absorbent material. Wood may be used only if it is smooth and well covered with 2 coats of body paint and one coat of enamel paint or spar varnish. Wood shall not be used for partitions between toilet rooms nor for partitions which separate a toilet room from any room used by the opposite sex. All such partitions shall be made soundproof. This is not intended to prohibit the use of wood stud partitions between rooms if partitions are lathed and plastered on both sides.

(2) The interior surface of walls and partitions shall be of light color to improve illumination and facilitate cleaning.

History: 1-2-56; r. and rec. Register, September, 1953, No. 45, eff. 10-1-59.

**Ind 52.59 Enclosure of fixtures.** (1) The fixtures (closets and urinals) in every toilet room shall be arranged to secure privacy in use. Water-closets shall be enclosed with partitions. Urinals shall be placed against walls and arranged individually. Individual floor type urinals shall be placed not less than 24 inches center to center and the space between urinals shall be filled flush with the front and top with non-absorbent material. *Exception:*

(a) The above requirements need not apply to toilet rooms accommodating only a single closet or urinal.

(2) A space of 6 to 12 inches shall be left between the floor and the bottom of each partition. The top of the partition shall be from  $5\frac{1}{2}$  to 6 feet above the floor. Doors with the top  $5\frac{1}{2}$  to 6 feet above the floor, and the bottom 6 to 12 inches above the floor, shall be provided for all water-closet compartments. All partitions and doors shall be of material and finish required for walls and ceilings under Wis. Adm. Code section Ind 52.58.

(3) The water-closet compartments in toilet rooms shall be not less than 30 inches in width, and shall be not less than 54 inches in depth with a clearance of not less than 24 inches between the fixture and the compartment door when closed except as specified in subsection (4). Compartment doors which are hung to swing inward shall clear the fixture not less than 2 inches.

Note: Section 146.056, Wis. Stats., provides that not more than 50% of the toilet compartments of any public toilet room of any public building, other than licensed hotels and resorts, shall be kept locked.

(4) Water-closet compartments for physically handicapped persons.

(a) One toilet room for each sex in every public building or place of employment except those exempted in section Ind 51.15 (7) (j) shall have at least one water-closet compartment that is not less than 36 inches in width and at least 54 inches in depth.

(b) The door shall be not less than 32 inches in width and shall be hung to swing outward.

(c) A grab bar or handrail 33 inches high and parallel to the floor shall be provided on each side of the compartment.

History: 1-2-56; am. (3) and or. (4), Register, November, 1962, No. 35, eff. 12-1-63.

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**Ind 52.60 Fixtures.** (1) Only individual water closets of porcelain or vitreous china shall be used. Water closet seats shall be of wood or other non-heat absorbing material, and shall have a finished surface that is impervious to water or cleaning agents. In public buildings, places of employment, and all other public places except within living units of apartment, hotel and motel buildings, the water closets shall have elongated bowls. All water closets except within living units of apartment buildings shall have open front seats without cover.

(2) Only individual urinals of porcelain, vitreous china, or stainless steel shall be used. Such urinals shall be set into the floor, the floor graded to the urinal and the urinals shall be equipped with an effective automatic or foot operated flushing device.

*History: 1-2-66: r. and Recr. Register, September, 1963, No. 41, eff. 10-1-66; am. (1), Register, September, 1973, No. 213, eff. 10-1-73.*

**Ind 52.51 Protection from freezing.** All water-closets and urinals and the pipes connecting therewith shall be properly protected against freezing, so that such water-closets and urinals will be in proper condition for use at all times.

**Ind 52.63 Disposal of sewage.** (1) Each water-closet and urinal, and each lavatory or slop sink, located in a toilet room shall be connected with a sewer and water system, where such systems are available. In locations where a sewer system is not available, or cannot be made available, the disposal of human waste may be accomplished as follows:

(a) Sewage treatment tank and disposal system.

*Note: For detailed requirements on such systems see state plumbing code.*

(b) Where the local conditions make it impractical to install such system, outdoor toilets, as described in Wis. Adm. Code section Ind 52.63, or other facilities, such as septic toilets installed in accordance with the provisions of the septic toilet code issued by the state board of health, may be used; provided that in the case of places of employment for more than 10 persons, schools larger than 2 rooms, and apartment houses, water-flush toilets as herein described shall be provided, unless outdoor toilets or other facilities are permitted in writing by the department of industry, labor and human relations or the state board of health. In every case where chemical or septic toilets are installed, the approval of plans and specifications therefor by the state board of health shall be secured before work is started.

**Ind 52.68 Outdoor toilets.** (1) Outdoor toilets shall comply with Wis. Adm. Code sections Ind 52.50 to Ind 52.59, inclusive, and in addition:

(a) No privy, with or without a leaching pit or other container, shall be erected or maintained within 50 feet of any well, 10 feet of the line of any street or other public thoroughfare, 5 feet of the property line between premises or 25 feet of the door or window of any building.

(b) Located on ground that is well drained, and where there is no possibility of contaminating any drinking water supply.

(c) Provided with suitable approach, such as concrete, gravel or cinder walk.

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- (d) The foundations shall be of concrete or other masonry.
- (e) The vault shall extend at least 6 inches above ground, be as dark as possible, and be proof against entrance by flies, rats, or other vermin. The upper portion shall be of concrete, or of brick or stone laid in cement mortar. If in poorly drained soil, the entire vault shall be of concrete, or brick, or stone, laid in cement mortar.
- (f) All windows, ventilators and other openings shall be screened to prevent the entrance of flies, and all doors shall be self-closing. A separate ventilator shall be provided for the vault and shall extend from the vault to not less than one foot above the roof and be provided with an effective ventilating hood.
- (g) The entire installation shall be kept clean and sanitary. Milk of lime (freshly slaked lime) or other equally effective disinfectant shall be used in the vault and in the urinal trough in sufficient quantities, and at frequent intervals. The floors, seats and urinals shall be scrubbed as often as necessary. The vault shall be cleaned out at proper intervals.

*Note:* See the Wisconsin code for rural school privies issued by the state board of health.

Ind 52.64 Maintenance and housekeeping. (1) **MAINTENANCE OF TOILETS.** Every toilet room, and every part thereof, including walls, floor, ceiling and fixture therein, shall be kept clean, efficient, and in good repair.

(2) **PAPER.** In every toilet room, sufficient toilet paper made of material which will not interfere with the operation of the system or obstruct the fixtures, shall be provided.

(3) **DEFACEMENT.** Indecent or suggestive marks, pictures, or words are forbidden in toilet rooms, and such defacement when found shall be removed at once.

(4) **SERVICE CLOSETS.** In buildings having 5 or more fixtures (water closets and/or urinals) a service closet shall be provided conforming with the requirements for toilet rooms.

(a) The service closet shall be supplied with mop, broom, bucket, soap, toilet paper, towel and other equipment for sanitary upkeep of toilet rooms.

*History:* 1-2-56; r. and recn. (4), Register, October, 1967, No. 142, eff. 11-1-67.

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## Chapter Ind 54

### FACTORIES, OFFICE AND MERCANTILE BUILDINGS

|            |                                         |           |                                    |
|------------|-----------------------------------------|-----------|------------------------------------|
| Ind 54.001 | Scope                                   | Ind 54.10 | Trap doors and floor openings      |
| Ind 54.01  | Construction, height and allowable area | Ind 54.11 | Lighting                           |
| Ind 54.02  | Number and location of exits            | Ind 54.12 | Sanitary equipment                 |
| Ind 54.03  | Type of exits                           | Ind 54.13 | Isolation of hazards               |
| Ind 54.04  | Total width                             | Ind 54.14 | Standpipes and fire extinguishers  |
| Ind 54.05  | Capacity of buildings                   | Ind 54.15 | Automatic sprinklers               |
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| Ind 54.07  | Passageways                             | Ind 54.17 | Floor load signs                   |
| Ind 54.08  | Enclosure of stairways and shafts       | Ind 54.18 | Signs indicating number of persons |
| Ind 54.09  | Opening to roof                         | Ind 54.19 | No smoking signs                   |
|            |                                         | Ind 54.20 | Tents                              |

Ind 54.001 Scope. This classification includes all factories and workshops (including all places where manual labor is employed), office buildings, telegraph and telephone offices, mercantile establishments where commodities are bought or sold, taverns, warehouses, railroad stations, exhibition buildings, and places where not more than 100 persons assemble for recreation, entertainment, worship, or dining purposes.

Ind 54.01 Construction, height and allowable area. (1) Buildings in this classification shall be of the type of construction and shall not exceed the number of stories as specified in this section. The floor area of any such building shall not exceed that permitted for the corresponding type of construction and number of stories shown in table 54.01.

Notes: See section Ind 51.04 for standards of classes of construction

**TABLE 64.01**  
**ALLOWABLE FLOOR AREAS (Square Feet)**  
(Maximum gross floor area per floor)

| Class of Construction           | Building<br>Frontage<br>Street<br>Exposure | Number of Stories             |                            |                            |                            |                            |                           |                           |                           |        |
|---------------------------------|--------------------------------------------|-------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|---------------------------|---------------------------|---------------------------|--------|
|                                 |                                            | 1                             | 2                          | 3                          | 4                          | 5                          | 6                         | 7                         | 8                         | Over 8 |
| 1. Fire-Resistive Type A.....   | 1<br>2<br>3                                | NO RESTRICTION                |                            |                            |                            |                            |                           |                           |                           |        |
| 2. Fire-Resistive Type B.....   | 1<br>2<br>3                                | N.F. RE-<br>STRICTED<br>TYPEN | 20,000<br>25,000<br>31,000 | 17,130<br>22,000<br>27,000 | 14,000<br>18,500<br>23,000 | 11,500<br>15,500<br>20,000 | 9,000<br>13,000<br>17,000 | 7,000<br>11,000<br>15,000 | 6,000<br>10,000<br>14,000 | N.P.   |
| 3. Metal Frame Protected.....   | 1<br>2<br>3                                | 21,000<br>26,500<br>32,000    | 18,000<br>23,000<br>28,000 | 15,000<br>19,500<br>24,000 | 12,000<br>16,000<br>20,000 | N.P.                       |                           |                           |                           |        |
| 4. Heavy Timber.....            | 1<br>2<br>3                                | 17,000<br>22,000<br>27,000    | 14,000<br>19,000<br>24,000 | 11,000<br>16,000<br>21,000 | 9,000<br>13,500<br>18,000  | N.P.                       |                           |                           |                           |        |
| 5. Exterior Masonry.....        | 1<br>2<br>3                                | 14,000<br>18,000<br>22,000    | 11,500<br>15,000<br>19,000 | 9,000<br>12,500<br>16,000  | 7,000<br>10,000<br>13,000  | N.P.                       |                           |                           |                           |        |
| 6. Metal Frame Unprotected..... | 1<br>2<br>3                                | 14,000<br>18,000<br>22,000    | 11,500<br>15,000<br>19,000 | 9,000<br>12,500<br>16,000  | N.P.                       |                            |                           |                           |                           |        |
| 7. Wood Frame Protected.....    | 1<br>2<br>3                                | 12,500<br>16,000<br>20,000    | 7,500<br>10,000<br>12,000  | N.P.                       |                            |                            |                           |                           |                           |        |
| 8. Wood Frame Unprotected.....  | 1<br>2<br>3                                | 10,000<br>12,000<br>14,000    | 5,000<br>6,000<br>7,000    | N.P.                       |                            |                            |                           |                           |                           |        |

Note: N.P. means "not permitted."

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(2) ALLOWABLE INCREASE OF FLOOR AREAS. (a) When the entire building is protected by an approved automatic sprinkler system, the areas in Table 54.01 may be increased by 150% for one-story buildings and 75% for buildings of more than one story. (See example below.)

(b) There shall be no area restriction in one-story buildings satisfying one of the following conditions:

1. Construction meets the requirements for Type No. 3 or Type No. 4 and is protected by an approved automatic sprinkler system.

2. Construction meets the requirements for Type No. 5 or 6 of totally noncombustible construction and is protected by an approved automatic sprinkler system.

3. Construction of floors, walls, roof and structural framing is of noncombustible material and the contents of building are noncombustible.

(c) Buildings with no area limitations shall have a continuous all-weather, hard-surfaced area 50 feet or more in width for a distance of at least 50% of the perimeter of the building. The said hard-surfaced area shall be located so as to provide an unobstructed space for a distance of not more than 50 feet from the building.

NOTE 1: See section Ind 51.23 for approved automatic sprinkler system.

NOTE 2: Example:

|                        | (from<br>table 54.01) | (if sprinklered)        | (total<br>allowable) |
|------------------------|-----------------------|-------------------------|----------------------|
| 1. One story           | 10,000 sq. ft.        | $+ (1.5 \times 10,000)$ | $= 25,000$ sq. ft.   |
| 2. Two or more stories | 10,000 sq. ft.        | $+ (.75 \times 10,000)$ | $= 17,500$ sq. ft.   |

(3) No building shall be limited in area when divided into sections which do not exceed the maximum areas tabulated in this section by fire division walls. Such fire division walls shall be as specified in section Ind 51.02 (13). All openings in such walls shall be protected by fire-resistive doors as specified in section Ind 51.017. Such doors may normally remain open if held in that position by fusible links.

History: 1-2-56; am. (2) and (3), Register, September, 1959, No. 46, eff. 10-1-59; am. (3), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (3) eff. 8-1-71 and exp. 1-1-72; cr. (3) eff. 1-1-72, Register, July, 1971, No. 187; r. and rec. (1) and (2), Register, June, 1972, No. 194, eff. 1-1-73; r. and rec. (2) and (3), Register, September, 1973, No. 213, eff. 10-1-73.

Ind 54.02 Number and location of exits. (1) Every building and every floor level thereof shall have at least 2 exits. One exit will be allowed in the following exceptions:

(a) Floor levels used entirely for storage in buildings 2 stories or less in height and not over 3,000 square feet gross area per floor.

(b) Interior balconies or mezzanine floors not over 3,000 square feet gross area used entirely for storage.

(c) Office areas (suites) having a floor area of not more than 1,800 square feet net area, provided that there are 2 directions for exiting from the suite entrance door.

(d) Retail establishments not over 750 square feet net area, provided that there are 2 directions for exiting from the store entrance door.

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(2) Additional exits shall be provided so that no part of any factory or mercantile building having contents which are liable to burn with extreme rapidity or from which poisonous fumes may be liberated or explosions occur in case of fire, will be more than 75 feet distant from an exit. In other buildings in this classification this distance may be increased to 100 feet and where approved sprinklers are provided throughout the building, a further increase to 150 feet will be permitted. All of the above distances are to be measured along public passageways and aisles.

(3) Exits in all buildings of this classification shall be so located and distributed so as to afford the best possible egress.

History: 1-2-54; cr. (1) (c), Register, September, 1959, No. 45, eff. 10-1-59; am. (1) (b), Register, February, 1971, No. 182, eff. 2-1-71; r. and recr. (1) (b) eff. 8-1-71 and am. 1-1-72, and cr. (1) (b) eff. 1-1-72, Register, July, 1971, No. 187; am. (1), Register, September, 1973, No. 213, eff. 10-1-73.

Ind 54.03 Type of exits. (1) At least one-half of the exits above required shall be stairways as specified in sections Ind 51.16-51.18. The other exits shall be either stairways or horizontal exits as specified in section Ind 51.19, or fire escapes as specified in section Ind 51.20. No fire escape, however, will be accepted as a required exit on any building more than 6 stories or 55 feet in height. In a 2 story building, an outside wooden stairway may be used as an exit.

(2) Every building which will accommodate more than 50 persons above the second story shall have at least 2 stairways.

(3) Wherever stairways are required under this classification, ramps with a slope not greater than one foot in 6 feet may be substituted. Ramps shall comply with all the requirements for stairways as to construction, enclosures, width, landing and lighting, and shall be surfaced with an approved non-slip material. Handrails shall not be required where the slope of the ramp is less than one foot in 10 feet.

Ind 54.04 Total width. (1) In a building not provided with horizontal exits, the total width of a stairway shall be not less than the following:

(a) In Type No. 5 through No. 8 buildings, 60 inches per 100 persons; if sprinklered, 40 inches per 100 persons.

(b) In Type No. 1 through No. 4 buildings:

|                                                    | Type<br>No. 1 & 2<br>Sprink-<br>lered | Type<br>No. 1 & 2<br>Not<br>Sprink-<br>lered | Type<br>No. 3 & 4<br>Sprink-<br>lered | Type<br>No. 3 & 4<br>Not<br>Sprink-<br>lered |                                               |
|----------------------------------------------------|---------------------------------------|----------------------------------------------|---------------------------------------|----------------------------------------------|-----------------------------------------------|
| Plus.....                                          | 30                                    | 60                                           | 40                                    | 80                                           | In. per 100 persons on 2nd floor              |
| Plus.....                                          | 15                                    | 25                                           | 20                                    | 40                                           | In. per 100 persons on 3rd floor              |
| Plus.....                                          | 12                                    | 20                                           | 16                                    | 32                                           | In. per 100 persons on 4th floor              |
| Plus.....                                          | 9                                     | 15                                           |                                       |                                              | In. per 100 persons on 5th floor              |
| Plus.....                                          | 6                                     | 10                                           |                                       |                                              | In. per 100 persons on 6th floor              |
| Plus.....                                          | 3                                     | 5                                            |                                       |                                              | In. per 100 persons on 7th floor              |
| Plus.....                                          | 0                                     | 0                                            |                                       |                                              | In. per 100 persons on 8th floor<br>and above |
| but in no case shall such total width be less than |                                       |                                              |                                       |                                              |                                               |
|                                                    | 80                                    | 50                                           |                                       |                                              | In. per 100 persons on any one<br>floor.      |

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(2) Standard fire escapes (section Ind 51.20) may be substituted for stairways to the extent of not more than  $\frac{1}{4}$  of the required total width, subject to the provision of section Ind 54.02.

(3) If horizontal exits (section Ind 51.19), are provided for any floor, the number of persons accommodated on such floor may be increased at the rate of 100 persons for each 40 inches of width of such exits, provided such increase shall not exceed 100% of the number of persons accommodated by the stairways.

**Example:** As examples of calculations under this section where the same number of persons are to be accommodated on each floor, the following table shows the number accommodated by 2 stairways of minimum width (each 44 inches wide):

(a) Type No. 5 through No. 8 buildings, 147 persons total, above first story; if sprinklered, 220 persons.

(b) Type No. 1 through No. 4 buildings:

| Height of Building    | Type No. 1 & 2<br>Not<br>Sprinklered | Type No. 3 & 4<br>Not<br>Sprinklered | Type No. 5 & 6<br>Not<br>Sprinklered | Type No. 7 & 8<br>Not<br>Sprinklered |                       |
|-----------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|-----------------------|
| 2 stories.....        | 203                                  | 175                                  | 220                                  | 147                                  | Persons on each floor |
| 3 stories.....        | 187                                  | 157                                  | 197                                  | 133                                  | Persons on each floor |
| 4 stories.....        | 164                                  | 92                                   | 110                                  | 77                                   | Persons on each floor |
| 5 stories.....        | 133                                  | 80                                   |                                      |                                      | Persons on each floor |
| 6 stories.....        | 123                                  | 78                                   |                                      |                                      | Persons on each floor |
| More than 6 stories.. | 117                                  | 70                                   |                                      |                                      | Persons on each floor |

(4) Where one minimum stairway and one "A" fire escape are provided, take  $\frac{1}{2}$  of the above numbers; subject to the limitations of section Ind 54.02.

**History:** 1-2-50; am. (1) (a) and (b) and (3) (a) and (b), Register, June, 1972, No. 198, eff. 1-1-73.

**Ind 54.05 Capacity of buildings.** (1) In calculating the aggregate width of exits, the capacity of the buildings shall be established as follows:

|                                             |                       |
|---------------------------------------------|-----------------------|
| (a) Stores, first floor and basement .....  | 30 sq. ft. per person |
| (b) Stores, second floor and above .....    | 60 " " " "            |
| (c) Dining rooms, cafes, taverns, etc. .... | 10 " " " "            |
| (d) Places of seated assemblage .....       | 7 " " " "             |
| (e) Warehouses .....                        | 300 " " " "           |
| (f) Factories and offices .....             | 75 " " " "            |

(2) The above figures are based on the net area of each occupied space. Where dining rooms, cafes, dance halls and places of seated assemblage accommodate more than 100 persons, see section Ind 55.01.

(3) In other occupancies not specified above, the capacity shall be determined by the actual number of persons liable to be accommodated therein and no greater number of persons will be permitted therein.

**Ind 54.06 Exit doors.** (1) Every door which serves as an exit from a room accommodating more than 10 persons, or which is an exit from a public passageway or stairway shall be a standard exit door

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as specified in section Ind 51.15, except that such exit door need not swing outward if it accommodates less than 25 persons, is not located at the foot of a stairway, or is not more than 4 risers above the outside grade.

(2) Every exit doorway from each floor, other than the principal entrance on the first floor, shall be indicated by an approved illuminated sign over the door bearing the word EXIT or OUT in plain letters not less than 6 inches in height.

**Ind 54.07 Passageways.** Where there is not direct access to outside exit doors, safe and continuous passageways, aisles or corridors leading directly to every exit shall be maintained at all times on all floors of all buildings. Every passageway, aisle or corridor shall conform in width to the rule for width of stairways as specified in section Ind 54.04. Widths shall be measured in the clear, at their narrowest points produced by any projection, radiator, pipe or other object and the required width shall be maintained clear and unobstructed at all times.

**Ind 54.08 Enclosure of stairways and shafts.** (1) All stairways including landings, ramps and elevator shafts, shall be enclosed as shown in table 51.03-A.

(2) All doors opening into such enclosures shall be as specified in section Ind 51.047, and all windows shall be of wired glass and metal frames and sash.

(3) **Exception:** Monumental stairs leading from the street floor to the second floor or to a basement used for commercial purposes need not be enclosed, provided they are effectively cut off at the second floor (and basement) by partitions having fire-resistance as specified above.

**Note: Elevators and Elevator Enclosures:** For requirements governing the installation and operation of elevators, and the construction and protection of elevator shaftways, see the elevator code issued by the department of industry, labor and human relations, which code applies to all public buildings and places of employment.

**History:** 1-2-56; am. (1) (a), (b), (c), (d) and (2), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (1) (a), (b), (c), (d) and (2) eff. 8-1-71 and exp. 1-1-72; cr. (1) (a), (b), (c), (d) and (2) eff. 1-1-72, Register, July, 1971, No. 187; r. and rec. (1), Register, June, 1972, No. 196, eff. 1-1-73.

**Ind 54.09 Opening to roof.** Every building, or section of a building, 2 stories or more in height shall have a permanent means of access to the roof from the inside. Where such access consists of a scuttle in the roof, the opening shall be not less than 20 by 30 inches and there shall be a permanent ladder or stairway leading thereto.

**Ind 54.10 Trap doors and floor openings.** Every opening through any floor or through any roof used by the public or by employees shall be guarded by a substantial enclosure or rail not less than 3 feet 6 inches high. Floor openings in buildings of more than 2 stories, unless enclosed with fire-resistive enclosures as specified in section Ind 54.08 shall be protected by fire-resistive doors as specified in section Ind 51.047.

**History:** 1-2-56; am. Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. eff. 8-1-71 and exp. 1-1-72; cr. eff. 1-1-72, Register, July, 1971, No. 187.

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**Ind 54.11 Lighting.** (1) All stairways, fire escapes and exits and the passageways leading thereto when used at night shall be properly illuminated to facilitate egress. The intensity of illumination shall be not less than 2.5 foot candles.

(2) All gas jets or gas lights in factories or workshops where combustible material is used, shall be properly enclosed by globes or wire cages, or otherwise properly guarded.

**Ind 54.12 Sanitary equipment.** (1) Toilet facilities shall be provided and maintained in connection with every public building and place of employment under this classification.

(2) In all public buildings under this classification, separate toilet rooms shall be provided for males and females, except as in section Ind 52.51 and as otherwise provided hereunder.

(3) In public places where stimulating drinks, such as beer, wines and other alcoholic beverages, are served for consumption on the premises, except in dining rooms, restaurants and similar places where the serving of drinks is only incidental to the regular food service, and where no public bar is provided, toilet fixtures shall be provided in connection with the area served, for the sex (or sexes) served, as follows:

(a) One water-closet for every 40 females, or fraction thereof;

(b) One water-closet for every 75 males, or fraction thereof, and

(4) Where there are more than 25 males accommodated there shall be one urinal for every 50 males, or fraction thereof, in excess of 25.

(5) The numbers indicated above refer to the number of persons that can be accommodated at the same time and shall be determined on the basis specified in section Ind 54.05.

(6) In toilet rooms used by males, all water-closets shall have an elongated bowl and open front seat without cover. All urinals shall be of the type of construction specified in section Ind 52.60. Where a urinal is not provided, the water-closet shall have an elongated bowl with self-rising seat. In toilet rooms used by females, all water-closets shall have an elongated bowl and open front seats without cover.

(7) In public occupancies other than those where stimulating drinks (as defined above) are served for consumption on the premises, one water-closet of the type described above shall be provided in connection therewith for each sex accommodated. Except that a small mercantile establishment where normally not more than 25 patrons are expected to be on the premises at the same time, need have in connection therewith only one toilet room to accommodate both the public and employees.

(a) *Toilets in places of employment.* See section Ind 22.03 of the general orders on sanitation following this section.

(b) *General requirements.* For general toilet room requirements in regard to location, construction, ventilation, fixtures, etc., see sections Ind 52.50 to Ind 52.64, inclusive.

(8) Where toilet rooms used by males and females adjoin, the walls between such toilet rooms, if of studding with lath and plaster, the lath shall be of metal.

(9) **DRINKING WATER.** Sufficient pure drinking water piped from mains, or in sanitary containers, shall be provided in connection with every public building under this classification. Drinking fountains separate from other fixtures and constructed as provided in the state plumbing code, or individual drinking cups of a type approved by the state board of health, shall be provided, except in places where food or drink is served and in public buildings where normally not more than 25 patrons are expected to be on the premises at the same time. Drinking fountains shall not be placed in toilet rooms.

(a) For drinking water requirements in places of employment see section Ind 22.17 of the general orders on sanitation following this section. See also section 146.07, Wis. Stats., which prohibits the use of common drinking cups.

(10) **WASHING FACILITIES.** In every public building and in every place of employment, except as provided in section Ind 22.13, wash bowls shall be provided in connection with toilet rooms, one for every 2 water-closets or urinals, or fraction. Clean individual cloth or paper towels and soap shall be provided in connection with every lavatory installation. The installation of a towel for common use, or the use of any common towel is not permissible.

See also sections Ind 22.13 to Ind 22.15, inclusive.

History: 1-2-55; am. (3) (a) and (b) and (c), Register, September, 1955, No. 45, eff. 10-1-55.

Note: The following sections, Ind 22.03, Ind 22.13, Ind 22.14, Ind 22.15, Ind 22.17, and Ind 22.18 are taken from the general orders on sanitation issued by the department of industry, labor and human relations. For further requirements on sanitation, see that publication.

Ind 22.03 Number of closets and urinals. (1) In every place of employment, whether heretofore or hereafter constructed, one water-closet shall be provided for every 20 persons, or fraction thereof, of either sex. (2) In addition thereto, where more than 10 males are employed, one urinal shall be provided for every 40 males, or fraction thereof. Where not more than 10 males are employed, either a urinal shall be provided or the water-closet shall have an elongated bowl and self-rising seat.

(3) The requirements in subsections (1) and (2) shall be computed on the basis of the maximum number of employees on any one shift.

(4) In all new installations, only individual urinals shall be used. Such individual urinals shall be of porcelain, vitreous china, or stainless steel, set into the floor, the floor graded to the urinal, and shall be equipped with an effective automatic tank or valve or a satisfactory foot operating flushing device.

(5) All water-closets hereafter installed shall be of the individual type having elongated bowls and open front seats.

Ind 22.13 Lavatories: location. Washing facilities shall be provided in or adjacent to every toilet room. In new installations, there shall be at least one lavatory for every 5 fixtures (closets and urinals), or fraction.

Cross reference—See section Ind 22.14 for additional requirements for places of employment.

See section Ind 22.14 on material from which lavatories shall be made and for allowable types of installations.

Note: One lavatory for every 2 or 3 fixtures is recommended.

Ind 22.14 Washing facilities for places of industrial employment. (1) **LAVATORIES.** (a) There shall be at least one lavatory supplied with hot and cold water provided for every 10 employees or fraction in the following places of employment:

1. In all places of employment where lead, arsenic or other poisonous or injurious materials are handled by the employees.

2. In all places of employment where food is prepared or manufactured.

3. In all other places of employment where the employees' hands become dirty or greasy.

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Ind 22.16 Wash rooms shall be constructed according to the requirements for toilet rooms.

(c) Twenty inches of trough wash sink, or of the edge of a circular wash fountain shall be considered the equivalent of one lavatory. The trough wash sink or circular wash fountain shall not be equipped with a plug or other stopper. Each lavatory and each 20 inches of trough wash sink shall be equipped with either a faucet or spray pipe, so connected as to supply water of the desired temperature.

(d) All lavatories shall be made of porcelain, enameled iron, or other similar impervious material.

(5) Showers. Shower facilities shall be provided in accordance with the following requirements:

(a) In places of employment where poisonous or irritating materials which penetrate the clothing are handled at least one shower shall be provided for every 10 employees or fraction who handle or come in contact with such materials.

(b) In glass factories, tanneries, foundries, mines, and other places of employment where materials which penetrate the clothing are handled at least one shower for every 20 such employees, or fraction, shall be provided.

(c) Showers shall be provided with hot and cold water and be equipped with a hot and cold regulating valve. The regulating device or valve shall be plainly marked and shall be so located that the valve can be operated without standing under the shower. Supply or feed pipes to showers shall be placed overhead or protected to avoid the possibility of a person coming in contact with the hot water pipes.

(d) Each shower room or compartment shall be constructed of material impervious to moisture, and the floor under each shower head shall be of such construction, or be provided with a suitable sanitary device, so as to prevent slipping.

(3) Soap. For all hand washing facilities in places of employment, an adequate quantity of bland, non-irritating, non-abrasive soap which shall effectively cleanse the skin shall be provided.

Ind 22.15 Towels. (1) Where washing facilities are required, the following conditions shall be satisfied:

(a) The use of towels in common is prohibited.

(b) The employer shall furnish at least one of the following:

1. Individual cloth towels.

2. Magazine type roll cloth towels.

3. Paper towels.

4. Approved electric hand dryers with a swivel nozzle provided at the ratio of at least one dryer for every 3 lavatories.

Note: The department will accept the qualified dryers listed by Underwriters' Laboratories.

History: 1-2-56; r. and rec. Register, April, 1973, No. 208, eff. 5-1-73.

Ind 22.17 Drinking water. (1) Every place of employment shall be supplied with sufficient pure drinking water and the faucets or outlets for the same shall be placed convenient to the employees, but not in toilet rooms. Common drinking cups are prohibited. Sanitary drinking fountains shall be installed or individual cups shall be provided by the employers.

Cross reference--See the state plumbing code for required construction of sanitary drinking fountains.

(2) Where running water is not available, a covered drinking water container equipped with a faucet or bubbler shall be provided. The container shall be cleaned and sterilized at frequent intervals and kept in a sanitary condition and in good repair.

Ind 22.18 Rest rooms. (1) A rest room shall be provided at the principal place of business (owned, leased, or rented), where 5 or more persons are employed.

(2) Rest rooms shall be furnished with a cot or couch, and shall be lighted, heated and ventilated in accordance with the applicable standards published in Wisconsin administrative codes.

(3) A toilet room shall not, under this rule, be construed to be nor may it serve as a rest room. A first aid room may serve as a rest room.

History: 1-2-56; r. and rec. Register, August, 1967, No. 140, eff. 2-1-67.

Ind 24.13 Isolation of hazards. (1) All heating boilers and furnaces, power boilers, fuel rooms, storage vaults for paints, oils, and similar combustibles and other similar hazards in a building shall be isolated

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from the rest of the building by at least a 2-hour fire-resistive enclosure as specified in section Ind 51.04; except that in buildings not more than 2 stories in height and having a floor area of not more than 3,000 square feet per floor, a 1-hour fire-resistive enclosure as specified in section Ind 51.04, or better, shall be provided.

(2) All openings shall be protected with self-closing fire-resistive doors as specified in section Ind 51.047.

(3) Space heaters, suspended furnaces, and direct-fired unit heaters, fired with various fuels, may be used without an enclosure where approved by the department of industry, labor and human relations. Where suspended furnaces and direct fired unit heaters are used without an enclosure, all such units shall be located at least 7 feet above the floor.

History: 1-2-56; am. (1) and (2), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (1) and (2) eff. 5-1-71, and exp. 1-1-72; cr. (1) and (2) eff. 1-1-72, Register, July, 1971, No. 167.

Ind 54.14 Standpipes and fire extinguishers. (1) For exterior standpipes see section Ind 51.21.

(2) Standard interior first aid standpipes, as specified in section Ind 51.21 shall be provided in all buildings of more than 2 stories and more than 8000 square feet undivided floor area, where flammable material or any other hazardous condition is present, unless an approved automatic sprinkler system is provided.

(3) Wherever water supply of sufficient pressure is not available, 2 standard fire extinguishers as specified in section Ind 51.22 shall be provided on each floor in place of each required interior standpipe.

Ind 54.15 Automatic sprinklers. (1) A complete automatic sprinkler system, as specified in section Ind 51.23, shall be provided in every building of this classification where more than 50 persons are employed or accommodated above the third story except as provided below:

(a) Office buildings.

(b) In 3 story buildings other than office buildings with more than 50 persons on the third floor, only basements and sub-basements must be sprinklered.

(c) An office building in which one or more floors are used for mercantile purposes, only the mercantile portion must be sprinklered.

(d) Buildings of Type No. 1 and No. 2 construction whose contents are not readily combustible.

History: 1-2-56; r. and rec., Register, December, 1970, No. 180, eff. 1-1-71; am. (1) (d), Register, June, 1972, No. 198, eff. 1-1-73.

Ind 54.16 Fire alarm. A fire alarm system complying with section Ind 51.24 shall be provided in every factory or workshop where more than 10 persons are employed above the second story except buildings which are provided with a complete automatic sprinkler system and except Type No. 1 and No. 2 buildings whose contents are practically noncombustible.

History: 1-2-56; am. Register, June, 1972, No. 198, eff. 1-1-73.

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Ind 54.17 Floor load signs. (1) In every factory, workshop, warehouse, or other building where material is piled, notices of a permanent character shall be painted or otherwise prominently displayed, stating the live load in pounds per square foot which the floor is designed to carry. Such notices shall be placed in full view, on each floor.

(2) Where floors are always used for the storage of some particular material, the walls shall be marked to the height to which the material shall be piled without exceeding the safe load.

Ind 54.18 Signs indicating number of persons. In all buildings of this classification where 50 or more persons are accommodated on any floor above the second, notices shall be prominently displayed stating the maximum number of persons on each floor for whom stairways and other exits have been provided according to sections Ind 54.02-Ind 54.06. Such notices shall be placed in full view, on each floor.

Ind 54.19 No smoking signs. Smoking shall not be permitted in retail establishments where flammable materials are handled or sold. Suitable signs bearing the words "No Smoking" shall be erected in all places where such hazard exists.

Ind 54.20 Tents. All tents used for sales or storage purposes shall conform to the requirements specified for tents in sections Ind 55.58-Ind 56.63, inclusive, of this code.

History: Cr. Register, September, 1969. No. 46, eff. 10-1-69.

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## Chapter Ind 55

### THEATERS AND ASSEMBLY HALLS

|            |                                      |           |                                                   |
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| Ind 55.32  | Standpipes                           |           |                                                   |
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Ind 55.001 Theaters. In the theater classification, are included all buildings or parts of buildings, containing an assembly hall, having a stage which may be equipped with curtains or permanent or movable scenery, or which is otherwise adaptable to the showing of plays, operas, motion pictures or similar forms of entertainment.

Ind 55.01 Assembly halls. (1) In the assembly hall classification are included all buildings, or parts of buildings, other than theaters, which will accommodate more than 100 persons for entertainment, recreation, worship or dining purposes.

Note: For assembly areas in connection with schools and other places of instruction, refer to Wis. Adm. Code chapter Ind 56.

(a) Every assembly hall which will accommodate not more than 100 persons shall conform to the requirements of Wis. Adm. Code chapter Ind 54, covering factories, office and mercantile buildings.

History: 1-2-55; am. (1) (Intro. par.). Register, March, 1972, No. 195, eff. 4-1-72.

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**Ind 55.02 Class of construction.** (1) The capacities of buildings or parts of buildings in this classification for the various types of construction shall not exceed, and shall comply with, the following requirements:

#### MAXIMUM CAPACITIES

| Type of Construction | With Stages | Without Stages |
|----------------------|-------------|----------------|
| Type No. 1 and No. 2 | No limit    | No limit       |
| Type No. 3 and No. 4 | 760         | 1,500          |
| Type No. 5 and No. 6 | 500         | 1,000          |
| Type No. 7 and No. 8 | 300         | 750            |

(a) **Exception.** One-story buildings are permitted for unlimited capacities providing the following conditions are satisfied:

1. The class of construction requirements satisfy Type No. 3, 4 or 6.
2. There are no ground floors or basements.
3. The setback satisfies the requirements of Table 51.03-A for over 20 feet distance.

(2) Type No. 7 and No. 8 construction. (See Ind 51.03.) Where buildings of these classifications are erected of Type No. 7 or No. 8 construction, the following restrictions shall apply:

(a) Not more than one story in height without a balcony, and with no basement except a heating and fuel room enclosed with fire-resistive construction as specified in section Ind 55.29, with all interior openings protected with self-closing fire-resistive doors as specified in section Ind 51.047.

(b) Located at least 20 feet from any other building or adjoining property line.

(c) Is not built in connection with a building used for any other purpose.

(d) Is provided with foundation walls and piers of masonry construction.

(e) Where motion picture booths are required, they shall be enclosed with 2-hour fire-resistive construction.

**Exception:** In places of worship, a full basement and a balcony seating not more than 50 persons may be provided.

(3) Balconies accommodating more than 100. In any theater or assembly hall, balconies which accommodate more than 100 persons shall be of Type No. 1 or No. 2 construction as specified in section Ind 51.03.

**History:** 1-2-55; (1); (1) (a); (2); (2) (a); (3) (b); (2) (c); (2) (d); (2) (e); (2) (f); (3); am. Register, June, 1956, No. 8, eff. 7-1-56; am. (1) (a), Register, August, 1957, No. 20, eff. 9-1-57; am. Register, January, 1961, No. 61, eff. 2-1-61; am. (2) (a), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (2) (a) eff. 8-1-71 and exp. 1-1-72; cr. (2) (a) eff. 1-1-72; Register, July, 1971, No. 187; r. and rec. (1), am. (2) intro. par., and (3), Register, June, 1972, No. 198, eff. 1-1-73; cr. (1) (a), Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 55.03 Height above grade.** (1) **THEATERS.** The height of the sills of the principal entrance doors to any theater, as defined in section Ind 55.001, shall be not more than 18 inches above the outside grade at that point. The floor level at the highest row of seats on the main floor shall not be more than 6 feet above the outside grade at the main entrance; the floor level at the lowest row of seats on

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the main floor shall be not more than 6 feet below, or above, the grade at the nearest exit.

(2) **ASSEMBLY HALLS AND ROOF GARDENS ABOVE FIRST STORY.** Where assembly halls are provided above the first story, the following limitation of occupancy, type of construction and exit facilities shall apply:

| Type of Construction  | Maximum No. of Occupants | Height Above Grade |
|-----------------------|--------------------------|--------------------|
| Type No. 1 and No. 2  | No limit                 | See Ind 51.03†     |
| Type No. 3 thru No. 6 | 400                      | 2nd story          |
| Type No. 3 thru No. 6 | 200                      | 3rd and 4th story  |

†One smokeproof stair tower from the level of the assembly hall leading directly to the exterior at street grade shall be provided for every 750 persons capacity, or fraction thereof. These stairways shall be at least 44 inches wide and shall be in addition to other required stairways in the building.

(3) **BASEMENT ASSEMBLY HALL.** An assembly hall may be placed in the basement of a Type No. 1 or No. 2 building if the capacity does not exceed 2,500 persons, or in the basement of a building of Type No. 3 through No. 6 construction if the capacity does not exceed 400 persons.

History: 1-2-54; n. and rec. Register, September, 1958, No. 45, eff. 10-1-58; am. (2) and (3), Register, June, 1972, No. 198, eff. 1-1-73; am. (2), Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 55.04 Exposure and courts.** (1) Every theater or assembly hall which accommodates more than 600 persons shall have at least 3 walls abutting on streets, alleys, or open courts.

(2) The wall containing the main entrance to any theater or assembly hall shall abut on a street. The lobby or passageway leading from the main entrance doors to the foyer or auditorium shall be direct and unobstructed and of a minimum width equal to the sum of the widths of the main entrance doors. There shall be no openings from other occupancies to such a corridor or passageway.

(3) The width of every exit court shall be at least 6 feet for an occupancy not exceeding 500 persons, and shall be increased at the rate of one foot per each 500 persons additional. Every such court shall lead to a public thoroughfare, either directly, or through a passageway of equal width, not less than 8 feet high enclosed with unpierced 4-hour fire-resistive walls, ceiling and floor as specified in section Ind 51.04. The floor and ceiling shall be designed for a live load of not less than 150 pounds per square foot. No such court, or passageway shall be used for storage or any other purpose whatsoever.

History: 1-2-54; am. (3), Register, February, 1971, No. 182, eff. 7-1-71; n. and rec. (3), eff. 8-1-71 and exp. 1-1-72; cr. (3), eff. 1-1-72, Register, July, 1971, No. 187.

**Ind 55.05 Separation from other occupancies.** (1) Every theater and assembly hall shall be separated from any other occupancy by an absolute occupancy separation as specified in section Ind 51.08, except that a special occupancy separation as specified in section Ind 51.08 may be used between an assembly hall accommodating not more than 750 persons and any other non-hazardous occupancy. Where a special

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occupancy separation is permitted in this section, a single fire-resistive door may be used for the protection of openings.

(2) For assembly halls of unlimited capacity located on upper floors of Type No. 1 and No. 2 buildings which are served by elevators, the elevator openings may be permitted under the requirements for special occupancy separation specified in section Ind 51.08, but otherwise absolute occupancy separation is required.

(3) Where a garage which is more than 500 square feet in area, chemical laboratory or other occupancy where flammable or explosive liquids or gases are used or stored is built in connection with a building used for a theater or assembly hall, it shall be separated therefrom by means of 4-hour fire-resistive walls and unpierced 4-hour fire-resistive floors above and below as specified in section Ind 51.04. All openings in the wall to adjoining parts of the building shall be protected by means of self-closing fire-resistive doors as specified in section Ind 51.047.

*History:* 1-2-56: am. Register, January, 1951, No. 61, eff. 2-1-61; am. (31), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (3) eff. 8-1-71 and exp. 1-1-72; cr. (2) eff. 1-1-72, Register, July, 1971, No. 187; am. (2), Register, June, 1972, No. 192, eff. 1-1-73.

**Ind 55.06 Capacity.** (1) The following table includes various types of occupancy within the scope of this section, together with the method to be used in determining the capacity.

(2) No greater number of persons than the number thus established shall be permitted in any theater or assembly hall.

| Use or Occupancy                     | Basis of Capacity                                                                   |
|--------------------------------------|-------------------------------------------------------------------------------------|
| (a) Arenas and field houses -----    | 4 sq. ft. per person. Use seated areas only.                                        |
| (b) Assembly halls, with stage ----- | 7 sq. ft. per person.                                                               |
| (c) Banquet halls -----              | 10 sq. ft. per person.                                                              |
| (d) Churches (auditoriums) -----     | 7 sq. ft. per person.                                                               |
| (e) Churches (dining rooms) -----    | 10 sq. ft. per person.                                                              |
| (f) Dance halls -----                | 10 sq. ft. per person.                                                              |
| (g) Dining rooms -----               | 10 sq. ft. per person.                                                              |
| (h) Gymnasiums -----                 | 8 sq. ft. per person for seated space.<br>15 sq. ft. per person for unseated space. |
| (i) Lecture halls -----              | 7 sq. ft. per person.                                                               |
| (j) Lodge halls -----                | 6 sq. ft. per person for seated space.<br>15 sq. ft. per person for unseated space. |
| (k) Skating rinks -----              | 15 sq. ft. per person.                                                              |
| (l) Theaters -----                   | 7 sq. ft. per person.                                                               |
| (m) Theater lobbies -----            | 7 sq. ft. per person.                                                               |

(3) The capacity of theaters and theater lobbies must be combined to determine the theater capacity.

(4) (a) Every theater or assembly hall having movable seats shall display a sign stating the maximum number of persons permitted by code.

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1. The sign shall be placed in a conspicuous place at the main entrance to each theater or assembly hall.

2. The sign shall have the following wording: "Limit (Number) Persons." The maximum number of persons shall be determined by the capacity as permitted by subsection (2) and section Ind 55.12. The lettering shall be white on a dark background. The letters shall be not less than 1 1/2 inches in height and the number shall be not less than 3 inches in height.

History: 1-2-58; or, (4) (a), Register, July, 1968, No. 127, eff. 8-1-65; r. (2) (k), renum. (2) (l) (m) (n) to be (k) (l) and (m), Register, September, 1971, No. 211, eff. 10-1-73.

Ind 55.07 Number and location of exits. (1) Every floor and balcony of a theater and assembly hall shall be provided with not less than 2 exits, placed as far apart as practicable and so located that if any exit is blocked, some other exit will still be available from every part.

Exception: In places of worship, only one exit will be required from a balcony seating not more than 30 persons.

(2) Where more than 600 persons are accommodated, there shall be at least 3 exits and where more than 1,000 persons are accommodated, there shall be at least 4 exits.

(3) Exits shall be distributed on all sides which adjoin streets, alleys or open courts.

Ind 55.08 Type of exits. (1) The required exits from any part of a theater or assembly hall shall be exit doorways, stairways or ramps.

(2) All exits to grade from a higher or lower level shall be stairways or approved ramps. In all theaters and in assembly halls having a capacity of more than 400 persons, where the exit rise is not more than 8 feet approved ramps shall be used. By approved ramp is meant an incline located inside the building and having a slope of not more than one foot of rise in 8 feet.

(3) Stairway exits shall be interior stairways, or smokeproof towers as specified in section Ind 51.17; except that "B" type fire escapes may be used as exits from balconies for not more than one-half the required exit width, if located against blank walls.

Ind 55.09 Stairways. (1) Every stairway in a theater or assembly hall shall be enclosed as specified in sections Ind 51.17 and 51.18 with the following exceptions:

(a) Stairways from the main floor to the first balcony need not be enclosed.

(b) Stairways from the basement to the first floor of a single story place of worship need not be enclosed if they lead directly to the exits.

(2) No storage closets shall be placed under any stairway, platform or landing. A room may be placed under a stairway or stair-landing of 2-hour fire-resistive construction or better provided such room does not have combustible material or hazardous equipment stored or operated therein. All such rooms shall have a ceiling height of not less than 7 feet and the door thereto shall be a self-closing solid flush type wood door 1 1/2 inches in thickness or better.

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(3) Stairways and steps which have more than 3 risers shall have handrails on both sides.

(4) Every stairway used by the public in a theater or assembly hall shall have a uniform rise of not more than 7½ inches and a uniform tread of not less than 10 inches, measuring from tread to tread and from riser to riser. No winders shall be used and there shall be not less than 3 nor more than 16 risers in any run.

**Note.** See section Ind 51.15 for general stairway requirements.

**History:** 1-2-56; am. Register, January, 1951, No. 51, eff. 2-1-51; r. and rec. Register, February, 1958, No. 146, eff. 3-1-58; am. (4), Register, February, 1971, No. 182, eff. 7-1-71.

**Ind 55.10 Exit doorways and doors.** (1) Every required single exit doorway shall contain a standard exit door as specified in section Ind 51.15. For double doors, with or without mullions, the width of each door may be reduced to 2 feet 6 inches.

(2) No single door or leaf of a double door, shall be more than 3 feet 6 inches wide, and no 2 doors shall be hinged together.

(3) No rolling, sliding or revolving door shall be counted as an exit from any theater or assembly hall, nor shall any such door be permitted where it would be liable to be used by the public as an exit.

(4) Sills at all exit doorways shall be level and flush with adjacent inside floors and ramps. Where an aisle or passageway leads to an exit from either side of the exit doorway there shall be a level floor space at the doorway subtending the width of the aisle and the doorway.

**Ind 55.11 Exit lights.** (1) In every theater and assembly hall, except church auditoriums, exit lights shall be provided immediately over all exit doorways, and in such other places as may be necessary to direct the occupants to exit doorways and to a street, alley or exit court. The installation of such exit lights shall comply in all respects with the provisions of the Wisconsin state electrical code.

(2) Every light over an exit doorway shall be a red illuminated sign bearing the word EXIT or OUT in plain letters not less than 5 inches in height.

(3) All exit lights shall remain lighted during each occupancy and until the occupants have left the building.

**Ind 55.12 Width of exits.** (1) The total width of exits from every theater and assembly hall, and from every part thereof, shall not be less than the following: buildings of Type No. 1 or No. 2 construction, 36 inches per 100 persons; buildings of Type No. 3 thru No. 6 construction, 40 inches per 100 persons; buildings of Type No. 7 or No. 8 construction, 44 inches per 100 persons.

(2) In theaters, the width of the front entrance shall be not less than ⅓ of the total required exit width.

**History:** 1-2-56; am. (1), Register, June, 1972, No. 198, eff. 1-1-73.

**Ind 55.13 Seating.** (1) All seats, chairs and benches shall be placed not less than 32 inches back to back measured horizontally, except

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that for grandstands and bleachers without back rests this dimension may be reduced to 22 inches. For benches without arms, grandstands, and bleacher seats, the seating capacity shall be established by allowing one sitting or seat to each 18 inches of length. (See section Ind 55.54).

(2) All seats, chairs, and benches, except chairs in boxes or loggias, shall be securely fastened to the floor; or if the floor is level, the seats or chairs may be fastened together in groups of 3 or more.

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Chapter Ind 56

SCHOOLS AND OTHER PLACES OF INSTRUCTION

|            |                                         |           |                                               |
|------------|-----------------------------------------|-----------|-----------------------------------------------|
| Ind 56.001 | Scope                                   | Ind 56.09 | Passageways                                   |
| Ind 56.01  | Maximum height                          | Ind 56.10 | Access to attic and roof                      |
| Ind 56.02  | Classes of construction                 | Ind 56.13 | Auditoriums, gymnasi-<br>ums and field houses |
| Ind 56.04  | Subdivisions and fire<br>stops          | Ind 56.14 | Seats, desks and aisles                       |
| Ind 56.05  | Exterior wall openings                  | Ind 56.15 | Heating plants                                |
| Ind 56.06  | Type, location and num-<br>ber of exits | Ind 56.16 | Sanitary facilities                           |
| Ind 56.07  | Total width of exits                    | Ind 56.17 | Lighting                                      |
| Ind 56.08  | Exit doors                              | Ind 56.18 | Fire extinguishers                            |
|            |                                         | Ind 56.19 | Fire alarms                                   |

Ind 56.001 Scope. The requirements of this chapter, sections Ind 56.001 to Ind 56.19 inclusive, shall apply to all public and private schools, universities, colleges, academies, seminaries, libraries, museums and art galleries; including all buildings or parts of buildings used primarily for instructional purposes.

History: 1-2-56; am. Register, May, 1971, No. 185, eff. 6-1-71.

Ind 56.01 Maximum height. (1) Buildings occupied primarily by pupils up to and including grade 12 shall not exceed 4 stories or 48 feet in height.

(a) Exception. Buildings provided with complete automatic sprinkler or automatic smoke detection systems, occupied primarily by students of grades 9 through 12, shall be no more than 6 stories or 72 feet in height.

Note: Also see requirements for classes of construction.

History: 1-2-56; r. Register, May, 1971, No. 185, eff. 6-1-71; or. Register, September, 1973, No. 213, eff. 10-1-73.

Ind 56.02 Classes of construction. (1) Every building not more than one story in height may be of type No. 7 or No. 8 construction as specified in section Ind 51.03.

(2) Every 2-story building shall be not less than type No. 6 construction as specified in section Ind 51.03 with the exception that all floors and their supports shall be at least noncombustible one-hour fire-resistive rating.

(3) Every building 3 or more stories in height shall be of type No. 1 or No. 2 construction as specified in section Ind 51.03.

(4) Auditoriums, gymnasiums or field houses, or those parts of buildings similarly used, shall comply with the following:

(a) Limitations when occupancy is restricted to first story or ground floor only.

| Type of Construction | Maximum Number of Occupants in Any Room Used for Auditorium, Gymnasium, or Field House Purposes |               |
|----------------------|-------------------------------------------------------------------------------------------------|---------------|
|                      | With Stage                                                                                      | Without Stage |
| Type No. 1 and No. 2 | No limit                                                                                        | No limit      |
| Type No. 3 and No. 4 | 750                                                                                             | 1500          |
| Type No. 5 and No. 6 | 500                                                                                             | 1000          |
| Type No. 7 and No. 8 | 300                                                                                             | 750           |

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1. Exception. One-story buildings are permitted for unlimited capacities providing the following conditions are satisfied:

- a. The class of construction requirements satisfy Type No. 3, 4 or 5.
- b. There are no ground floors or basements.
- c. The setback satisfies the requirements of table 51.03-A for over 30 feet distance.

(b) Limitations when occupancy is above the first story.

| Type of Construction  | Maximum Number of Occupants | No. of Stories    |
|-----------------------|-----------------------------|-------------------|
| Type No. 1 and No. 2  | No limit                    | See Ind 56.01†    |
| Type No. 3 thru No. 5 | 400                         | 2nd story         |
| Type No. 3 thru No. 5 | 200                         | 3rd and 4th story |

† One smokeproof stair tower from the level of the assembly hall leading directly to the exterior at street grade shall be provided for every 750 persons capacity, or fraction thereof. These stairways shall be at least 44 inches wide and shall be in addition to other required stairways in the building.

History: 1-2-56; r. and recr. Register, May, 1971, No. 185, eff. 6-1-71; am. (1) and (2) and r. and recr. (3), Register, June, 1972, No. 192, eff. 1-1-73; cr. (4), Register, September, 1973, No. 213, eff. 10-1-73.

Ind 56.03 History: 1-2-56; am. Register, February, 1971, No. 182, eff. 7-1-71; r. Register, May, 1971, No. 185, eff. 6-1-71.

Ind 56.04 Subdivisions and fire stops. Every building of this classification which is built in connection with a building of a lower grade of construction shall be separated from such other building by walls of 4-hour fire-resistive construction as specified in section Ind 51.04, and all communicating openings shall be protected by fire-resistive doors as specified in section Ind 51.047 or equal. If such openings are used as a means of egress, they shall be kept normally open during the occupancy of the building.

History: 1-2-56; am. Register, February, 1971, No. 182, eff. 7-1-71; r. and recr. eff. 6-1-71 and exp. 1-1-73; cr. eff. 1-1-72, Register, July, 1971, No. 187.

Ind 56.05 Exterior wall openings. (1) One-story buildings with no floor levels below the first floor need not be provided with exterior wall openings other than required exits.

(2) Buildings with basements shall at such levels be protected with an approved automatic sprinkler system (Ind 51.23) or an approved automatic smoke detection system, either of which shall be connected to the required fire alarm (Ind 56.19).

Note: See section Ind 51.01 for definitions of "automatic" and "basement."

(3) Buildings more than one story shall be provided with wall openings for emergency purposes above the first story as specified in subsection Ind 52.02 (2) except as follows:

(a) The requirements for wall openings is waived in buildings provided throughout with an approved automatic sprinkler system (Ind 51.23) or an approved automatic smoke detection system, either of which shall be connected to the required fire alarm (Ind 56.19).

History: 1-2-56; am. Register, January, 1961, No. 61, eff. 2-1-61; r. and recr., Register, May, 1971, No. 185, eff. 6-1-71; r. and recr., Register, September, 1973, No. 213, eff. 10-1-73.

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Ind 56.06 Type, location and number of exits. (1) TYPE OF EXITS.  
(a) Exit corridors requiring a fire-resistive rated enclosure to satisfy limitations on travel distance stated in (2) below shall satisfy the following conditions:

1. Enclosure shall satisfy one-hour fire-resistive construction unless classes of construction requirements are more restrictive or requirements for (2) (c) 2. must be satisfied.

2. In one-hour enclosures of corridors, all openings shall be protected with no less than  $\frac{1}{2}$ -hour approved fire doors with automatic closing devices or approved fire-resistive windows satisfying requirements for moderate fire exposures. Quality certified glued solid wood core flush doors,  $1\frac{1}{2}$  inches thick, may be used in lieu of  $\frac{1}{2}$ -hour approved fire doors.

Note: See Ind 51.047 for fire doors and windows.

3. Corridors requiring more than one-hour fire-resistive construction shall have all openings protected with approved fire doors corresponding to required fire-resistive wall ratings covered in Ind 51.047. Fire doors shall be equipped with automatic closing devices.

(b) Stairways shall satisfy:

1. Required exit stairways shall have a uniform rise of not more than  $7\frac{1}{2}$  inches measuring from tread to tread, and a uniform tread of not less than 10 inches measuring from nosing to nosing of tread.

2. Handrails shall be provided on both sides.

3. There shall be no winders used in required exit stairways.

4. Ramps other than those required for the physically handicapped may be used in lieu of stairways providing the slope is not greater than one foot of rise in 8 feet.

a. Exits serving areas noted under Ind 56.06 (2) (c) involving a change of elevation between floor levels or platforms not exceeding 3 feet shall be provided with an approved ramp.

5. Requirements other than those specified in 1., 2., 3. and 4. shall satisfy applicable sections of Ind 51.16.

6. All required exit stairways shall be identified with approved exit lights.

7. Stairways shall be enclosed as specified in sections Ind 51.02, Table 51.03-A, and Ind 51.18.

a. Stairways serving basement areas shall be enclosed at that level as specified in section Ind 51.18.

(c) All required exterior exit doors and those required interior exits serving each floor, and enclosed areas serving more than 100 persons, shall be identified by an approved exit light. Approved exit lights and any additional directional lights shall be as required by subsection Ind 51.15 (5).

(d) Fire escapes are not acceptable in meeting the standards for required exits. Where used for other purposes, the design of fire escapes shall satisfy the requirements of section Ind 51.20.

(2) LOCATION OF EXITS. (a) The required exits at the exterior and those interior exits serving enclosed areas requiring more than one exit as covered in (3) shall be located as remote from each other as practicable.

(b) Travel distance to an exterior exit door or a required fire-

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resistive rated enclosure, from any point in a building, shall not exceed 150 feet.

1. Exception. For building service areas such as pipe chases, tunnels, catwalks, ducts or similar spaces not accessible to the general public, the travel distance may be increased to 300 feet.

(c) Auditoriums, gymnasiums or field houses, whose capacity exceeds 600 persons, shall have exits satisfying one of the following requirements:

1. Where there is at least one wall directly exposed to the exterior, at least one-half of the required exits shall be located in this exterior wall.

2. If no wall serving these areas is exposed to the exterior, the exit passageways leading to the exits at the exterior of the building shall be enclosed with no less than 2-hour fire-resistive construction.

(d) Interior exit doors or openings serving an enclosed area, at or above ground floor levels, may be located so as to allow the occupants only one direction of travel, providing:

1. The distance from the farthest required interior exit is not more than 10 feet to the following area:

a. The opening to a public corridor permitting the occupant to choose one of 2 directions of travel to reach the required exits at the exterior of building.

2. The area served when satisfying conditions stated in 1. above, has at least one exterior wall exposure and does not exceed 1,800 square feet total net area.

3. The distance from the farthest required interior exit is not more than 20 feet to the exit at the exterior of the building and the total net area served does not exceed 1,800 square feet.

(3) NUMBER OF EXITS. The total number of required exits shall satisfy the requirements for total width specified in section Ind 56.07.

(a) Exits at the exterior of a building. There shall be at least 2 exits located at the exterior of every building which serve the first floor and those levels above or below the first floor.

(b) Exits within the interior of a one-story building.

1. There shall be at least 2 exits serving an enclosed area having a capacity of more than 50 persons.

a. Regular academic classrooms, administrative and office space areas having an exterior wall opening providing emergency ingress or egress as described in subsection Ind 52.02 (2), will be accepted in meeting the requirement for one exit, provided the capacity of the area does not exceed 100 persons.

b. Exits serving above areas may discharge directly to the outside or to a public passageway or corridor that leads to the required exits at the exterior of the building.

2. There shall be at least 2 means of exiting from an enclosed area without exterior wall exposure whose capacity exceeds 20 persons.

a. The means of exiting from the above area may be by means of direct access to a public corridor permitting 2 directions of travel that will lead to the exits at the exterior of the building; or

b. One such exit leading directly to a public corridor from the immediate area and the second exit by way of a connecting door

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leading into the adjoining area, providing that a clear passageway is maintained from the connecting door to the required exit or exits serving the adjoining area.

(c) Exits within the interior of a building more than one story.

1. Every floor and balcony shall be provided with not less than 2 exits that will lead occupants to the required exits at the exterior of the building.

2. There shall be at least 2 exits serving enclosed areas above the first floor having a capacity of more than 40 persons.

a. Regular academic classrooms, administrative and office space areas having an exterior wall opening providing emergency ingress or egress as described in subsection Ind 52.02 (2), will be accepted in meeting the requirement for one exit, provided the capacity of the area does not exceed 100 persons.

b. Exits serving above areas may discharge directly to a public passageway or corridor that leads to the required exit stairways.

3. There shall be at least 2 means of exiting from an enclosed area without exterior wall exposure whose capacity exceeds 20 persons.

History: 1-2-56; am. (1), cr. (1) '81, Register, September, 1959, No. 45, eff. 10-1-59; am. Register, January, 1961, No. 51, eff. 2-1-61; r. and rec. (1) (a), renum. (2) to be (3), (3) to be (4), (4) to be (5), (5) to be (6) and (6) to be (7), and cr. (2) and (8), Register, May, 1971, No. 185, eff. 6-1-71; r. and rec., Register, September, 1973, No. 213, eff. 10-1-73.

Ind 56.07 Total width of exits. (1) The total exit widths serving each floor and those exits serving each interior enclosed area shall be based on the following rates:

(a) For classes of construction types No. 1, 2, 3 and 4—30 inches per 100 persons.

(b) For classes of construction types No. 5, 6, 7 and 8—40 inches per 100 persons.

(2) The required width of exits serving each floor at or above the first floor shall be not less than the required width of exits serving the floor above having the largest capacity.

(3) The required width of exits serving each floor at or below the first floor shall be not less than the required width of exits serving the floor level below having the largest capacity.

(4) The exit widths required at first floor shall be not less than the sum of required exit widths serving the floor levels next above and below when such exits terminate at the first floor.

(5) The capacity of educational buildings or any individual story or section thereof for the purpose of determining exits shall be the maximum capacity designated on approved plans.

(a) The maximum capacity shall not exceed the requirements of subsection (b).

(b) The maximum capacities of all rooms and spaces as listed below shall be determined on the basis of the minimum net square feet area per person shown for that occupancy unless otherwise designated on the plans.

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|                                                                                                                                                              | Minimum<br>Square Feet<br>Per Occupant |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| 1. Academic classrooms—Regular -----                                                                                                                         | 20                                     |
| 2. Administrative and office space -----                                                                                                                     | 75                                     |
| 3. Arts, crafts, drafting -----                                                                                                                              | 30                                     |
| 4. Bleachers (one seat per 18 inches of bench length)                                                                                                        |                                        |
| 5. Gymnasiums, field houses, auditoriums, theatres, lecture<br>rooms (fixed seating) -----                                                                   | 6                                      |
| 6. Gymnasiums, field houses, multipurpose rooms, cafe-<br>terias, study halls, commons and other level floor areas<br>with nonfixed individual seating ----- | 10                                     |
| 7. Home economics, business education -----                                                                                                                  | 30                                     |
| 8. Industrial arts-vocational shop -----                                                                                                                     | 60                                     |
| 9. Laboratories—Science (fixed lab. tables) -----                                                                                                            | 30                                     |
| 10. Libraries and resource centers -----                                                                                                                     | 20                                     |
| 11. Museums and art galleries -----                                                                                                                          | 40                                     |
| 12. Music -----                                                                                                                                              |                                        |
| a. Vocal -----                                                                                                                                               | 10                                     |
| b. Instrumental -----                                                                                                                                        | 20                                     |
| 13. Special education -----                                                                                                                                  |                                        |
| a. Mentally retarded, physically handicapped, etc. -----                                                                                                     | 25                                     |

History: 1-2-56; r. and rec. (3), Register, May, 1971, No. 185, eff. 6-1-71; am. (1), Register, June, 1972, No. 195, eff. 1-1-73; r. and rec., Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 56.08 Exit doors.** Exit doors shall comply with the requirements of Wis. Adm. Code section Ind 51.15, except that in elementary schools the width may be reduced to 3 feet. The aggregate width of exit doors shall be as required in section Ind 56.07. No single door or leaf of a double door shall be more than 42 inches wide.

**Ind 56.09 Passageways.** (1) The minimum unobstructed width of corridors and passageways which are used by the public or by the occupants generally, shall be determined in the same manner as specified for stairways in section Ind 56.07, but in no case shall this width be less than 4 feet. Corridors and passageways serving as a means of egress shall be at least equal in combined width to the required width of the stairways or passageways leading to them.

History: 1-2-56; r. (1) and renum. (2) to be (1), Register, May, 1971, No. 185, eff. 6-1-71.

**Ind 56.10 Access to attic and roof.** Every building more than one story in height shall have permanent means of access to the roof and attic space from inside the building. Where a scuttle opening is provided, the opening shall be not less than 20 x 30 inches, with a permanent enclosure for a stairway or ladder leading thereto.

**Ind 56.11 History:** 1-2-56; am. (3), Register, September, 1959, No. 45, eff. 10-1-59; am. Register, January, 1961, eff. 2-1-61; r. Register, May, 1971, No. 186, eff. 6-1-71.

**Ind 56.12 History:** 1-2-56; am. Register, December, 1962, No. 84, eff. 1-1-63; am. (1) (intro. par.) Register, October, 1967, No. 142, eff. 11-1-67; r. Register, May, 1971, No. 185, eff. 6-1-71.

**Ind 56.13 Auditoriums, gymnasiums and field houses.** (1) AUDITORIUMS, GYMNASIUMS, field houses and other large group occupancy areas shall comply with the requirements of Chapter 56. Where any area of building in this category has a stage loft in excess of 25' 0" in height above the stage floor and is equipped with permanent or

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movable scenery, it shall comply with sections Ind 55.21 to 55.24 inclusive.

**Notes:** It is the intent to differentiate between a theatre and an auditorium, gymnasium, field house or other large group occupancy area.

(2) **SEATING.** (a) All seats, chairs and benches shall be placed so as to provide a minimum unobstructed passage of 12 inches measured horizontally between plumb lines at the furthest projection of the back of one seat and the front of seat immediately behind.

**Notes:** 1. Above measurements are relative to the furthest projection when seat is in its normal unseated position such as self-rising seat.  
2. See allowable occupant space capacity under subsection Ind 56.07 (3) (b) 3. For exception see Ind 56.13 (2) (b) 3.

(b) The maximum number of seats in a row.

1. With aisles on both sides of row the maximum number of seats shall be 14.

2. With an aisle on only one end of row the maximum number of seats shall be 7.

3. The number of seats in a row may be increased to 100 where:

a. A minimum unobstructed passage of 18 inches between rows of seats measured horizontally between plumb lines at the furthest projection of the back of one seat and the front of seat immediately behind.

**Notes:** For measurements see "Note No. 1" under Ind 56.13 (2) (a).

b. The unobstructed passage between rows leads to a side aisle on each end of row where exit doors are located at no more than 20 feet intervals leading to an exit corridor or exit court.

(c) No platform on which seats are placed shall be more than 22 inches in height of riser.

(d) The highest level of any floor or platform whether level, tiered or sloped, shall provide no less than 7 feet vertical clearance between floor and any ceiling construction or projection beneath the ceiling.

(3) **WIDTH OF AISLES.** (a) Aisles having seats on both sides shall not be less than 2 feet 10 inches wide at the beginning and shall increase in width toward the exits at the rate of 1/4 inch per foot of run; or the aisle may have a uniform width not less than the average width of the foregoing calculation. No wall aisle shall be less than 3 feet wide and no other straight aisle shall be less than 3 feet 6 inches wide.

(b) There shall be a cross aisle leading to each required side exit. Cross aisles shall not be less than 6 feet 8 inches back to back of adjacent rows of seats.

**History:** 1-2-55; r. and rec., Register, May, 1971, No. 185, eff. 6-1-71.

**Ind 56.14 Seats, desks and aisles.** (1) Seats, desks, tables and other loose equipment need not be fastened to the floor or to each other provided that any seating arrangement use, will maintain during occupancy, free and unobstructed intermediate, cross and wall aisles leading to the exit.

(a) Stepped floors or tiered platforms shall be no less than 48 inches in width to permit the above arrangement.

(b) Seats, desks, tables and other loose equipment used in instruc-

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tional occupancies shall be of a durable type of construction to assure safety and stability.

History: 1-2-56; r. and rec., Register, May, 1971, No. 186, eff. 6-1-71.

**Ind 56.15 Heating plants.** (1) In every building more than one story in height, all heating plants and fuel rooms shall be enclosed with not less than 4-hour fire-resistive construction as specified in Wis. Adm. Code section Ind 51.04. All openings shall be protected with self-closing fire-resistive doors as specified in section Ind 51.047.

(2) In one story buildings all heating plants and fuel rooms shall be enclosed with not less than 2-hour fire-resistive construction as specified in section Ind 51.04, except that this requirement shall not apply to buildings where jacketed stoves or school room heaters are permitted. All openings shall be protected by self-closing fire-resistive doors as specified in section Ind 51.047.

History: 1-2-56; am. Register, February, 1971, No. 182, eff. 7-1-71; r. and rec., eff. 8-1-71 and exp. 1-1-72; cr. eff. 1-1-72, Register, July, 1971, No. 187.

**Ind 56.16 Sanitary facilities.** (1) The following tabulated groups or combinations thereof shall be provided with one fixture of each type in accordance with the ratio given in chart to serve the total number of persons designated on the plans.

| Type of Fixture         | K-8                                               | 7-12 | Post High School | Large Group Occupancy Areas | Administrative Areas |
|-------------------------|---------------------------------------------------|------|------------------|-----------------------------|----------------------|
| Water Closets (F).....  | 25                                                | 50   | 100              | 200                         | 10                   |
| Water Closets (M).....  | 75                                                | 100  | 200              | 300                         | 15                   |
| Urinals.....            | 35                                                | 50   | 100              | 150                         | 40                   |
| Lavatories.....         | 75                                                | 100  | 100              | 150                         | 15                   |
| Drinking Fountains..... | 1 per 5,000 sq. ft. floor area and/or 1 per floor |      |                  |                             |                      |

(a) When fixtures required for a designated group are not available to another designated group the number of fixtures shall be provided according to the ratio indicated in the chart and independent of other group requirements.

(b) Where a theatre is a part of an educational facility the requirements listed under "large group occupancies" shall apply.

History: 1-2-56; am. (3), (3), (4) and (4) (a), Register, September, 1969, No. 46, eff. 10-1-59; r. and rec. (4), Intro. par., Register, December, 1967, No. 144, eff. 1-1-68; r. and rec., Register, May, 1971, No. 186, eff. 6-1-71; am. (1) (Intro.), r. and rec. (1) (a), cr. (1) (b), Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 56.17 Lighting.** (1) **ELECTRIC LIGHTING.** Every class, study or recitation room shall be equipped with sufficient electrical lighting units to maintain the illumination required in Wis. Adm. Code Chapter Ind 19, Illumination Code.

(2) **GENERAL.** All other rooms and spaces in school buildings shall be equipped with means for supplying electric illumination in the quantity required for the purpose for which the room or space is used.

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All electrical work shall be installed to conform to the requirements of the Wisconsin State Electrical Code.

History: 1-2-54; am. Register, January, 1941, No. 61, eff. 1-1-41; cr. (3), Register, November, 1963, No. 98, eff. 12-1-63; am. (3) (c), Register, February, 1971, No. 182, eff. 7-1-71, r. and rec. Register, May, 1971, No. 185, eff. 6-1-71.

**Ind 56.18 Fire extinguishers.** In every building, standard fire extinguishers, as specified in Wis. Adm. Code section Ind 51.22, shall be provided in the proportion of one extinguisher to each 2,500 square feet, or fraction, of floor area, but there shall be at least the fire extinguisher on each floor including basement. In addition to the fire extinguishers for general protection there shall be at least one extinguisher of appropriate type and size in each laboratory, art, shop or other vocational room. Every fire extinguisher shall be prominently exposed to view and always accessible.

History: 1-2-56; am. Register, May, 1971, No. 185, eff. 6-1-71.

**Ind 56.19 Fire alarms.** Every building shall be provided with a proper alarm system complying with Wis. Adm. Code section Ind 51.24.

History: 1-2-56; am. Register, May, 1971, No. 185, eff. 6-1-71.

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Chapter Ind 57

APARTMENT BUILDINGS, HOTELS AND PLACES  
OF DETENTION

|                                                     |                                                      |
|-----------------------------------------------------|------------------------------------------------------|
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| Ind 57.01 Class of construction                     | Ind 57.16 Cleanliness                                |
| Ind 57.02 First floor fire-resistant                | Ind 57.17 Size of rooms                              |
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| Ind 57.05 Places of abode                           | Ind 57.20 Isolation of fire hazards                  |
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| Ind 57.07 Yards                                     | Ind 57.22 Fire alarms                                |
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| Ind 57.12 Lighting of exits                         | Ind 57.27 Filling stations; buildings and structures |
| Ind 57.13 Enclosure of stairways and shafts         | Ind 57.28 Automobile fire or battery shops           |
| Ind 57.14 Toilet rooms                              | Ind 57.29 Automobile parking decks                   |
| Ind 57.15 Washing facilities                        |                                                      |

Ind 57.001 Scope. (1) The requirements of this chapter shall apply to all apartment buildings, row houses, rooming houses, hotels, dormitories, convents, monasteries, hospitals, children's homes, homes for the aged and infirm, nursing homes, convalescent hospitals, convalescent homes, asylums, mental hospitals, jails, and other places of abode or detention, except as provided in section Ind 57.25 (2).

(2) By *place of abode* is meant a building or part of a building, such as apartment building, row house, rooming house, hotel, dormitory, convent, hospital, as follows:

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

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

(3) By *place of detention* is meant a building or part of a building used as a place of abode and wherein persons are forcibly confined, such as asylums, mental hospitals, and jails.

Note 1: The attorney general has ruled that all persons committed to an insane asylum by court order come within the meaning of the words "forcibly confined". Also that the words "forcibly confined" apply to all persons confined without their consent.

Note 2: For requirements regarding migrant labor camps see Wis. Adm. Code chapter Ind 49.

Ind 57.005 History: Cr. Register, July, 1967, No. 133, eff. 8-1-67; r. Register, December, 1970, No. 180, eff. 1-1-71.

Ind 57.01 Class of construction. (1) All places of abode which are more than 3 stories in height shall be of type No. 1 or No. 2 construction as specified in section Ind 51.03.

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(2) All 3-story places of abode, other than hospitals and places of detention, shall be at least type No. 6 construction as specified in section Ind 51.03.

(3) All places of detention shall be of type No. 1 or No. 2 construction as specified in section Ind 51.03. All hospitals, convalescent hospitals, and nursing homes 3 or more stories in height shall be of type No. 1 or No. 2 construction as specified in section Ind 51.03.

*History:* 1-2-56; am. (3), Register, September, 1959, No. 45, eff. 10-1-59; am. (1), (2) and (3), Register, June, 1972, No. 193, eff. 1-1-73.

**Ind 57.02 First floor fire-resistive.** (1) In 3 story buildings, except those having not more than one family on each floor, the first floor and its supports shall be of not less than 3-hour fire-resistive construction as specified in section Ind 51.04, except that in a 3 story apartment house which will accommodate not more than four families, or a 3 story hotel or rooming house which will accommodate not more than 30 persons, above the first story, the basement ceiling shall be of not less than 1-hour fire-resistive construction as specified in section Ind 51.04 or shall be protected by automatic sprinklers as specified in section Ind 51.23.

(2) Spaces between floor joists, below or above stud partitions where the studs extend through one or more stories, shall be fire-stopped.

*History:* 1-2-56; am. (1), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. eff. 8-1-71 and exp. 1-1-72, and cr. (1) eff. 1-1-72, Register, July, 1971, No. 187.

**Ind 57.03 Garage and business separation.** (1) In every building in which a lower story is used for garage purposes, the ceiling over the garage shall be of unpierced 4-hour fire-resistive construction as specified in section Ind 51.04. Stairways from garages leading to the upper stories shall be separated from the garage area with walls of 4-hour fire-resistive construction as specified in section Ind 51.04, with openings protected as specified for special occupancy separation, section Ind 51.08.

(2) In a building more than 2 stories in height where the lower story is used for business purposes, other than the hazards listed in Chapter Ind 57 of this code, the ceiling over the lower story shall be of not less than 1-hour fire-resistive construction as specified in section Ind 51.04.

*History:* 1-2-56; am. Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. eff. 8-1-71 and exp. 1-1-72, cr. eff. 1-1-72, Register, July, 1971, No. 187.

**Ind 57.04 Corridor and dividing partitions—3-story places of abode.** (1) The public passageways shall be enclosed with partitions of not less than one-hour fire-resistive construction as specified in section Ind 51.04 and shall have all living units separated by such partitions, except as follows:

(a) Apartment buildings having one living unit on each floor.

(b) Hotels, motels, hospitals, nursing homes and other similar buildings having not more than 8 habitable rooms on each floor.

(2) Hotels, motels, hospitals, nursing homes and other similar

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buildings having more than 8 habitable rooms on each floor shall be divided into groups of not more than 8 habitable rooms each, with partitions of not less than one-hour fire-resistive construction as specified in section Ind 51.04.

(3) Corridor and dividing partitions may be provided with door assemblies with glued solid wood core flush doors, 1 1/4 inches thick, and need not have a closing device.

Note: See Ind 51.047 (1) (a) 1, Note for standards of glued solid wood core flush doors.

History: 1-2-66; am. (1), Register, February, 1971, No. 182, eff. 7-1-71; r. and recr. (1) eff. 8-1-71 and exp. 1-1-72; or, (1) eff. 1-1-72; Register, July, 1971, No. 187; r. and recr., Register, September, 1972, No. 212, eff. 10-1-72.

Ind 57.05 Court walls. For walls of courts and similar interior shafts for light and air, see table 51.03-A.

History: 1-2-56; am. Register, February, 1971, No. 182, eff. 7-1-71; r. and recr. eff. 8-1-71 and exp. 1-1-72; or, eff. 1-1-72, Register, July, 1971, No. 187; am. Register, June, 1972, No. 198, eff. 1-1-73.

Ind 57.06 Yards. (1) Behind every apartment house, the rear of which does not abut on an alley or street, there shall be a yard across the entire width of the lot, open and unobstructed from the ground to the sky. The width of the yard behind a 2 story building shall be either:

(a) At least 5 feet of unobstructed width; or  
(b) At least 10 feet from the rear lot line to the building line, of which at least 3 feet shall be unobstructed, and the remainder may be occupied by an open (or screened) porch.

(2) For apartment houses of more than 2 stories, the unobstructed width of the entire yard shall be increased one foot for each additional story, except in the case of corner lots.

(3) No apartment house shall be placed behind any other building unless there is at least 50 feet between the buildings.

Ind 57.07 Number, location and type of exits. (1) There shall be at least 2 exits accessible from each living unit by means of stairways, ramps or horizontal exits. The number and location of such exits shall be such that in case any exit or passageway is blocked at any point, some other exit will still be accessible through public passageways from every living unit.

(a) In type No. 1 and No. 2 buildings a total area of not more than 1,200 square feet may be placed between an exit and the end of the building.

(2) Exits shall be distributed so that the entrance to each living unit will be not more than 60 feet distant from an exit, measuring along public passageways, if in a building of less than type No. 1 or No. 2 construction, or 75 feet in a type No. 1 or No. 2 building.

(3) At least one-half of the required exits, in buildings of more than one story, shall be stairways as specified in section Ind 51.16. The remaining exits shall be either stairways, or horizontal exits; or fire escapes may be used as exits from floors which are not more than 60 feet above grade if they are placed against blank walls. Every

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building which accommodates more than one family, or 8 persons, above the second story shall have at least 2 stairways.

(4) Apartment buildings 3 stories or less in height whose floors and supporting members are of not less than 2-hour fire-resistive construction as specified in section Ind 51.04, and which have a plan so arranged that not more than 2 living units on any floor make use of a common stairway, may be constructed with one common stairway as a single exit, provided the walls between units and those enclosing the stairway are of 2-hour fire-resistive construction as specified in section Ind 51.04. In this case, the stairways must be of not less than 2-hour fire-resistive construction, must lead directly to the outside and have all interior openings protected by approved fire-resistive doors as specified in section Ind 51.047.

(5) Where a jail or other place of detention wherein persons are forcibly confined is located on the upper floors of a court house or office building, at least one of the exits from the jail shall be a separate smokeproof stair tower leading directly from the jail section to the outside at street grade. This stairway shall serve only the jail area and there shall be no floors opening into it from the office or court house section of the building.

History: 1-2-56; r. and corr. (1), Register, December, 1970, No. 183, eff. 1-1-71; am. (4), Register, February, 1971, No. 182, eff. 1-1-71; r. and corr. (1) eff. 4-1-71 and exp. 1-1-72, ch. 10 eff. 1-1-72, Register, July, 1971, No. 187; am. (1) and (2), Register, June, 1972, No. 188, eff. 1-1-73; am. (1) (intro.), (3) and (4), Register, September, 1973, No. 213, eff. 10-1-73.

Ind 57.08 Aggregate width of exits. The aggregate width of exits shall be as provided for in section Ind 54.04.

Ind 57.09 Exit doors. Exit doors shall be as specified in section Ind 51.15; except that a door which is used by not more than 6 families, or 40 persons, shall be not less than 3 feet wide and shall not be required to open outward.

Ind 57.10 Passageways. Every public passageway leading from an exit shall be at least as wide as the required width of such exit. Every public passageway leading to an exit shall be at least 3 feet wide. The required width shall be kept clear and unobstructed at all times.

Ind 57.11 Lighting of exits. In every building which accommodates more than 4 families, or 30 persons, and in every building which accommodates transients, the public passageways and stairways and exit doors shall be illuminated from one hour after sunset to one hour before sunrise. This illumination shall include lights at all intersections of passageways, at all exits, and at the head, foot and landing of every stairway. The lights at emergency exit doors shall be red lights and shall be accompanied by a sign bearing the word "EXIT" or "OUT", in plain letters.

Ind 57.12 Enclosure of stairways and shafts. (1) All stairways and shafts shall be enclosed as specified in table 51.03-A, except that in all buildings 3 or more stories all basement stairways shall be

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enclosed with 2-hour fire-resistive partitions as specified in section Ind 51.04.

(2) In buildings more than 3 stories in height, all stairways shall be enclosed with 2-hour fire-resistive partitions, as specified in section Ind 51.04, except that one stairway may be unenclosed in the first and second stories, provided such stairway does not lead to the basement.

(3) In all buildings more than 2 stories in height in which the first story is used for business purposes, at least one stairway shall be enclosed in the first story with an unpierced wall of 2-hour fire-resistive construction, as specified in section Ind 51.04, and such stairway shall not connect with the basement.

(4) Every elevator shaftway, dumbwaiter shaftway, clothes chute, wastepaper chute, pipe shafts and other similar vertical shafts in buildings more than 2 stories in height shall be enclosed with 2-hour fire-resistive partitions, as described in section Ind 51.04, except that for 3 story buildings, 1-hour fire-resistive partitions may be used where the enclosure does not pass through a business portion. In all cases the basement enclosure shall be of not less than 4-hour fire-resistive construction.

History: 1-2-56: am. Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. eff. 9-1-71 and ex. 1-1-72; cr. eff. 1-1-72. Register, July, 1971, No. 187; r. and rec. (1), Register, June, 1972, No. 188, eff. 1-1-73.

Ind 57.13 Toilet rooms. (1) Every building within this occupancy classification shall be provided with toilet rooms meeting the requirements of this section and the requirements for general sanitation, section Ind 52.50 through 52.64.

(a) Each living unit of an apartment or row house building shall be provided with a toilet room having a water closet, lavatory and bathing facilities.

(2) Every building within this occupancy classification, except apartment buildings, shall have at least one water closet for every 10 persons or fraction thereof.

(b) Occupants of rooms with private water closets shall not be considered in counting either the number of persons or the number of fixtures.

Note: For general toilet room requirements, see sections Ind 52.50 to Ind 52.64, inclusive.

History: 1-2-56: am. (1), (2) and (3) Register, June, 1956, No. 8, eff. 7-1-56; cr. (4), Register, July, 1957, No. 139, eff. 8-1-57; r. and rec., Register, December, 1970, No. 180, eff. 1-1-71.

Ind 57.11 Washing facilities. Every building within this occupancy classification where water supply is available or can be made available, there shall be at least one sink or wash bowl in connection with each toilet fixture.

History: 1-2-56: r. and rec., Register, December, 1970, No. 180, eff. 1-1-71; am. Register, May, 1971, No. 185, eff. 6-1-71.

Ind 57.15 Repairs. Every building of this classification, and all parts thereof, shall be kept in good repair and the roof shall be maintained to prevent leakage. All rainwater shall be so drained and conveyed therefrom to prevent dampness in the walls and ceilings.

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**Ind 57.16 Cleanliness.** Every building shall be kept clean, and shall also be kept free from any accumulation of dirt, filth, rubbish, garbage, or other matter in or on the same or in the yards, courts, passages, areas or alleys connected with or belonging to the same.

**Ind 57.17 Size of rooms.** Every habitable room used for sleeping shall be of sufficient size to afford at least 400 cubic feet of air space for each occupant over 12 years of age and 200 cubic feet for each occupant under 12 years, except that a minimum of 150 cubic feet may be provided for infants in hospital nurseries. No greater number of occupants than the number thus established shall be permitted in any such rooms.

*History: 1-3-66, r and recd. Register, June, 1967, No. 128, eff. 7-1-67; r and recd. (2) Register, July, 1967, No. 128, eff. 8-1-67; r (2) Register, December, 1970, No. 180, eff. 1-1-71; am. Register, September, 1973, No. 213, eff. 10-1-73.*

**Ind 57.18 Habitable rooms—floors below grade.\*** (1) Any building or part of a building used or occupied as a hospital, home for the aged and infirm, nursing home, convalescent hospital or home, asylum, mental hospital, jail or place of detention shall not have any living units located below grade (at building) except:

(a) In ground-story living units, habitable rooms shall have at least one exterior wall with a full exterior exposure from the ground floor level to the ceiling. The exterior exposure shall not be made by the construction of an areaway.

(2) Living units, other than those in (1) above, having habitable rooms, or parts thereof, on floor levels below grade (at building) shall comply with the requirements of this section.

(a) The grade (at building) does not include the grade level within the perimeter of an areaway.

(3) Every habitable room shall have at least one exterior wall adjoining an areaway or court.

(4) Every habitable room shall have at least one outside window which can be opened from the inside without the use of tools to provide a clear opening of not less than 22 inches in least dimension and not less than 5 square feet in area, with the bottom of the opening not more than 4 feet above the floor.

(a) Windows having sills below grade (at building) shall be provided with an areaway as described in (5) of this section.

(b) All windows shall comply with the requirements of Ind 52.02 and 57.19 in addition to this subsection.

(c) Window assemblies of a type which, when open, obstruct emergency egress shall not be used.

(5) Areaways used for compliance with this section shall:

(a) Have a minimum width of 3 feet measured perpendicular to the building wall;

*Note: For further restrictions, see Ind 59.24 (4).*

(b) Have, when used as a required means of egress, exits complying with sections Ind 51.16 and 52.21.

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(6)\* All living units with floors below grade (at building) shall have access to 2 exits complying with all applicable sections of this code except as listed below.

(a) Exception: Living units having one exit door leading directly outside (not to an arenway) need not have access to a second exit.

(7) All buildings having living units below grade (at building) shall be designed and constructed to prevent undue collection of moisture in all stories below grade.

Note 21: Surface and subsoil draining systems for arenways and foundation walls are regulated under the requirements of the Wis. Admin. Plumbing Code Chapter 11-62, administered by the department of health and social services.

Note 22: See Ind 60.10 (1) "Note" for reference to flood plane requirements.

(a) All foundation walls shall be thoroughly dampproofed prior to backfilling of soil.

(b) Provisions shall be made to prevent the accumulation of moisture due to condensation of high humidity so as to prevent slippery floors and to prevent conditions susceptible to mildew or other undesirable fungi or bacteria.

Note 23: The inside design conditions for cooling or dehumidification will be accepted on the basis of a dry bulb temperature of 75° F and a relative humidity not greater than 50%.

Note 24: See Ind 53.20 (4) (5) "Note: Cross reference" for the acceptance of nationally recognized association methods and standards as a basis for calculations and design data.

Note 25: The standards for winter heating are found in Chapter Ind 59 of this code.

History: 1-2-56; r. and rec., Register, September, 1973, No. 213, eff. 10-1-73.

Ind 57.19 Windows. The outside windows in every habitable room shall have a total sash area of at least one-tenth of the floor area of the room but not less than 12 square feet. The openable area of such windows shall be equal to not less than 5% of the floor area of the room served.

Note: Also see Ind 52.02 and Ind 59.24 (4).

History: 1-2-56; r. and rec., Register, September, 1973, No. 213, eff. 10-1-73; r. and rec., Register, June, 1967, No. 138, eff. 7-1-67; r. and rec., (2), Register, July, 1967, No. 139, eff. 8-1-67; r. (2), Register, December, 1970, No. 180, eff. 1-1-71; am. Register, September, 1973, No. 213, eff. 10-1-73.

Ind 57.20 Isolation of fire hazards. (1) All boiler and furnace rooms, including fuel rooms and bruching, all laundries, drying rooms, carpenter shops, paint shops, and other hazardous work rooms and storage rooms in hospitals and buildings accommodating transients which are more than 3 stories in height and in all asylums and other places of detention shall be enclosed with a 4-hour fire-resistive enclosure as specified in section Ind 51.04. All openings shall be protected by self-closing fire-resistive doors as specified in section Ind 51.047.

(2) In all other buildings under this classification, such rooms shall be enclosed with a 2-hour fire-resistive enclosure as provided in section Ind 51.04, or better, except as otherwise provided in this section.

\*See Appendix A for further explanatory material.

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(3) In apartment buildings not more than 2 stories in height, such rooms shall be enclosed with a 1-hour fire-resistive enclosure as specified in section Ind 51.04, or better, except as provided in subsection (5).

(4) In one-story buildings having a floor area of not more than 3,000 square feet and two-story buildings having a floor area of not more than 1,500 square feet per floor which are used for business purposes and also accommodate not more than two families, such rooms shall be enclosed with a 1-hour fire-resistive enclosure, as specified in section Ind 51.04, or better.

(5) The enclosure for the heating plant may be omitted in apartment buildings not more than 2 stories in height and having not more than 2 living units on a floor, and in rooming houses not more than 2 stories in height and having not more than 8 habitable rooms on a floor, provided no part of the building is used for business purposes and all interior basement stairways are enclosed with a one-hour fire-resistive enclosure as specified in section Ind 51.04, or better. See section Ind 57.25 for exception to row house installations.

(a) Exception: Gas-fired space heaters may be used within living units of apartment buildings and within habitable rooms of motels or tourist courts without an enclosure if approved by the department. Space heaters fired with liquid fuel may be used without an enclosure in motels and apartment buildings not more than one story in height.

History: 1-2-56, am. (1), Register, September, 1953, No. 43, eff. 1-1-57; am. Register, February, 1971, eff. 7-1-71, R. and corr. eff. 8-1-71 and exp. 1-1-72; or. eff. 1-1-72, Register, July, 1971, No. 187; am. (5), Register, September, 1973, No. 213, eff. 10-1-73.

Ind 57.21 Fire protection equipment. (1) Standard first-aid standpipes shall be provided in every building which is more than 2 stories high and accommodates 20 or more transients, and in all hospitals, asylums and other places of detention.

(2) In the above buildings where adequate water supply is not available, and in buildings accommodating less than 20 transients where first-aid standpipes are not provided, a standard fire extinguisher shall be placed on each floor at the head of each stairway and at each elevator or group of elevators.

Ind 57.22 Fire alarms. (1) Every building which accommodates 20 or more persons except hospitals, places of detention, and motels not more than one story in height in which each unit has an outside door at grade level, shall be provided with a fire alarm system complying with section Ind 51.24.

(2) Every hospital which accommodates 20 or more persons shall be provided with a fire alarm complying with section Ind 51.24 except that chimera or other approved sounding devices shall be used when within hearing distance of the patients. Visual attention calling devices may be used in hospitals where approved by the department of industry, labor and human relations.

(a) A presignal fire alarm system may be installed in hospitals or hotels when not less than 4 employees are on duty at all times to respond to fire alarms.

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(b) Where presignal systems are installed, it is recommended that the fire department be called immediately after the pre-alarm signal is received.

(3) This section applies to buildings now in existence and to buildings hereafter constructed.

History: 1-2-56; am. Register, October, 1958, No. 34, eff. 11-1-58.

Ind 57.23 Scuttle. Every building more than one story in height which accommodates more than 4 families, or 30 persons, shall have a permanent means of access to the roof from the inside. The opening shall be not less than 20 x 30 inches and there shall be a permanent ladder or stairway leading thereto.

Ind 57.24 Directions for escape. (1) In every habitable room likely to be used by transients, a notice shall be conspicuously posted giving complete and plain directions for reaching at least 2 exits.

(2) In addition to this, a red exit light shall be provided over each exit on every floor.

History: 1-2-56; am. (1), Register, September, 1973, No. 213, eff. 10-1-73.

Ind 57.25 Row house. (1) DEFINITION. A row house is a place of abode not more than 2 stories in height, arranged to accommodate 3 or more attached row living units in which each living unit is separated from the adjoining unit by an unpierced vertical occupancy separation of not less than one-hour fire-resistive construction, extending from the basement or lowest floor to the under side of the roof boards.

(2) REQUIREMENTS. (a) Each living unit shall have separate entrances and exits leading directly to the outside.

(b) Heating ducts may be installed in the space between studs in the occupancy separation wall provided all such ducts are covered with 1/4 inch corrugated asbestos or the equivalent protection. Heating ducts shall not be installed back to back in the occupancy separation wall.

(c) Where each living unit has a separate heating system, the requirements of sections Ind 57.20 and 57.22 need not be complied with.

(d) Each living unit shall have access to the attic from the inside by means of an opening not less than 20 x 30 inches located above the stair landing on the second floor, but the other provisions of section Ind 57.23 need not be complied with.

History: 1-2-56; am. (1) and (2) (a), Register, September, 1973, No. 213, eff. 10-1-73.

#### HAZARDOUS OCCUPANCIES

Ind 57.50 Garages. (1) DEFINITIONS. (a) A garage is a building, or part of a building, which accommodates or houses self-propelled vehicles. For the purpose of this code the term vehicle includes land, air and water vehicles.

(b) A private garage is one used in connection with a private

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residence for the purpose of housing self-propelled vehicles owned by the occupant of the residence and used only for personal or family service.

(2) **CONSTRUCTION REQUIREMENTS.** (a) All garages, except private garages, which are more than 500 square feet in area, shall have walls and roof of types No. 1 through No. 6 construction as specified in section Ind 51.03, and all floors of vehicle storage rooms, salesrooms and repair shops shall be of not less than 4-hour fire-resistive construction as specified in section Ind 51.04.

*Exception:* 1. A garage not more than one story in height and 2,000 square feet in area may have walls and roof of type No. 7 or No. 8 construction if located at least 100 feet from any other building or boundary line between premises.

2. A hangar for the storage of not more than one airplane, or a boathouse for the storage of not more than one motor boat, may be of type No. 7 or No. 8 construction if located at least 15 feet from any property line or other building.

(b) All walls, or parts of walls, nearer than 5 feet to a boundary line between premises or to any other building shall be unpierced. All walls, or parts of walls, nearer than 10 feet, but not nearer than 5 feet, to a boundary line between premises or to any other building shall have all openings therein protected by means of fire-resistive doors and windows as specified in section Ind 51.047.

(c) Where a garage which is more than 500 square feet in area is built in connection with a building used for other purposes, it shall be separated therefrom by means of 4-hour fire-resistive walls as specified in section Ind 51.04 and unpierced 4-hour fire-resistive floors above and below as specified in section Ind 51.04. All openings in the walls to adjoining parts of the building shall be protected by means of self-closing fire-resistive doors as specified in section Ind 51.047. Stairways from garages leading to upper stories shall be separated from the garage area with walls of 4-hour fire-resistive construction as specified in section Ind 51.04 with all openings protected by means of self-closing fire-resistive doors as specified in section Ind 51.047.

(d) Where a garage which is less than 500 square feet in area is built in connection with a public building or place of employment under this code, the garage shall have walls and ceilings of not less than 1-hour fire-resistive construction as specified in section Ind 51.04, and the openings to adjoining parts of the building shall be protected by means of fire-resistive doors as specified in section Ind 51.047.

(3) **FIRE PROTECTION.** Boilers, furnaces and all open flame equipment within garages and service stations shall be effectively separated from other areas by not less than 2-hour fire-resistive walls, floors and ceilings as specified in section Ind 51.04. Such enclosures in basements shall have no openings into other basement areas. All stairways leading to such basement enclosures from the first floor shall be enclosed on the first floor with not less than 2-hour fire-resistive construction as specified in section Ind 51.04, and the opening thereto protected with a fire-resistive door as specified in section Ind 51.047.

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(a) Suspended furnaces and direct fired unit heaters fired with liquid fuel or gas may be used without an enclosure where approved by the department of industry, labor and human relations. Where approved, the equipment and installation shall satisfy requirements of section Ind 59.66.

(b) In garages or service stations which are heated by a suspended furnace located in a utility room or storage room, the enclosing walls, floor and ceiling shall be of 2-hour fire-resistive construction unless one side of the room is left open.

(4) FLOOR PITS. There shall be no pits or other depressions in the floor of any garage area, except that this requirement shall not apply to the shallow depressions formed to secure floor drainage, nor to catch basins installed in compliance with the provisions of the plumbing code issued by the state board of health nor to floor openings for access to regular basements.

(a) This will permit service openings in the floors of garages or service stations provided that the area below can be classed as regular basements and are ventilated in accordance with the requirements of the building, heating, ventilating and air conditioning code.

History: 1-2-54; r. and rec. (2) (c). Register, September, 1959, No. 45, eff. 10-1-59; am. Register, January, 1961, No. 51, eff. 2-1-61; am. (3) (a). Register, December, 1967, No. 144, eff. 1-1-68; am. (2) (a) Intro. par., (b), (c), (d) and (3) Intro. par., Register, February, 1971, No. 182, eff. 3-1-71; r. and rec. (2) (a) Intro. par., (2) (b), (c), (d) and (3) Intro. par., eff. 5-1-71, exp. 1-1-72; cr. (2) (a) Intro. par., (2) (b), (c), (d) and (3) Intro. par., eff. 1-1-72. Register, July, 1971, No. 187; am. (2) (a). Register, June, 1972, No. 193, eff. 1-1-73.

Ind 57.51 Filling stations; buildings and structures. (1) DEFINITIONS. (a) By filling station is meant one or more pumps, tanks, and other pieces of equipment used in the storage and dispensing of liquid fuels and arranged for the sale of such liquid fuels to the public.

(b) By dispensing area is meant any area within 15 feet of any pump or other dispensing equipment.

(c) By basement or open space under a floor or dispensing area is meant any space that does not have an outlet at its lowest level, at or above grade.

(2) CONSTRUCTION. (a) All buildings having a service space of not more than 500 square feet in area, designed to accommodate motor-driven vehicles, and all other buildings erected within 15 feet of the dispensing equipment, shall be of types No. 1 through No. 6 construction as specified in section Ind 51.03, except where canopies are provided over the dispensing equipment such canopies shall be of noncombustible construction throughout.

1. Pumps or other dispensing equipment serving liquid fuel to the public, which are located within or under any occupied part of any building or structure, shall be installed in compliance with the provisions of the flammable liquids code.

(b) Buildings not more than one story in height and not exceeding 500 square feet in area may be of type No. 7 or No. 8 construction if located at least 15 feet from dispensing equipment and 10 feet from the boundary lines between premises and from other buildings on the same premises.

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(c) Buildings more than 500 square feet in area used as office buildings exclusively, or in connection with other nonhazardous occupancies, may be of type No. 7 or No. 8 construction if not more than one story in height and located at least 30 feet from boundary lines between premises, from other buildings on the same premises and from the dispensing equipment.

(d) All walls, or parts of walls, in buildings under par. (a) which are nearer than 5 feet to a boundary line between premises or to any other building shall be unperforated. All walls, or parts of walls nearer than 10 feet, but not nearer than 5 feet, to a boundary line between premises or to any other building shall have all openings therein protected by means of fire-resistive doors and windows as specified in section Ind 51.047.

(e) The main floor level of any building erected within 15 feet of equipment used to dispense liquid fuel shall not be below the level of the driveway or grade at such equipment.

(f) There shall be no basement or other open space under the floor of the dispensing area outside of the building. There shall be no basement or other open space under the floor of any filling station building, unless:

1. The main floor level is at least 6 inches above the driveway or grade at the dispensing equipment; and

2. There is no outside door, window or other wall opening to such under floor space, except tool chutes or other similar vertical openings having a tight-fitting cover, with the bottom of such opening at least 6 inches above the driveway or grade at the dispensing equipment.

3. The floor and enclosure of the underfloor space is of 4-hour fire-resistive construction as specified in section Ind 51.01.

4. The under floor space is effectively vented by gravity means.

*Note:* For requirements applying to floor pits, see section Ind 57.54.

*History:* 1-2-56; am. (2) (a); cr. (2) (a) 1, Register, September, 1959, No. 15, eff. 10-1-59; am. (2) (a) and (2) (f) 3, Register, February, 1971, No. 182, eff. 7-1-71; r. and corr. (2) (d) and (2) (f) 3, eff. 8-1-71, esp. 1-1-72; cr. (2) (d) and (2) (f) 3, eff. 1-1-72. Register, July, 1971, No. 187; am. (2) (a), (b), (c), Register, June, 1972, No. 198, eff. 1-1-72.

**Ind 57.52 Automobile tire or battery shops.** (1) Any building, or part of a building, in which tires are repaired or fitted to vehicles shall be constructed, equipped and maintained as a garage under section Ind 57.50.

(2) Any building or part of a building, in which electric storage batteries are charged, repaired, or are installed in vehicles shall be constructed, equipped and maintained as a garage under section Ind 57.50.

**Ind 57.53 Automobile parking decks.** (1) **DEFINITION.** For the purpose of this code, a parking deck is an unenclosed or partially enclosed structure used for the parking or storage of self-propelled vehicles, which are driven into the structure and are parked under their own power with no facilities for the repairing of such vehicles.

(2) **CONSTRUCTION REQUIREMENTS.** (a) Parking decks may be erected without enclosing walls except that unperforated enclosing walls

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of not less than 2-hour fire-resistive construction, as specified in section Ind 51.04, shall be provided on all sides which are located less than 10 feet from the boundary line between premises or from any other building.

(b) Parking decks of 4-hour fire-resistive construction shall not be limited in height or in floor area.

(c) Parking decks having floor and supporting members of 2-hour fire-resistive construction or better shall not exceed 75 feet in height or 40,000 square feet in area. This area may be increased to 50,000 square feet where the structure faces 2 streets and to 60,000 square feet where the structure faces 3 or more streets.

(d) Parking decks of unprotected incombustible construction shall not exceed 50 feet in height or 20,000 square feet in area. This area may be increased to 25,000 square feet where the structure faces 2 streets and to 30,000 square feet where it faces 3 or more streets.

(e) A continuous wheel guard not less than 10 inches in height shall be provided on all sides of the structure on all floors.

(f) A guard rail not less than 3 feet 6 inches in height and having an intermediate rail at mid-height and a toeboard at least 6 inches high at the base, or the equivalent, shall be provided on all open sides of the structure on each floor.

(g) All parking decks and parts thereof shall be designed and constructed to support the following minimum superimposed live loads in pounds per square foot of horizontal area, in addition to the dead load:

| <i>Passenger Cars Only</i> | <i>Pounds Per Square Foot</i> |
|----------------------------|-------------------------------|
| Top floor .....            | 80                            |
| First floor .....          | 80                            |
| Intermediate floors .....  | 50                            |
| Ramps .....                | 80                            |

*Busses and Trucks*

All floor and ramp areas ..... 8,000 pound axle load  
in any possible position  
or 80 pounds per square  
foot, whichever produces  
the greater stress.

**History:** Cr. Register, June, 1956, No. 6, eff. 7-1-56; cr. (2) (g), Register, August, 1957, No. 20, eff. 9-1-57; am. Register, December, 1962, No. 84, eff. 1-1-63; am. (2) (a), Register, February, 1971, No. 182, eff. 7-1-71; r. and recr. (2) (a) eff. 8-1-71 and exp. 1-1-72; cr. (2) (a) eff. 1-1-72, Register, July, 1971, No. 187.

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Chapter Ind 59

HEATING, VENTILATING AND AIR CONDITIONING

|           |                                                                        |           |                                                           |
|-----------|------------------------------------------------------------------------|-----------|-----------------------------------------------------------|
| Ind 59.01 | Scope of code                                                          | Ind 59.51 | Retail establishments                                     |
| Ind 59.20 | Design, inspection, approval of drawings and specifications            | Ind 59.52 | Garages and service stations                              |
| Ind 59.21 | Accident prevention and fire protection                                | Ind 59.53 | Places of employment                                      |
| Ind 59.22 | Design conditions                                                      | Ind 59.55 | Penal institutions and places of detention                |
| Ind 59.24 | General requirements for heating, ventilating and exhaust systems      | Ind 59.56 | Hospitals                                                 |
| Ind 59.25 | Maintenance and operation                                              | Ind 59.58 | Combustion air intakes                                    |
| Ind 59.40 | Occupancy classification                                               | Ind 59.60 | Outside ventilating air intakes or exhausts               |
| Ind 59.41 | General requirements for occupancies under (a) and (b) classifications | Ind 59.61 | Air cleansing apparatus                                   |
| Ind 59.42 | Places of assembly                                                     | Ind 59.63 | Boilers                                                   |
| Ind 59.43 | Motion picture booth                                                   | Ind 59.64 | Radiation and convection equipment                        |
| Ind 59.44 | Places of assembly for worship                                         | Ind 59.66 | Jacketed stoves                                           |
| Ind 59.45 | Schools                                                                | Ind 59.68 | Space heating equipment                                   |
| Ind 59.46 | Places for vocational instruction and research                         | Ind 59.67 | Chimneys, gas vents, mechanical draft and venting devices |
| Ind 59.48 | General sanitation and service areas                                   | Ind 59.68 | Fans and blowers                                          |
| Ind 59.49 | Kitchens                                                               | Ind 59.69 | Ducts                                                     |
| Ind 59.50 | Offices                                                                | Ind 59.70 | Volume dampers and deflectors                             |
|           |                                                                        | Ind 59.72 | Equipment location and protection required                |
|           |                                                                        | Ind 59.74 | Piping                                                    |
|           |                                                                        | Ind 59.75 | Refrigerants                                              |

History: Chapter Ind 58 as it existed on January 31, 1965 was repealed and a new chapter Ind 59 was created effective February 1, 1965.

Ind 59.01 Scope of code. (1) PUBLIC BUILDINGS AND PLACES OF EMPLOYMENT. The provisions of this code shall apply to all buildings used, or to be used, as places of employment or as public buildings, as defined by statutes.

Note: For a definition of "public buildings" and "places of employment" see section 101.01 (1), Wis. Stats. For a definition of "farming" see section 102.04 (3), Wis. Stats.

(2) NEW BUILDINGS. The provisions of this code shall apply to the heating, ventilating and air conditioning of all new buildings.

(3) EXISTING INSTALLATIONS. The provisions of this code shall apply to the addition of or replacement of any major apparatus in existing buildings.

(4) CHANGE IN USE. The provisions of this code shall apply to every building, or portion of a building, devoted to new use for which the requirements under this code are in any way more stringent than the requirements covering the previous use.

(5) DEFINITIONS. See section Ind 51.01.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65; or. (5), Register, September, 1973, No. 213, eff. 10-1-73.

50.10 History: Cr. Register, January, 1965, No. 109, eff. 2-1-65; r. Register, June, 1972, No. 198, eff. 1-1-73.

Ind 59.20 Design, inspection, approval of drawings and specifications. (1) The design and preparation of drawings and data for the installation of heating, ventilating and air conditioning equipment shall satisfy the requirements of this code.

(2) All drawings and specifications shall be sealed or stamped by an engineer, architect or designer registered in accordance with the

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laws of Wisconsin when they involve one or more of the following conditions:

- (a) Buildings whose total volume is greater than 50,000 cubic feet.
- (b) An addition to a building in which the addition results in the entire building having a volume greater than 50,000 cubic feet.

*Note:* Laws regulating the practice of engineering and architecture are found in Chapter 443, Wis. Stat.

(3) The installation of the heating, ventilating and air conditioning equipment that must satisfy requirements of Ind 59.20 (2) shall be inspected by a registered professional engineer, architect or designer.

(a) On completion of the installation, the inspecting engineer, architect or designer shall file a written statement with the department certifying that, to the best of his knowledge and belief, the installation has been performed in compliance with approved drawings and specifications.

(b) No building owner shall alter the installation or portions thereof except in compliance with the provisions of this code.

(4) **APPROVAL OF DRAWINGS AND SPECIFICATIONS.** (a) At least 3 complete sets of all drawings and one copy of specifications and data for the design and installation of heating, ventilating and air conditioning equipment shall be submitted to the department for approval before affected work is commenced. The requirement shall apply to the following:

1. Where such equipment is installed in buildings or structures that are included in the scope of the building code.

a. Exception: Refer to Ind 50.03 and Ind 50.10 (2).

2. Where the installation of this equipment is in connection with meeting requirements of the following codes and, as a result, the installation has a direct bearing on the acceptance of the entire heating, ventilating and air conditioning system:

- a. Chapter Ind 4, Elevator.
- b. Chapter Ind 7, Cleaning and Dyeing.
- c. Chapter Ind 8, Flammable and Combustible Liquids.
- d. Chapter Ind 20, Dusts, Fumes, Vapors and Gases.
- e. Chapter Ind 21, Spray Coating.
- f. Chapters Ind 41-42, Boilers and Unfired Pressure Vessels.
- g. Chapter Ind 45, Mechanical Refrigeration.
- h. Chapter Ind 49, Migrant Labor Camps.
- i. Chapters Ind 50-59, Building and Heating, Ventilating and Air Conditioning.
- j. Volume 2, Electrical.

*Note 1:* To expedite approval, the required material should be submitted with the drawings submitted for approval of building design.

*Note 2:* Approval is not required for the installation of air cooling equipment when added to an approved heating and ventilating system.

(b) Drawings for installations within the city limits of Milwaukee shall be submitted to the Inspector of Buildings, Milwaukee, for examination and approval. For list of additional cities to which drawings may be submitted, see subsection Ind 50.10 (7) of the building code.

(c) The replacement of major apparatus is subject to approval by the department.

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1. A statement, in triplicate, showing capacities of old and new equipment may be submitted instead of data required in subsection Ind 59.20 (4) (g).

(d) *Approval of major changes.* Revisions to approved heating and ventilating drawings or specifications shall be approved by the department before work is commenced when such revisions involve code regulations.

(e) *Evidence of approval.* A complete set of approved drawings and specifications shall be made available at the job site.

(f) *Information required on drawings and in specifications.* The drawings, data and information for heating, ventilating and air conditioning systems submitted for approval shall be prints that are permanent, clear, legible and complete and shall include all details and data necessary for review of the proposed installation, such as:

Note 21: Original drawings are not considered as a substitute for permanent prints.

Note 22: Duplicate information need not be submitted when heating, ventilating, air conditioning and building drawings are submitted simultaneously.

1. Name of the owner of the building and complete address of the building.

2. The location of building with respect to property lines and/or lot lines and/or adjoining streets, alleys and any other buildings on the same lot or property when wall openings are used for natural ventilation as per Ind 59.24 or are used for outside ventilating intakes or exhausts per Ind 59.60.

3. Architect, engineer or designer's name shall appear on the title sheet.

4. A floor plan for each floor where equipment is installed.

5. A room schedule, indicating the intended use of all rooms.

6. A description of the construction for walls, floors, ceilings and roof.

a. Location of required fire or smoke dampers. [See Ind 59.69 (13).]

7. Elevation and sectional plans to illustrate and clarify equipment arrangements where required.

8. Location, size and type of all equipment.

9. Size and continuity of all pipe and duct work.

10. Description of construction and location of chimney.

11. Specifications shall be properly identified with the drawings.

(g) *Data required.* All drawings submitted for approval shall be accompanied by sufficient data and information for the department to judge if the capacity of the equipment and the performance of the system will meet the requirements of the code. The following data shall be submitted:

1. Construction losses for each typical room.

a. Heat loss calculated in Btu per hour.

2. List CFM circulated, outside air and exhaust required for each typical room.

Note: Refer to Ind 59.54 concerning ratings of radiators and convectors.

3. Summation(s) of total heating and ventilating requirements shall include:

a. A listing of specific heating and/or ventilating unit(s) with their input and net rating in Btu/hour to satisfy the summation(s). For direct fired equipment give input rating.

b. Where more than one heating and/or ventilating unit is to be installed, provide a separate summation for each unit.

**Notes:** Cross reference: The department will accept as the basis for calculations and design data the methods and standards recommended by the Mechanical Contractors' Association of America; the American Society of Heating, Refrigerating and Air Conditioning Engineers; and the Institute of Boiler and Radiator Manufacturers.

4. When requested, additional data pertaining to design and operation of a heating and ventilating system shall be submitted to the department for approval by the engineer, architect, designer or manufacturer before such equipment is installed or used.

(5) **SEASONAL OCCUPANCIES.** When approved in writing by the department, heating requirements may be waived (but not ventilation required by sections Ind 59.40 and 59.41) during the period of June 1 through September 15 for the following or similar occupancies:

- (a) Drive-in eating places.
- (b) Club houses.
- (c) Outdoor toilets.
- (d) Camp lodge buildings.
- (e) Canning factories.
- (f) Migrant labor camps. (Also see Ind Chapter 49, Migrant Labor Camps.)

(6) **APPROVAL OF MATERIAL AND EQUIPMENT.** The use of materials, equipment, devices and methods of installation not mentioned in this code is subject to written approval by the department. Sufficient test data and descriptive information shall be submitted to prove its use.

**History:** Cr. Register, January, 1965, No. 109, eff. 2-1-65; am. (1), Register, May, 1966, No. 126, eff. 6-1-66; am. (1), Register, October, 1967, No. 142, eff. 11-1-67; r. and rec. (1), Register, June, 1968, No. 150, eff. 7-1-68; am. (1) and (2) Intro par., Register, December, 1970, No. 160, eff. 1-1-71; r. and rec. Register, March, 1971, No. 183, eff. 4-1-71; r. and rec. Register, September, 1971, No. 213, eff. 10-1-71.

Ind 59.21 Accident prevention and fire protection. (1) **GUARDS.** All mechanical apparatus shall be guarded to comply with Wis. Adm. Code, chapter Ind 1.

(2) **FIRE PROTECTION.** All installations under this code shall comply with the precautionary requirements of the department of industry, labor and human relations to reduce fire hazards.

**Notes:** Refer to the building code and electrical code for additional safety and fire protection requirements:

- Masonry chimneys, construction... Wis. Adm. Code section Ind 52.10
- Metal smoke stacks, construction... Wis. Adm. Code section Ind 52.11
- Smoke pipes... Wis. Adm. Code section Ind 52.12
- Steam and hot water pipes, protection... Wis. Adm. Code section Ind 52.13
- Vertical duct shaft, construction... Wis. Adm. Code section Ind 52.14

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Boiler and furnace rooms-----Wis. Adm. Code sections Ind 54.13,  
Ind 55.29, 56.15, 57.20, 57.50

Heating and ventilating equipment and  
wiring-----Wis. Adm. Code section E 1-E 900

Ind 59.22 Design conditions. (1) INSTALLATION OF EQUIPMENT. All heating, ventilating and air conditioning installations shall be designed and installed to provide the service and results required by this code.

Note: Compliance with this code shall not constitute assurance of proper installation or operation of the heating, ventilating and air conditioning system. This code is not to be used as a design manual but it is established as a minimum standard for safety, health and general welfare of the public.

(2) CAPACITY AND ARRANGEMENT. The calculated capacity and the arrangement of all installations for required heating and ventilating shall be based upon simultaneous service to all parts of the building, unless otherwise provided in this code.

(3) OUTSIDE TEMPERATURE DESIGN CONDITIONS. In the accompanying map, the state of Wisconsin has been divided into 3 zones. The maximum heat losses for a heating system shall be calculated on the basis of the temperatures indicated in Table 1 with reference to location of the project in each respective zone.

(4) INSIDE TEMPERATURE DESIGN CONDITIONS. The heating system shall be designed to maintain a temperature of not less than that shown in Table 2.

TABLE 2

| Type of Buildings                  | Deg.<br>Fahr. | Type of Buildings                | Deg.<br>Fahr. |
|------------------------------------|---------------|----------------------------------|---------------|
| Barber Shops and Beauty Parlors... | 75            | Hotels:                          |               |
| Schools:                           |               | Bedrooms and Baths.....          | 70            |
| Classrooms.....                    | 70            | Dining Rooms.....                | 70            |
| Assembly Rooms.....                | 65            | Kitchens and Laundries.....      | 65            |
| Gymnasiums.....                    | 65            | Ballrooms.....                   | 65            |
| Wardrobe and Locker Rooms.....     | 70            | Service Rooms.....               | 65            |
| Kitchens.....                      | 65            | Apartment.....                   | 70            |
| Dining and Lunch Rooms.....        | 65            | Offices.....                     | 65            |
| Play Rooms.....                    | 60            | Stores.....                      | 65            |
| Natatoriums and Bathrooms.....     | 75            | Factories and Machine Shops..... | 60            |
| Toilet Rooms.....                  | 70            | Foundries and Boiler Shops.....  | 50            |
| Hospitals:                         |               | Toilet and Locker Rooms—         |               |
| Private Rooms.....                 | 75            | General.....                     | 70            |
| Operating Rooms.....               | 75            | Garages:                         |               |
| Wards.....                         | 75            | Repair and Service Areas.....    | 60            |
| Kitchens and Laundries.....        | 65            |                                  |               |
| Bathrooms.....                     | 75            |                                  |               |
| Toilet Rooms.....                  | 75            |                                  |               |
| Theaters:                          |               |                                  |               |
| Seating Space.....                 | 65            |                                  |               |
| Lounge Rooms.....                  | 65            |                                  |               |

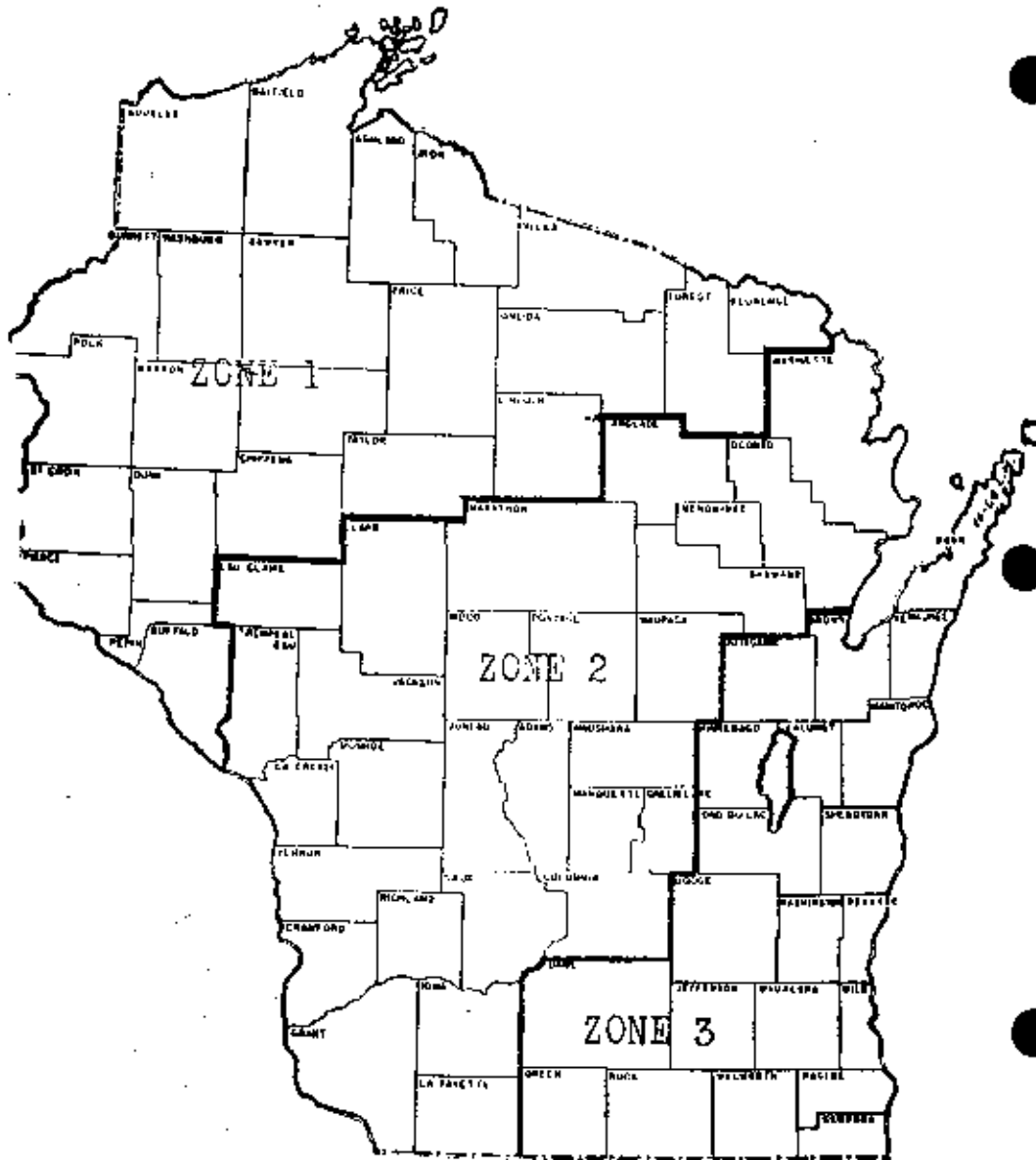
(5) AIR-CLEANSING APPARATUS. (a) Air-cleansing apparatus shall be designed and installed to permit access to the equipment for maintenance and to insure proper operation of the heating and ventilating system.

(6) SUPPLY AIR TEMPERATURE. The design condition of the supply air temperature shall not exceed 140° Fahrenheit.

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TABLE 1

MAP OF WISCONSIN SHOWING DESIGN TEMPERATURE ZONES



Zone 1 - - - - - 30° Below Zero F.  
 Zone 2 - - - - - 25° Below Zero F.  
 Zone 3 - - - - - 15° Below Zero F.

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(7) **CONTROLS.** Where ventilation is required by this code, controls shall be provided so that minimum air circulation, supply and exhaust shall be maintained continuously during periods of occupancy.

(8) **AIR QUANTITY.** The quantity of air used to ventilate a given space during period of occupancy shall always be sufficient to maintain the standards of air temperature, air quality, air motion and air distribution as required by this code. (See Wis. Adm. Code section Ind 59.24).

(9) **NUMBER AND ARRANGEMENTS.** The capacity, number and arrangement of outlets, returns and exhausts shall insure a uniform distribution of air.

(10) **ELEVATOR SHAFTS AND STAIRWELLS.** Air shall not be transferred through elevator shafts and stairwells where doors are required at any floor level.

(11) **GRILLES OR DIFFUSERS REQUIRED.** All air supply outlets and returns shall be equipped with grilles or devices which will provide a uniform distribution of air.

(12) **CORRIDOR VENTILATION.** Air in a volume equal to the outside air required from a room may be discharged and recirculated through a corridor and exhausted through lockers, toilet rooms, kitchens, janitor closets and similar areas. Additional exhaust ventilation shall be provided where the volume of air exhausted from the corridor is less than the volume of air supplied.

**History:** Cr. Register, January, 1966, No. 109, eff. 2-1-66; am. table 2, cr. (9), (10), (11) and (12). Register, September, 1973, No. 213, eff. 10-1-73.

Ind 59.24 General requirements for heating, ventilating and exhaust systems. (1) **HEATING SYSTEMS REQUIRED.** Heating systems complying with the requirements of this code shall be provided, maintained and operated for all occupied areas within the scope of this code.

(2) **GUARDING OF SURFACES.** Equipment located in occupied areas and installed less than 7 feet above the floor shall be guarded to prevent bodily contact with:

(a) Any surface temperatures that exceed 180° F.

(b) Surfaces that are likely to cause lacerations.

**Note:** For more restrictive conditions, see Ind 59.66 (2).

(3) **VENTILATING SYSTEMS REQUIRED.** Ventilating systems shall be provided, maintained and operated to accomplish required ventilation service for all occupied areas within the scope of this code.

**Note:** Cross reference: For requirements pertaining to all places of employment or occupancy where smoke, gas, dust, fumes, steam, vapor, industrial poisons, or other detrimental materials are used, stored, handled, or are present in the air in sufficient quantities to obstruct the vision, or to be irritating, or to be injurious to the health, safety or welfare of the employees or frequenters, see Wis. Adm. Code Chapter Ind 20—Dusts, Fumes, Vapors and Gases.

(4) **NATURAL VENTILATION.** Where outdoor openings are used for natural ventilation the openings shall be within 100 feet, or 5 times the least dimensional width of the occupied area, whichever is the least.

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(a) Outdoor openings below grade will not be accepted unless there is a clear space outside of the opening having a width not less than  $1\frac{1}{2}$  times the distance below grade at the bottom of the opening.

**Note:** Width of clear space is the horizontal distance measured at right angles to the plane of the opening.

(b) Outdoor openings shall be at least 5 feet from a property line and/or lot line or an adjacent building on the same property. This distance restriction does not apply to property lines along streets.

**Note:** For further restrictions, see Table 51.03-B and section Ind 50.60.

(5) GRAVITY DIRECT-INDIRECT SYSTEMS. The installation of gravity direct-indirect systems is prohibited.

**Note:** This rule is intended to prohibit the use of direct-indirect radiation whereby the outside air supply is admitted to the base and delivered at the top without mechanical assistance.

(6) HOT WATER HEATING AND VENTILATING SYSTEMS. Hot water systems installed in areas where ventilation is required under this code shall comply with the following requirement:

(a) The system hot water shall be circulated continuously by mechanical means.

(7) EXHAUST VENTILATING SYSTEM. (a) Exhaust ventilating systems shall be designed to reasonably prevent contaminated air reentering the building.

(b) The required exhaust ventilating systems shall operate continuously whenever the space exhausted is occupied.

**Note:** See Wis. Adm. Code Chapter Ind 20.

(8) TEMPERED AIR SUPPLY. (a) Where ventilation is affected by exhaust methods, an outside tempered air supply shall be provided to replace the air exhausted from the area if the volume of air exhausted exceeds one air change per hour.

(b) Where heat gain from a process is equal to all or part of the ventilation heat load, the air may be recirculated and supplied mechanically within the immediate area and mixed with a quantity of outside air to temper the air supply, provided that dampers and temperature controls are installed in the system to maintain a discharge temperature of not less than 50° F.

**Note:** See other applicable sections of Chapter Ind 50 for further restrictions.

(c) A tempered air supply depending on a negative pressure within the space is prohibited except in foundries, steel fabricating shops and similar areas.

(9) CONTAMINATION OF ADJACENT AREA. The ventilation of all equipment and system service rooms which house sources of odors, fumes, noxious gases, smoke, steam, dust, spray, or other contamination, shall be such as to prevent spreading of any such contamination to other parts of the building occupied by people.

(a) Areas where chlorinated hydrocarbons are introduced shall be arranged to satisfy the following conditions:

**Note:** Some of the chlorinated hydrocarbons commonly used are: trichloroethylene, perchloroethylene, carbon tetrachloride, methylene chloride, methyl chloroform, Freon F-11, Freon F-12, Freon F-21 and

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Freon P-114. For example, these materials are used in dry cleaning establishments, in degreasing operations, and where pressure can propellants are used. Pressure cans are used for such products as enamels, lacquers, paint removers, stencil inks, lubricants, pesticides, hair sprays, shaving lathers, shampoos and colognes.

1. The area shall have an exhaust system capable of maintaining a negative pressure within the enclosed area.

2. The volume and distribution of air movement within the area shall be such that the average threshold limit values of specific airborne contaminants are not exceeded. See Wis. Adm. Code Chapter Ind 20—Dusts, Fumes, Vapors and Gases.

3. No direct-fired heating unit with or without a heat exchanger shall be located within this area nor shall it recirculate air from this area.

4. Surface temperatures of any kind of heating equipment used in these areas shall be below the temperature at which toxic materials may be released.

Note: Toxic materials are those covered in Wis. Adm. Code Chapter Ind 20—Dusts, Fumes, Vapors and Gases.

(b) Ventilation air shall not be drawn from an area of greater contamination to satisfy code requirements.

Note: The following examples are typical of acceptable systems: corridor to toilet; corridor to cloak rooms or janitor closets; dining room to kitchen; locker room to toilet room; gymnasium to locker room; and showroom to garage.

(10) **FINAL TEST REQUIRED.** The designer or installer shall be responsible for the testing and balancing of every heating, ventilating and air conditioning system.

(11) **INSTRUCTIONS.** The designer or installer shall provide the owner with written instructions for the operation and maintenance of the system and equipment.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65; r. and recr., Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 59.25 Maintenance and operation.** (1) **MAINTENANCE.** All heating, ventilating, exhaust and air conditioning systems shall be maintained in good working order and shall be kept clean and sanitary.

(2) **OPERATION.** All heating, ventilating and exhaust systems shall be operated to satisfy the requirements of this code during periods the building is occupied unless otherwise exempted by this code.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65.

**Ind 59.40 Occupancy classification.** (1) The various occupancies to which the provisions of this code apply shall be classified as follows:

- (a) Require ventilation on an occupancy basis.
- (b) Require ventilation on an occupancy basis unless otherwise exempted.
- (c) Require exhaust.
- (d) Require ventilation on the basis of floor area.

(2) Table 3 is a list of occupancies to determine ventilation requirements and number of persons.

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TABLE B

| Use or Occupancy                                                                                                                            | Classification | Basic Capacity                                                                                                           |
|---------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------|
| Arenas and field houses*                                                                                                                    | (a)            | 4 sq. ft. per person. Use seated area only.                                                                              |
| Armories (drill halls)                                                                                                                      | (b)            | 30 sq. ft. per person.                                                                                                   |
| Assembly halls*                                                                                                                             | (a) or (b)     | 7 sq. ft. per person. See Wis. Adm. Code section Ind 59.42.                                                              |
| Banquet halls*                                                                                                                              | (a) or (b)     | 15 sq. ft. per person. See Wis. Adm. Code section Ind 59.42.                                                             |
| Barber shops                                                                                                                                | (d)            | 20 sq. ft. per person. See Wis. Adm. Code section Ind 59.51.                                                             |
| Bath and shower rooms                                                                                                                       | (c)            | See Wis. Adm. Code section Ind 59.48.                                                                                    |
| Beauty parlors                                                                                                                              | (b)            | 20 sq. ft. per person. See Wis. Adm. Code section Ind 59.51.                                                             |
| Billiard rooms                                                                                                                              | (a) or (b)     | 15 sq. ft. per person. See Wis. Adm. Code section Ind 59.42.                                                             |
| Bowling alleys                                                                                                                              | (a) or (b)     | Seating capacity, plus 6 persons per alley. To compute occupied area at foul line. See Wis. Adm. Code section Ind 59.51. |
| Brokerage board rooms                                                                                                                       | (a) or (b)     | 7 sq. ft. per person. See Wis. Adm. Code section Ind 59.51.                                                              |
| Cafeterias*                                                                                                                                 | (a) or (b)     | 15 sq. ft. per person. See Wis. Adm. Code section Ind 59.42.                                                             |
| Churches and places of worship                                                                                                              | (a) or (b)     | See Wis. Adm. Code section Ind 59.44.                                                                                    |
| Chapels                                                                                                                                     | (a) or (b)     | 7 sq. ft. per person.                                                                                                    |
| Dining and snack rooms                                                                                                                      | (a) or (b)     | 15 sq. ft. per person.                                                                                                   |
| Hall or auditorium                                                                                                                          | (a) or (b)     | 7 sq. ft. per person.                                                                                                    |
| Club rooms                                                                                                                                  | (a) or (b)     | Depends on usage.                                                                                                        |
| Dance halls                                                                                                                                 | (a) or (b)     | 15 sq. ft. per person. See Wis. Adm. Code section Ind 59.51.                                                             |
| Dining rooms*                                                                                                                               | (a) or (b)     | 15 sq. ft. per person. See Wis. Adm. Code section Ind 59.42.                                                             |
| Educational facilities                                                                                                                      |                |                                                                                                                          |
| Academic classrooms-regular                                                                                                                 | (a)            | 20 sq. ft. per person.                                                                                                   |
| Administrative and office space                                                                                                             | (a) or (b)     | 50 sq. ft. per person.                                                                                                   |
| Art, crafts, drafting                                                                                                                       | (a) or (b)     | 50 sq. ft. per person. Also see Wis. Adm. Code chapter Ind 20 - Dusts, Fumes, Vapors and Gases.                          |
| Bleachers                                                                                                                                   | (c)            | One seat per 18 inches of bench length.                                                                                  |
| Gymnasiums, field houses, auditoriums, theaters, lecture rooms (fixed seating)                                                              | (a)            | 10 sq. ft. per person.                                                                                                   |
| Gymnasiums, field houses, multipurpose rooms, cafeterias, study halls, commons and other level floor areas with nonfixed individual seating | (a)            | 10 sq. ft. per person.                                                                                                   |
| Home economics, business education                                                                                                          | (a)            | 30 sq. ft. per person.                                                                                                   |
| Industrial arts-vocational shop                                                                                                             | (a) or (b)     | 50 sq. ft. per person. See Ind 59.52 and Wis. Adm. Code chapter Ind 20 - Dusts, Fumes, Vapors and Gases.                 |
| Laboratories-science (fixed lab. tables)                                                                                                    | (a) or (b)     | 30 sq. ft. per person. Also see Wis. Adm. Code chapter Ind 20 - Dusts, Fumes, Vapors and Gases.                          |
| Libraries and resource centers                                                                                                              | (a)            | 20 sq. ft. per person.                                                                                                   |
| Museums and art galleries                                                                                                                   | (a)            | 40 sq. ft. per person.                                                                                                   |
| Musical                                                                                                                                     |                |                                                                                                                          |
| Vocal                                                                                                                                       | (a)            | 10 sq. ft. per person.                                                                                                   |
| Instrumental                                                                                                                                | (a)            | 20 sq. ft. per person.                                                                                                   |
| Special education (mentally retarded, physically handicapped, etc.)                                                                         | (a)            | 35 sq. ft. per person.                                                                                                   |
| Factories and machine shops                                                                                                                 | (b)            | See Wis. Adm. Code section Ind 59.53. Also see rules of Wis. Adm. Code chapter Ind 20 - Dusts, Fumes, Vapors and Gases.  |
| First-aid rest rooms                                                                                                                        | (a) or (b)     | 15 sq. ft. per person. See Wis. Adm. Code section Ind 59.53.                                                             |
| Foundries and boiler shops                                                                                                                  | (b)            | See Wis. Adm. Code section Ind 59.53. Also see rules of Wis. Adm. Code chapter Ind 20 - Dusts, Fumes, Vapors and Gases.  |

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TABLE 3—Continued

| Use or Occupancy                                                | Classifi-<br>cation | Basis of Capacity                                                                                                              |
|-----------------------------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Funeral homes.....                                              | (a) or (b)          | See Wis. Adm. Code section Ind 59.44.                                                                                          |
| Chapel.....                                                     | (d)                 | 7 sq. ft. per person.                                                                                                          |
| Garages and service stations.....                               | (a) or (b)          | See Wis. Adm. Code section Ind 59.52.                                                                                          |
| General offices.....                                            | (a) or (b)          | See Wis. Adm. Code section Ind 59.50.                                                                                          |
| Gymnasiums and combined gym-<br>nasiums and assembly halls..... | (a)                 | 4 sq. ft. per person for seated space,<br>15 sq. ft. per person for space not seated.                                          |
| Hospitals.....                                                  | (a) or (b)          | See Wis. Adm. Code section Ind 59.51.<br>See Wis. Adm. Code section Ind 57.17 and<br>Ind 57.19.                                |
| Hospitals (Mental).....                                         | (a)                 | See Wis. Adm. Code section Ind 59.55.                                                                                          |
| Day rooms.....                                                  | (b)                 | See Wis. Adm. Code section Ind 57.19.                                                                                          |
| Dormitories.....                                                | (b)                 | See Wis. Adm. Code section Ind 57.17 and<br>Ind 57.19.                                                                         |
| Junior chests.....                                              | (a)                 | See Wis. Adm. Code section Ind 59.48 and<br>Ind 59.50.                                                                         |
| Kitchens.....                                                   | (a)                 | See Wis. Adm. Code section Ind 59.49.                                                                                          |
| Laboratories.....                                               | (a) or (b)          | 25 sq. ft. per person. See rules of Wis. Adm.<br>Code chapter Ind 20—Dusts, Fumes, Vapors<br>and Gases.                        |
| Laudettes.....                                                  | (a)                 | See Wis. Adm. Code section Ind 59.56 (a).                                                                                      |
| Lecture halls.....                                              | (a)                 | 7 sq. ft. per person. Use seated area only.                                                                                    |
| Library reading rooms.....                                      | (a)                 | 25 sq. ft. per person.                                                                                                         |
| Locker rooms.....                                               | (a) or (b)          | See Wis. Adm. Code section Ind 59.48 and<br>Ind 59.50.                                                                         |
| Lodge halls.....                                                | (a) or (b)          | 4 sq. ft. per person for seated space,<br>15 sq. ft. per person for space not seated. See<br>Wis. Adm. Code section Ind 59.51. |
| Mental hospitals.....                                           | (a)                 | See Wis. Adm. Code section Ind 59.55.                                                                                          |
| Day rooms.....                                                  | (b)                 | See Wis. Adm. Code section Ind 57.19.                                                                                          |
| Dormitories.....                                                | (b)                 | See Wis. Adm. Code section Ind 57.17 and<br>Ind 57.19.                                                                         |
| Motion picture booths.....                                      | (a) or (b)          | See Wis. Adm. Code section Ind 59.43.                                                                                          |
| Penal institutions.....                                         | (a) or (b)          | See Wis. Adm. Code section Ind 57.17 and<br>Ind 57.19.                                                                         |
| Jail cell overnight lockup.....                                 | (a) & (b)           | 6 air changes per hour.                                                                                                        |
| Places of employment.....                                       | (a)                 | 75 sq. ft. per person. See Wis. Adm. Code<br>section Ind 59.53.                                                                |
| Playrooms (unfurnished areas).....                              | (a)                 | 23 sq. ft. per person.                                                                                                         |
| Printing establishments.....                                    | (b)                 | See Wis. Adm. Code section Ind 59.51. Also<br>see rules of Wis. Adm. Code chapter Ind 20<br>—Dusts, Fumes, Vapors and Gases.   |
| Restaurants.....                                                | (a) or (b)          | 15 sq. ft. per person. See Wis. Adm. Code<br>section Ind 59.51.                                                                |
| Retail establishments.....                                      | (a) or (b)          | Rooming: 40 sq. ft. per person. Other floor:<br>15 sq. ft. per person. See Wis. Adm. Code<br>section Ind 59.51.                |
| Security vaults (occupied).....                                 | (a)                 | 2 CFM per sq. ft.                                                                                                              |
| Slating racks.....                                              | (a) or (b)          | 15 sq. ft. per person. See Wis. Adm. Code<br>section Ind 59.51.                                                                |
| Sunday School.....                                              | (b)                 | 15 sq. ft. per person.                                                                                                         |
| Swimming pools.....                                             | (a)                 | See Wis. Adm. Code section Ind 59.48.                                                                                          |
| Taverns.....                                                    | (a) or (b)          | 20 sq. ft. per person. See Wis. Adm. Code<br>section Ind 59.51.                                                                |
| Theaters.....                                                   | (a)                 | 7 sq. ft. per person.                                                                                                          |
| Theater lobbies.....                                            | (a)                 | 15 sq. ft. per person.                                                                                                         |
| Theater lounge rooms.....                                       | (a)                 | 15 sq. ft. per person.                                                                                                         |
| Toilet rooms.....                                               | (a)                 | See Wis. Adm. Code section Ind 59.49.                                                                                          |
| Wardrobes, lockers and cloak<br>rooms.....                      | (a)                 | 2 CFM per sq. ft. floor area. See Wis. Adm.<br>Code section Ind 59.48 and Ind 59.53.                                           |

\*These occupancies are other than those related to educational facilities under Chapter Ind 15.

[For areas listed under "educational facilities," the department will accept maximum capacities stated on building plans according to section Ind 59.97.

History: Cr. Register, January, 1955, No. 109, eff. 2-1-55; am. (2)  
table 2, Register, September, 1973, No. 213, eff. 10-1-73.

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Ind 59.41 General requirements for occupancies under (a) and (b) classifications. (1) SCOPE. The requirements of this rule shall apply to all occupancies listed in Wis. Adm. Code section Ind 59.40 (1) (a) and (b) unless otherwise exempted by this code.

(2) AIR MOVEMENT. The total air circulated for all occupancies in this classification shall not be less than 6 air changes per hour unless otherwise provided by this code.

(a) The air delivery capacity of all equipment supplying air for heating, ventilating and air conditioning purposes shall be based on standard air ratings.

Note: Standard air is substantially equivalent to dry air at 70° Fahrenheit and 29.92 inches (H<sub>g</sub>) barometric pressure.

(b) An air movement of less than 6 air changes per hour is permitted where mechanical cooling (air conditioning) is provided and the heat gain requirement for the space has been satisfied.

(3) OUTSIDE SUPPLY. The outside air supply maintained during occupancy of a given space shall not be less than 7½ cubic feet per minute per occupant. Exhaust ventilation in equal volume shall be maintained simultaneously.

Note: See Wis. Adm. Code section Ind 59.40 (Table 2) for method of determining number of occupants.

(4) AIR DISTRIBUTION. All air outlets and returns shall be so located, arranged or equipped as to provide a uniform distribution of air.

(5) RECIRCULATION. No air contaminated by other than human occupancy shall be used for recirculation, except within the same occupancy classification.

(6) AUTOMATIC CONTROLS. Automatic controls shall be provided to maintain temperature and controlled ventilation to satisfy the following conditions during periods the area is occupied.

(a) Provide a continuous air movement of not less than the minimum required by this code.

(b) Provide a continuous supply of tempered outside air as determined by the number of occupants of not less than 7½ cubic feet of air per minute per person.

(c) Maintain design temperature.

(7) AIR CLEANSING DEVICES. Approved air cleansing devices shall be installed in a manner to filter the outside air and recirculated air used with mechanical heating and ventilating systems except as follows:

(a) Filters are not required in garages, factories, foundries and similar occupancies.

(b) Filters are not required for use with unit heaters designed for heating and recirculation.

(c) Where jet systems or blend-air systems are approved, air filters are not required in the ducts that are installed for the recirculation of air within the same occupied space.

Note: The department of industry, labor and human relations recognizes as approved, filters listed in Building Materials List published by the Underwriters' Laboratories, Inc. and test data of any other recognized testing agency for the purpose for which it is used.

History: Cr. Register, January, 1965, No. 109, sR, 2-1-65.

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**Ind 59.42 Places of assembly. (1) SCOPE.** This classification shall include arenas, armories, assembly halls, banquet halls, billiard rooms, bowling alleys, cafeterias, club rooms, dance halls, dining rooms, gymnasiums, lecture halls, lodge halls, playrooms, restaurants, school auditoriums, skating rinks and theaters, that will accommodate more than 100 persons.

*Note:* For areas that will accommodate less than 100 persons, see Wis. Adm. Code section Ind 59.41.

**(2) AIR MOVEMENT, SUPPLY AND DISTRIBUTION.** The air movement, supply and distribution for all occupancies under this classification shall conform to the requirements of section Ind 59.41.

**(3) STAGES.** The stage in any theater or assembly hall, for which a fire curtain is required, shall be supplied with sufficient air or other means to equalize the pressure to avoid deflecting the curtain.

**(4) ALTERNATE SERVICE AND CAPACITY.** Heating and ventilating systems installed in so-called community buildings and lodge halls may be arranged for selective delivery of the entire service to either the first floor area or to the basement floor area provided these areas are not used simultaneously.

*History:* Cr. Register, January, 1965, No. 109, eff. 2-1-65.

**Ind 59.43 Motion picture booth. (1) SCOPE.** This classification shall include all motion picture booths housing projection equipment using carbon arc lamps.

**(2) EXHAUST VENTILATION.** Hazardous fumes and gases shall be mechanically exhausted to the outside atmosphere from projectors, spotlights, stereopticons, and similar equipment. One exhaust system shall be used to remove all contaminated air. The volume of air exhausted shall be not less than 15 cubic feet per minute for each arc lamp or other source of contamination. Dampers are prohibited in the system. The system shall not be used for any other service.

**(3) AIR SUPPLY.** Where a mechanical exhaust system is required, a volume of tempered air shall be supplied to equal the volume of air exhausted. Air shall be supplied by one or a combination of the following methods:

(a) Tempered air may be supplied to the booth from other ventilating systems in the building if the inlet opening is protected with an approved shutter having quick acting fusible links, or other approved heat release devices that will automatically and quickly close the inlet opening simultaneously with the openings in the front of the booth.

(b) A separate supply system, such as a unit ventilator, if the equipment is arranged so that the air supply will be stopped automatically and simultaneously with the closing of the openings in front of the booth.

*Note:* When approved in writing by the department of industry, labor and human relations, the air may be taken through openings in the booth walls from the auditorium or other space adjoining the booth. For relief outlets in addition to exhaust ventilation, see Wis. Adm. Code section Ind 59.45.

*History:* Cr. Register, January, 1965, No. 109, eff. 2-1-65.

**Ind 59.44 Places of assembly for worship. (1) SCOPE.** This classification shall include auditoriums, social assembly rooms, and Sunday

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School rooms, in churches or houses of worship. It shall also include chapels in funeral homes, parochial schools and convents.

(2) **VENTILATION REQUIRED.** The air movement supply and distribution for occupancies in this class shall conform to the requirements of Wis. Adm. Code section Ind 59.40 and Ind 59.41. Mechanical ventilation will not be required where the total openable area of outside doors and windows is greater than 3% of the floor area served, except in funeral homes the openable area shall be greater than 5%. Window openings below grade will not be accepted unless there is a "clear space" outside of the window having a width not less than 1½ times the distance below grade at the bottom of the window.

*Note:* Width of "clear space" is the horizontal distance measured at right angles to the plane of the window.

(3) **ALTERNATE SERVICE AND CAPACITY.** Heating and ventilating systems installed in occupied areas of this class may be arranged for selective delivery of the entire service to either the auditorium floor area or to the basement floor area provided these areas are not used simultaneously.

*History:* Cr. Register, January, 1965, No. 109, eff. 2-1-65.

Ind 59.45 Schools. (1) **SCOPE.** This classification shall include all class, study, recitation, lecture, project rooms, kindergartens, library reading rooms and similar areas in all school, college and library buildings used for educational purposes. (See Wis. Adm. Code section Ind 59.42 for assembly rooms).

(2) **VENTILATION REQUIRED.** (a) *General.* The air movement and supply for all occupancies in this class shall conform to the requirements of sections Ind 59.40, 59.41 and 59.42.

(b) *Air movement and supply.* The air movement and supply for all occupancies under this classification shall conform to the requirements of section Ind 59.41. For corridors and halls used in conjunction with occupied areas of this class, the air movement shall not be less than 10 cubic feet per minute per lineal foot of corridor or hall. This air supply shall be accomplished by means of air inlets admitting air from adjacent classrooms or by a direct tempered air supply.

*History:* Cr. Register, January, 1965, No. 109, eff. 2-1-65.

Ind 59.46 Places for vocational instruction and research. (1) **SCOPE.** This classification shall include all places for vocational instruction and research, such as laboratories, school shops, domestic science rooms and similar occupied areas.

(2) **VENTILATION REQUIRED.** The air movement and supply for areas in this class shall conform to the requirements of sections Ind 59.41 and 59.52.

(3) **EQUIPMENT AND PROCESS EXHAUST.** (a) An exhaust system shall be provided for all equipment and processes that create dusts, fumes, vapors or gases injurious to health.

*Note:* See Wis. Adm. Code, Ch. Ind 20.

(b) Exhaust systems shall be separate from and independent of all other services and systems in a building.

*History:* Cr. Register, January, 1965, No. 109, eff. 2-1-65.

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**Ind 59.48 General sanitation and service areas.** (1) **SCOPE.** This classification shall include toilet rooms, locker rooms, natatoriums, shower rooms and janitor closets.

**Note 21:** A janitor closet is a service closet with one or more plumbing fixtures.

**Note 22:** For exhaust ventilation requirements in hospital service areas, see Wis. Adm. Code section Ind 59.56 (2).

**Note 23:** For exhaust ventilation requirements in places of employment, see Wis. Adm. Code section Ind 59.55.

(2) **VENTILATION REQUIRED.** (a) Exhaust ventilation shall be provided for all areas of this class unless otherwise exempted. The volume of air exhausted shall not be less than 2 cubic feet per minute per square foot of floor area.

(b) The effectiveness of the exhaust shall be greater than the supply.

(c) Exhaust ventilation shall be installed in toilet rooms having more than one fixture (water-closets and urinals).

**Note:** Exhaust ventilation is not required from toilet rooms having one water-closet or one urinal when the window area is greater than 4 square feet and more than 2 square feet is openable.

(d) The air movement in the natatorium shall be not less than 6 air changes per hour and the volume of tempered outside air supplied and exhausted shall be not less than 2 cubic feet per minute per square foot of pool surface.

(e) Locker rooms used with natatoriums, baths and toilet rooms, shall be supplied with tempered air.

**Note:** The air supplied may be exhausted through baths or toilet rooms.

(f) **Exemptions.** Exhaust ventilation is not required from toilet rooms having one water closet or one urinal, or from janitor closets having one service sink or receptor, providing the room has an outside window of at least 4 square feet with at least 2 square feet that is openable.

(3) **EXHAUST VENTILATING SYSTEMS.** Exhaust ventilating systems serving this class of occupancy shall not be used for any other service.

**History:** Cr. Register, January, 1965, No. 199, eff. 2-1-65; am. (1), cr. (2) (1), Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 59.49 Kitchens.** (1) **SCOPE.** This classification includes all areas where food is prepared, except in domestic science educational facilities from grades kindergarten thru 12, and single unit apartments in hotels, motels and apartment buildings.

(2) **VENTILATION REQUIRED.** (a) **Exhaust.** The exhaust ventilation shall be not less than 4 cubic feet per minute per square foot of floor area for every occupied area within the scope of this section.

1. **Exception:** The exhaust ventilation shall be not less than 2 cubic feet per minute per square foot of floor area for kitchens used in the preparation of only one meal a day. The exception may apply to churches, auditoriums and lodge halls.

(b) **Exhaust ventilating system.** Exhaust ventilating systems serving this class of occupancy shall not be used for any other services.

(3) **EXHAUST HOODS.** (a) **Where required.** Exhaust hoods are required under the following conditions:

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**1. Where frying and/or broiling is done.**

*Note:* The above includes deep-fat frying and surface frying.

**2. Where cooking is a regular commercial operation.**

*Note:* The above includes ranges, griddles, fryers, broilers and similar grease-producing equipment.

(b) *Size of hood.* The horizontal inside dimensions of the hood shall be sized to effectively capture grease vapors, but in no case shall these dimensions be less than the overall horizontal dimensions of the grease-producing equipment.

(c) The volume of exhaust air from the hood shall be not less than 100 cubic feet per minute per square foot of the overall horizontal dimensions of the grease-producing equipment.

(d) When hoods are connected to ducts supplying outside air, performance data shall be submitted as required by subsection Ind 59.20 (4) (g).

(e) Hood surfaces and exposed exhaust ducts within 18 inches of combustible material shall be protected by 2-hour fire-resistive construction.

(f) Hood surfaces that are concealed by or recessed into adjoining construction shall be protected by 2-hour fire-resistive construction.

(g) Recirculation of air as described under subsection Ind 59.24 (8) (b) is prohibited.

(4) **Ducts.** (a) Exhaust ducts or vents connected to required hoods that pass through any other area of the building, including suspended ceilings, shall be protected with not less than 2-hour fire-resistive construction. Where 2-hour fire-resistive construction cannot be provided, a manufactured or masonry chimney shall be used. The manufactured chimney shall be tested and approved for use at a flue gas temperature of not less than 1000° F.

*Note 1:* See Wis. Adm. Code section Ind 51.04 for various building materials having a 2-hour rating.

*Note 2:* See Ind 59.09 (1) (c) and (2) for fire dampers.

(b) Accessible clean-out openings shall be installed in the area of the duct not requiring a 2-hour fire-resistive construction.

(c) The air discharge shall be directed away from combustible materials.

(d) Sheet metal ducts shall be constructed of not less than 20 U.S. gauge sheet steel.

*History:* Cr. Register, January, 1963, No. 109, eff. 2-1-63; am. (1) and (4) (a), (b), (c) and (d), Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 59.50 Offices.** (1) **SCOPE.** This classification shall include areas where clerical and administrative work is the chief usage.

(2) **VENTILATION REQUIRED.** The air movement supply and distribution for this classification shall conform to the requirements of Wis. Adm. Code section Ind 59.41 unless each of the following requirements has been satisfied:

(a) The total area of outdoor openings is not less than 3% of the floor area served.

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(b) The available floor space for each occupant is not less than 75 square feet per person.

(c) Heat or odors are not present in sufficient quantities to be injurious to the health, safety or welfare of the occupants.

History: Cr. Register, January, 1965, No. 103, eff. 2-1-65.

**Ind 59.51 Retail establishment.** (1) **SCOPE.** This classification shall include barber shops, beauty parlors, brokerage board rooms, taverns, bowling alleys, retail establishments where goods and commodities are bought and sold and places where not more than 100 persons assemble for recreation, entertainment or dining purposes.

(2) **VENTILATION REQUIRED.** The air movement, supply and distribution for all occupancies of this class shall conform to the requirement of section Ind 59.41 unless the total area of "outdoor openings" is more than 3% of the floor area served. Window openings below grade will not be accepted unless there is a "clear space" outside of the window having a width of not less than  $1\frac{1}{2}$  times the distance below grade at the bottom of the window.

**Note:** Width of "clear space" means the horizontal distance measured at right angles to the plane of the window.

History: Cr. Register, January, 1965, No. 103, eff. 2-1-65.

**Ind 59.52 Garages and service stations.** (1) **SCOPE.** Ventilation shall be provided for all repair garages, service stations, body shops, repair service shops and live storage garages where vehicles or equipment having internal combustion engines are operated for repair or other purposes.

**Note:** A live storage area does not include vehicles or equipment stored for a seasonal period or where such vehicles or equipment, when new, are displayed in a showroom area.

(2) **VENTILATION REQUIRED.** The supply and exhaust ventilation shall be provided for areas of this class, whenever open to the public or to employees.

(3) **STORAGE AREAS.** (a) **Heated live storage area.** Areas used for the storage of 6 or more motor-driven vehicles shall be provided with a tempered outside air supply of not less than  $\frac{1}{2}$  cubic foot per minute per square foot of floor area. Exhaust ventilation shall equal the volume of air supplied.

**Note:** A live storage area is any area within a building used for the storage of fire trucks, tractors, automobiles, trucks and other self-propelled vehicles driven in and out under their own power. For exception, see note under (1).

(b) **Unheated live storage area.** Areas used for the storage of 6 or more motor-driven vehicles and where heat is not required, shall be provided with exhaust ventilation equal to  $\frac{1}{2}$  cubic foot of air per minute per square foot of floor area unless the following requirements have been satisfied:

1. The floor is at or above grade level.
2. A permanent open wall of the included area is not less than 30% of the total wall area and arranged to cause air circulation throughout the respective area.

(4) **REPAIR AREAS.** (a) All areas in which motor-driven vehicles are repaired shall be supplied with a volume of tempered outside air not

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less than  $\frac{1}{2}$  cubic foot per minute per square foot of floor area. An equal volume of exhaust ventilation shall be provided and maintained. Exhaust air shall be drawn from a line not more than 18 inches above the floor.

(b) Provide a mechanical exhaust system in the repair area to remove the exhaust fumes from internal combustion engines. The duct system shall be designed with sufficient outlets to accommodate the total number of vehicles in the repair area. Provide flexible hose equipped with a device for connecting it to the exhaust pipe of the vehicle and to the exhaust system. Each outlet shall be provided with a shut-off valve that can be closed when not in use. The blower capacity shall be sufficient to exhaust a volume of air not less than 100 cubic feet per minute for each opening.

*Note:* In a repair area of a garage where the repair area can accommodate not more than 2 vehicles, an incombustible flexible tube or hose not more than 10 feet long connected to the engine exhaust (tail pipe) and terminating outside of the building may be used in lieu of a mechanical exhaust system.

(c) A noncombustible flexible tube or hose not more than 10 feet long, connected to the engine exhaust (tail pipe) and terminating outside the building, may be used in lieu of requirements stated in (b) above.

*Note:* The requirements stated in (b) or (c) need not be increased when satisfying requirements of either (b) or (c). Also see Wis. Admin. Code Chapter Ind 20—Dusts, Fumes, Vapors and Gases, for additional requirements.

(d) Areas involved in the servicing of small internal combustion engines such as lawnmowers, snowmobiles, chainsaws, cycles, boat engines, etc. shall be provided with at least  $\frac{1}{2}$  cubic foot of tempered outside air per square foot of enclosed service floor area and an equivalent exhaust.

(5) SERVICE STATIONS. Buildings of this classification shall include liquid fuel dispensing stations and/or where vehicles can be driven into the building for washing, greasing, oil change, motor tune-up or repair, tire replacement, battery charging or replacement, and similar operations.

(a) All service and/or workroom areas, other than where engine tune-up or repair is made, shall be supplied with a volume of tempered outside air not less than  $\frac{1}{2}$  cubic foot per minute per square foot of floor area.

1. An exhaust ventilation system shall be provided to satisfy the minimum required air movement.

2. The exhaust air shall be drawn from not more than 18 inches above the floor.

(b) All service and/or workroom areas involving engine tune-up or repair requiring the operation of internal combustion engines shall be provided with ventilation to satisfy requirements of (4) above.

(c) Buildings or portions of buildings having a capacity of and used exclusively for washing 2 or more vehicles simultaneously shall be supplied and exhausted with a volume of air equal to  $\frac{1}{2}$  cubic foot per minute per square foot of floor area.

1. The minimum floor area calculated for wash areas provided with vehicle conveyor systems shall be based on that portion of floor

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located between the termination of the conveyor system and the vehicle exit door.

(6) GENERAL REQUIREMENTS. (a) A separate ventilating system shall be provided for show rooms or offices, except in service stations, where such occupancies are adjacent to repair or live storage areas.

Note: Ventilation is not required if openable area is provided to conform with Wis. Adm. Code sections Ind 59.54 (2) (a) and 59.51 (2).

(b) Air shall not be recirculated from any repair, live storage or service area, unless the total volume of air in circulation is in excess of the ventilation required. Excess air may be recirculated.

(c) The air exhausted from the repair, live storage and service areas shall be removed from a line not more than 18 inches above the floor through vent ducts located in areas of greatest contamination. Where gravity exhaust ventilation is provided, the vent ducts shall extend not less than 2 feet above the high point of the roof or parapet and shall be capped with an approved siphon type roof ventilator.

Note: For ventilation requirements where spray coating is done, see Wis. Adm. Code Ch. Ind 21.

(d) If the provisions of this section do not provide sufficient ventilation to meet the standards for threshold limit values covered in Wis. Adm. Code Chapter Ind 20—Dusts, Fumes, Vapors and Gases, the additional exhaust requirements with an equivalent volume of tempered outside air shall be provided to satisfy the requirements of Chapter Ind 20.

(e) The ventilation for battery-charging rooms shall satisfy the requirements of (4) (d).

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65; r. and recd. (1) and (5), cr. (4) (c) and (d), (6) (d) and (e), Register, September, 1973, No. 213, eff. 10-1-73.

Ind 59.53 Places of employment. (1) SCOPE. This classification shall include all places of employment not classified elsewhere in this code.

(2) VENTILATION REQUIRED. (a) The air movement supply and distribution for all areas in this class shall conform to the requirements of Wis. Adm. Code section Ind 59.41 unless all of the following requirements have been satisfied:

1. The available floor space for each occupancy shall be at least 75 square feet per person.

2. Heat, smoke, gas, dust, spray, hazardous fumes, vapors, steam or other contamination shall not be present in sufficient quantities to obstruct the vision, or be irritating, or injurious to the health or safety of employees and frequenters.

3. The total area of outdoor openings shall be not less than 3% of floor area served, except in refrigeration plants, warehouses, cold storage buildings and processing areas where the nature of the occupancy does not permit outdoor openings.

(3) INDUSTRIAL EXHAUST SYSTEMS REQUIRED. (a) Industrial exhaust systems shall be installed and operated to remove harmful contaminants in conformance with Wis. Adm. Code, Ch. Ind 20.

(b) Supply a volume of tempered outside air to replace the air exhausted if the volume of air exhausted exceeds an infiltration rate of 3 air changes per hour.

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(4) **LOCKER ROOMS.** Locker rooms used in places of industrial employment shall be provided with a tempered air supply.

*Note 1:* See Wis. Adm. Code section Ind 59.48.

*Note 2:* Exhaust air from locker rooms may be directed through the adjoining toilet or shower room.

(5) **FIRST AID REST ROOMS IN PLACES OF EMPLOYMENT.** Ventilation shall be provided for all areas of this class to conform to the requirements of Wis. Adm. Code section Ind 59.41. Ventilation is not required where the total sash area is greater than 10% of the floor area and the openable area is greater than 5%.

*History:* Cr. Register, January, 1965, No. 109, eff. 2-1-65.

**Ind 59.55 Penal institutions and places of detention.** (1) **SCOPE.** This classification shall include corridors and areas of compulsory occupancy in penal institutions, mental hospitals and other places of detention.

(2) **VENTILATION REQUIRED.** The air movement supply and distribution for all areas of this class shall be accomplished by mechanical means and shall conform to the requirements of sections Ind 59.40 and 59.41. The air movement through the corridors shall be not less than 10 cubic feet per minute per lineal foot of corridor.

(3) **OVERNIGHT LOCK-UPS.** Where cells are provided for not more than 6 occupants for the purpose of overnight detention only, exhaust ventilation shall be provided on the basis of 6 air changes per hour for the occupied area.

*History:* Cr. Register, January, 1965, No. 109, eff. 2-1-65.

**Ind 59.56 Hospitals.** (1) **SCOPE.** This classification shall include hospitals, nursing homes, public health centers, and treatment centers where medical services are provided for treatment and care of "bed-fast patients".

*Note 1:* A "bedfast patient" is a person who is normally confined to a bed or chair.

*Note 2:* Refer to the State Board of Health, Hospital and Related Services, for additional requirements.

(2) **VENTILATION REQUIRED.** (a) Exhaust ventilation shall be provided on the basis of 2 cubic feet per minute for each square foot of floor area from such rooms as baths, laboratories, laundries, anesthetic storage, bedpan, sterilizing, soiled utility, soiled linen, and janitor closets.

(b) Drug storage rooms, clean utility rooms, treatment rooms, dark rooms, and X-ray rooms shall have a minimum air movement of 6 air changes per hour. Such ventilation shall be accomplished by exhaust methods.

(c) The heating and ventilating system serving such rooms as operating, anesthesia, recovery, labor, delivery, nursery, isolation, therapy, and autopsy shall satisfy the following conditions:

1. A minimum air movement of not less than 6 air changes per hour.

2. Tempered outside air of not less than 6 air changes per hour shall be provided.

3. The recirculation of air is not permitted in autopsy rooms.

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4. Recirculation of air shall only be permitted within the system serving an individual room.

5. Mechanical exhaust shall be provided.

6. The system shall be designed to maintain room temperature at 75° F.

7. The relative humidity in rooms where anesthetic gases are used shall be maintained at not less than 50%.

(d) Private rooms, semi-private wards, day rooms, and nursing stations shall be ventilated in accordance with the requirements of Wis. Adm. Code section Ind 59.41 unless openable sash area has been provided and the content of the space is in excess of 400 cubic feet per occupant.

Notes: See Wis. Adm. Code sections Ind 57.17 and 57.19.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65; am. (2) (d), Register, December, 1967, No. 144, eff. 1-1-68; r. and recr. (3), Register, September, 1973, No. 213, eff. 10-1-73.

Ind 59.59 Combustion air intakes. (1) All burners shall be provided with combustion air by one of the following methods:

(a) Infiltration where total area of outdoor openings is greater than 3% of the floor area in which the burner is located.

Notes: See Ind 59.56 (3) for special conditions.

(b) Gravity intakes where the free area of such opening is at least one square inch for each 5,000 Btu per hour of fuel consumed. The minimum free area of such opening shall be not less than 100 square inches.

1. Manually operated dampers are prohibited.

2. Motorized dampers are acceptable when interconnected with the burner of direct-fired equipment. Dampers shall be open when the burner is in operation.

(c) Mechanical combustion air systems such as induced draft, forced draft or makeup air units when complete design data, including size of combustion air intake, has been approved by the department.

Notes: The department will accept 150% or more of theoretical combustion air requirements or burner manufacturers' recommendations.

(2) All boiler and furnace rooms shall be provided with combustion air from outside the building as required by subsection (1) (b) or (c) above.

(3) A natural-draft burner shall not be installed where the space in which the burner is located is under negative pressure due to another exhaust system.

(4) Mounting height shall be as required in subsection Ind 59.60 (1) (c).

History: Cr. Register, September, 1973, No. 213, eff. 10-1-73.

Ind 59.60 Outside ventilating air intakes or exhausts. (1) LOCATION.

(a) Outside air intake openings shall be located so as to minimize contamination of intake air, but in no case shall the distance be less than:

1. Twenty feet horizontally or 10 feet vertically from chimney outlets.

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2. Ten feet (measured in any direction) from all other exhaust and plumbing vents.

(b) Air intakes and exhausts shall be at least 10 feet from a property line and/or lot line or an adjacent building on the same property. This distance restriction does not apply to property lines along streets or alleys.

(c) *Mounting height.* 1. The lowest side of outside air intake openings shall be located at least 12 inches above the outside grade or above the adjoining roof surface.

2. Where outside air intake openings are located in any areaway below grade, the lowest side of opening shall be at least 12 inches above the bottom of areaway.

a. The minimum horizontal cross-sectional area of areaway shall be at least equal to the free area of the opening.

3. A grating shall be provided over the top of the areaway required in 2. above.

a. The grating shall have a free area at least equal to the required area of combustion air intake.

b. The openings in grating shall be 1/2 inch to one inch in the clear.

c. The grating shall be capable of supporting the design loads for intended location, but in no case shall it be designed for less than 100 pounds per square foot.

(2) **SCREENS.** All outside air intake openings shall be provided with a device to prevent intake of foreign material of 1/2 inch size or larger.

*Note:* See Wis. Adm. Code section Ind 59.69 (Table 4) for allowable velocities in the design of outside air intake openings.

(3) **WEATHER PROTECTION.** All outside air intake openings shall be protected against weather and water with a weatherproof hood or louvers. All outside air intakes except intakes for combustion air shall be equipped with a damper to prevent the intake of unheated air to the building when the heating unit is not in operation.

(4) **ACCESSIBILITY AND CLEANLINESS.** All outside air intakes shall be easily accessible for cleaning, and shall be kept clean and sanitary in use throughout the circuit to the heater.

*History:* Cr. Register, January, 1965, No. 109, eff. 2-1-65; r. and recf. (1); r. (2) and (6); renum. (3), (4) and (5) to be (2), (3) and (4). Register, September, 1973, No. 213, eff. 10-1-73.

Ind 59.61 Air cleansing apparatus. (1) Contaminated water shall not be recirculated through sprays affecting air used for ventilating purposes.

*Note:* See note following Wis. Adm. Code, section Ind 59.41 (7) for approved materials used in cleansing devices.

*History:* Cr. Register, January, 1965, No. 109, eff. 2-1-65.

Ind 59.63 Boilers. (1) **GENERAL.** The boiler, safety devices and other auxiliary equipment shall be of a type approved by the department of industry, labor and human relations.

*Note:* See Wis. Adm. Code, Ch. Ind 41.

(2) **RATING.** All boilers not rated by a recognized testing laboratory shall have a net rating equal to 60% of fuel input.

*Note:* The department of industry, labor and human relations accepts net ratings as listed by Mechanical Contractors Association of America, Inc., Steel Boiler Institute, Inc. and Institute of Boiler and Radiator Manufacturers.

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(3) **CONTROLS.** The boiler shall be equipped with automatic controls that will shut off fuel supply to the burner and pilot in case of ignition failure.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-66.

**Ind 59.64 Radiation and convection equipment.** The rating of steam or hot water radiation and convection equipment shall be based on approved standards.

Notes: The Department will accept net ratings as listed by Mechanical Contractors Association of America, Inc.; Institute of Boiler and Radiator Manufacturers; and equipment tested according to Commercial Standard 140-47.

History: Cr. Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 59.65 Jacketed stoves.** (1) **SCORE.** Jacketed stoves are acceptable in the following occupancies:

(a) One-room schools and portable schools having no basement or other subfloor heater space.

(b) One-story office buildings, where total floor area is less than 1500 square feet.

(c) One-story motels and apartment buildings.

(2) **LOCATION.** Jacketed stoves in a schoolroom shall be located in the coldest area.

(3) **SHIELDS.** The casings or shields of jacketed stoves in schools shall be so constructed as to shield adjacent occupants from radiant heat. The clear air space between shield and stove shall average 6 inches and the shields themselves shall extend above and below all heat radiating surfaces, but not more than 12 inches clear of the floor.

(4) **OUTSIDE AIR INTAKE.** Jacketed stoves installed in school buildings shall have an outside air intake terminating outside the building at a line not less than 12 inches above grade. The outside air intake shall be protected with a weatherproof hood or louvers and a  $\frac{1}{2}$  inch wire mesh screen. The intake duct shall be joined to the heater casing and airway in a manner that will prevent cold air from spreading over the floor and insure contact with the heater surface. Underfloor ducts are prohibited.

(a) The area of the outside air duct shall not be less than 0.25 square inch per square foot of floor area. A damper shall be provided in the outside air supply duct to prevent the intake of unheated outside air to the building during periods when the heater is not in operation.

(5) **VENTS.** Vent outlets in rooms served by jacketed stoves and heaters shall be located at the floor line and not less than 6 feet from the heater casing.

(a) The area of auxiliary metal vent flues used in connection with smoke pipes shall not be less than 150 square inches.

(b) Where effective devices for mixing smoke and vented air are used, the smoke flue and outlet duct may be combined, provided that the free area of the vent duct is not less than 144 square inches.

(6) **OIL BURNING HEATERS.** Every oil burning jacketed stove or

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room heater shall be supplied directly from an oil supply tank having a capacity of not less than 250 gallons.

(a) The fuel oil tank shall be equipped with a fill pipe, vent pipe and an oil gauge.

*Note:* See Wis. Adm. Code, chapter Ind 8.

*History:* Cr. Register, January, 1965, No. 109, eff. 2-1-65.

**Ind 59.66 Space heating equipment. (1) FURNACES. (a) Fan-furnace installations.** Forced air heating systems shall be designed to prevent a negative pressure on the heat exchanger, except where systems are designed to supply 100% tempered make-up air to replace a volume equal to that exhausted.

(b) *Gravity furnaces.* Gravity furnaces shall be located so that the air supply circuits leading to and from them will be as short and direct as practicable. The outside air inlet to gravity furnace airways shall be such as will insure distribution of air to relatively unheated portions of the furnace proper and throughout the furnace airways. The top of such inlet shall not be higher than 2 inches below the top of the grates.

(c) *Rating.* All furnaces not rated by a recognized testing laboratory shall have a net rating equal to 60% of fuel input.

(d) *Fire-resistive enclosure.* The furnace shall be isolated in a fire-resistive enclosure constructed in conformity to the applicable provisions of the Wis. Adm. Code, chapters Ind 50-59, building and heating, ventilating and air conditioning code.

*Note:* See Wis. Adm. Code, section Ind 59.21 (2).

(e) *Approved type.* A furnace shall be a type approved by the department of industry, labor and human relations.

(f) *Venting.* Furnaces shall be connected to an approved stack, vent or chimney. (See Wis. Adm. Code section Ind 59.67.)

*Note:* The department of industry, labor and human relations recognizes equipment listed by Underwriters' Laboratories, American Gas Association or other nationally recognized testing laboratories.

(g) *Controls.* The furnace shall be equipped with automatic controls that will shut off fuel supply to the burner and pilot in case of ignition failure.

**(2) UNIT HEATERS, SUSPENDED FURNACES AND DUCT FURNACES. (a) Direct-fired appliances of this class are prohibited in theaters, assembly halls, places of worship, schools, hospitals, hotels, apartment houses, and similar places where more than 100 persons assemble for recreation, entertainment or dining purposes, except where the appliance is enclosed in a fire-resistive enclosure constructed in conformity to applicable provisions of the Wis. Adm. Code, chapters Ind 50-59, building, heating, ventilating and air conditioning code.**

(b) Direct-fired appliances of this class in retail establishments, manufacturing plants, garages, service stations, machine shops, wood-working plants, foundries, offices, and similar areas shall comply with the following requirements:

1. The appliance shall be suspended in an occupied space.
2. The heating appliance shall be of an approved type.
3. The heating appliance shall be vented to the outside atmosphere by connection to a masonry chimney, an approved vent pipe, or to a

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metal smoke stack. (See Wis. Adm. Code section Ind 59.67—approved chimneys.)

4. The heating appliance shall be supported by incombustible brackets or hangers. All units shall be located at least 7 feet above the floor and at least 6 inches away from any combustible wall or ceiling.

5. The oil-fired unit shall not be suspended over combustible material.

6. The appliance shall be equipped with automatic controls that will shut off fuel supply to the burner and pilot in case of ignition failure.

(c) Where the entering air to the heat exchanger of all gas-fired equipment is 30 degrees Fahrenheit or lower, the heat exchanger and burners shall be constructed of corrosion-resistive materials.

(d) Floor-standing direct-fired unit heaters, furnaces and boilers in metal fabricating plants, foundries, and machine shops shall be isolated in a fire-resistive enclosure unless the building and contents are incombustible.

(e) Direct-fired gas appliances designed to supply 100% outside air (where the products of combustion are mixed with the comfort air stream), may be installed in metal fabricating plants, foundries, machine shops and factories provided:

1. The volume of air supplied to the occupied space is exhausted mechanically.

2. The heater is equipped with automatic controls that will shut off fuel supply to the burner in case of ignition failure.

*Note:* The department of industry, labor and human relations recognizes as approved, equipment listed by the American Gas Association, Underwriters' Laboratories, Inc. and test data of any other recognized testing laboratories.

(f) Supply duct connections are prohibited with "low static" direct-fired unit heaters.

(g) Unit heaters, suspended furnaces and duct furnaces not rated by a recognized testing laboratory shall have a net rating equal to 60% of fuel input.

(3) **SPACE HEATERS.** (a) Space heaters are prohibited in hazardous occupancies. Space heaters may be used in motel guest rooms, individual apartments, individual offices and retail establishments, subject to the following provisions:

1. A space heater may be used in retail establishments provided the floor area of any story does not exceed 1500 square feet.

2. Space heaters used in a retail establishment shall be provided with outside combustion air supplied directly to the burner.

3. Space heaters may be used in offices located within a factory or warehouse building providing the total floor area of the office space or spaces does not exceed 500 square feet.

4. The rated input capacity shall not exceed 70,000 BTU per hour for each appliance.

5. Space heaters shall be a type approved by the department of industry, labor and human relations.

6. Space heaters shall not be installed in any enclosed space having a volume less than 1000 cubic feet unless the combustion air supply is taken from the outside directly to the appliance.

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7. Space heaters shall be vented to the outside atmosphere by connection to a masonry chimney, an approved vent, vent pipe or metal smoke stack. (See Wis. Adm. Code section Ind 59.67—approved chimneys.)

8. Space heaters shall be equipped with automatic pilot of the complete shut-off type for gas burners and automatic valve in oil supply line for oil burners that will close in case of ignition failure.

9. Oil-fired space heaters shall be equipped with mechanical pressure atomizing burner.

10. The burner of the appliance shall be enclosed with a metal housing so constructed that there will be no open flame and the burner housing shall be effectively guarded against personal contact. The arrangement shall be such that the shield will prevent any combustible material in the vicinity of the appliance from coming in contact with the flame or with the housing that encloses the burner.

11. Space heaters shall be located at least 6 inches from any unprotected combustible wall or partition, unless approved by the department of industry, labor and human relations. Space heaters standing on a combustible floor shall be supported on legs securely fastened to the floor. The space under the unit shall not be enclosed.

12. Every oil-burning space heater shall be supplied directly from an oil supply tank having a capacity of not less than 250 gallons. The fuel oil tank shall be equipped with an oil gauge, vent and fill pipe. The vent and fill pipe openings shall terminate outside of the building.

Note: For fuel oil storage location and piping requirements, see Wis. Adm. Code, Ch. 8.

13. Space heaters shall not be equipped with duct extensions beyond the vertical and horizontal limits of the metal enclosure.

14. Space heaters not rated by a recognized testing laboratory shall have a net rating equal to 80% of fuel input.

Note: The department of industry, labor and human relations recognizes equipment listed by American Gas Association, Underwriters' Laboratories, Inc. and test data of any other nationally recognized testing laboratory.

(4) INFRA-RED GAS-FIRED RADIANT HEATERS. (a) Heating appliances of this class installed in machine shops, foundries, manufacturing plants, warehouses, garages and aircraft hangars shall conform to the following:

1. The heaters shall be a type approved by the department of industry, labor and human relations.

2. The heater shall be equipped with automatic pilot of the complete shut-off type.

3. Ventilation shall be provided to supply combustion air and dilute the products of combustion.

4. The heaters shall be supported by incombustible brackets or hangers.

5. Not less than the minimum clearances shall be maintained between the heater and combustible materials determined in accordance with test procedures and standards approved by the department of industry, labor and human relations. The heater shall be suspended above the floor not less than a height equal to 7 feet plus the approved minimum clearance from face of heater to combustible materials.

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6. Infra-red gas-fired radiant heaters, vented or unvented, not rated by a recognized testing laboratory shall have a net rating equal to 80% of fuel input.

*Note:* The department of industry, labor and human relations recognizes as approved, equipment listed by the American Gas Association, Underwriters' Laboratories, Inc. and test data of any other nationally recognized testing laboratory.

(5) **ELECTRIC SPACE HEATING EQUIPMENT.** (Electric furnaces, space heaters, unit heaters, cable heating devices, infra-red radiant heaters, and heat pump systems.) Where electric space heating equipment is used, it shall conform to the following requirements:

(a) It shall be a type approved by the department of industry, labor and human relations.

(b) It shall be equipped with safety and temperature controls.

(c) Not less than the minimum clearances shall be maintained between the electric space heating equipment and combustible material determined in accordance with test procedures and standards approved by the department of industry, labor and human relations.

(d) Electric space heating equipment shall not be installed in hazardous occupancies unless it is approved for such use. (See Wis. Adm. Code, Electrical code, volume 2.) The open type resistance heating element is prohibited in hazardous occupancies.

(e) Electric space heating equipment shall be rated on the energy input to the heating element, expressed in BTU per hour.

*Note:* The department of industry, labor and human relations recognizes as approved equipment listed by Underwriters' Laboratories, Inc.

*History:* Cr. Register, January, 1965, No. 109, eff. 2-1-65.

Ind 59.67 Chimneys, gas vents, mechanical draft and venting devices.

(1) **GENERAL REQUIREMENTS.** Heating appliances using solid, liquid or gas fuels shall be vented to the outside. A natural draft chimney or other venting device shall have the height and area to remove the products of combustion.

(2) **TYPES.** (a) *Masonry chimney.* The design and construction of the chimney shall conform to the provisions of Wis. Adm. Code, section Ind 52.10, (Building and heating, ventilating and air conditioning code).

(b) *Metal smoke stacks.* The design and construction of a metal smoke stack shall conform to the provisions of Wis. Adm. Code, section Ind 52.11.

(c) *Factory-built chimneys.* Where a factory-built chimney or a gas vent is used instead of a masonry chimney or a metal smoke stack, it shall be an approved type.

1. Type "A". An approved type "A" chimney may be used with solid, liquid or gas-fired heating appliances, where the flue gas temperature does not exceed 1000 degrees Fahrenheit continuously and does not exceed 1400 degrees Fahrenheit for infrequent brief periods of forced firing.

2. Type "B". An approved type "B" gas vent may be used with

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gas-fired appliances where the flue gas temperature does not exceed 550 degrees Fahrenheit at the outlet of the draft hood.

3. Type "BW". An approved type "BW" gas vent may be used with a vented recessed heater.

4. Type "C". A type "C" gas vent may be used with gas-fired low heat appliances (low pressure boiler, furnaces and space heaters). The vent shall be not less than No. 20 standard gauge galvanized iron or other approved corrosion-resistant material. The installation shall conform to the requirements of Wis. Adm. Code, section Ind 52.12.

*Note:* The department of industry, labor and human relations recognizes as approved chimneys designated as types "A", "B", "BW", and "C" and listed by American Gas Association and Underwriters' Laboratories, Inc.

(3) SPECIAL REQUIREMENTS. (a) All chimneys or gas vents shall be supported from incombustible construction unless otherwise approved.

(b) All chimneys or gas vents depending on a gravity principle for the removal of the products of combustion shall terminate not less than 3 feet above the highest point where they pass through the roof of the building, and at least 2 feet higher than any ridge, peak or wall within 10 feet of the chimney.

(c) The height and cross-sectional area may be reduced for chimneys employing mechanical draft equipment when approved by the department of industry, labor and human relations.

(4) SMOKE PIPES. The construction and installation of smoke pipes shall conform with the requirements of the Wis. Adm. Code, section Ind 52.12.

*History:* Cr. Register, January, 1965, No. 109, eff. 2-1-65.

Ind 59.68 Fans and Blowers. (1) TYPE AND CAPACITY. Fans and blowers shall be of a type and size that will satisfy the design conditions of the heating and ventilating system. Fans and blowers shall be rated in accordance with an approved test procedure.

*Note:* The department of industry, labor and human relations accepts certified ratings listed by Air Moving and Conditioning Association, Inc.

(2) QUIET OPERATION. The sound generated by various fans and blowers shall not be objectionable.

(3) CONTROLS FOR FAN-FURNACE INSTALLATIONS. All fan-furnace installations shall be equipped with controls to shut off the heat generating equipment whenever the bonnet air temperature exceeds a safe limit and to maintain air circulation through furnace airways whenever required to distribute the heat generated. The fan shall be of a capacity adequate to provide the required ventilation.

*History:* Cr. Register, January, 1965, No. 109, eff. 2-1-65.

Ind 59.69 Ducts. (1) DESIGN. All ducts shall be designed to promote the unrestricted flow of air with long sweep elbows or turning vanes. All ducts of a gravity system shall be as direct as possible and shall have a rise of not less than one inch per foot in the direction of flow.

(2) AIR VELOCITIES. The air velocity in vent ducts shall not exceed the limits established in Table 4.

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TABLE 4

|                                           | Maximum Allowable Velocity |                |
|-------------------------------------------|----------------------------|----------------|
|                                           | Mechanical System          | Gravity System |
| Intake openings using propeller fans..... | 600 F.P.M.                 | 300 F.P.M.     |
| Vertical vent ducts.....                  | 600 F.P.M.                 | 300 F.P.M.     |
| Roof siphon ventilators.....              | 600 F.P.M.                 | 300 F.P.M.     |

Note: The allowable velocity may be increased to 600 feet per minute for gravity vent ducts equipped with siphon ventilators and the tempered outside air is supplied by mechanical means.

Note: For supply and return air duct velocities, reference may be made to the standards of the American Society of Heating, Refrigerating and Air Conditioning Engineers Guide and Data Book, which are acceptable.

(3) **USE.** No duct designed for the transmission of air shall be used for any other purpose.

Note: See Wis. Adm. Code section Ind 59.69 (4) (g) for exception.

(4) **UNDERGROUND DUCT CONSTRUCTION AND INSTALLATION.** (a) All underground duct systems using cement tile, glazed clay tile and other tile having a composition of cement and minerals shall be waterproof and shall have sufficient strength to prevent failure of duct at time of installation and while in service. All fittings shall be designed with bell and spigot or slip joint connections. All joints shall be waterproof.

(b) Metal and other approved materials not specified in (a) may be used for underground systems if encased in not less than 2 inches of concrete. The ducts shall be round, water-proof, incombustible, smooth, and of sufficient strength to prevent collapse.

(c) Supply air ducts installed parallel and adjacent to an outside wall shall be insulated with a moisture proof material (thermal conductance factor of .19 BTU per hour per square foot per degree Fahrenheit) placed between the duct and outside wall. The insulation shall extend from bottom of floor to 2 feet below finished grade.

(d) Underground ducts shall be provided with drainage to a lower room of the building or to a sump. No duct shall be connected to a sewer.

(e) All room inlets and outlets for underground ducts shall comply with Wis. Adm. Code, subsection Ind 59.71 (4). A water-tight connection shall be provided where the inlet and outlet risers are connected to underground ducts.

(f) In addition to the requirements of subsections (4) (a), (b), (c), (d), and (e), the trunk duct shall not be less than 12 inches high and 12 inches wide and branch ducts not more than 16 feet long may be 8 inches high and 8 inches wide. All ducts shall be provided with inspection and clean-out openings equipped with tight fitting incombustible covers.

(g) In addition to the requirements in subsections (4) (a), (b), (c), (d) and (e) warm air supply ducts shall be designed in compliance with allowable air velocities in Table 4. Where supply air ducts are installed parallel and adjacent to an outside wall, a moisture-proof insulating material (thermal conductance factor of .19 BTU per hour per square foot per degree Fahrenheit) shall be placed

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between the duct and outside wall. The insulation shall extend from bottom of floor to 2 feet below finished grade.

(b) Non-hazardous piping may be installed in underground ducts if it does not restrict the air flow and the inside dimensions of the duct are greater than 4 feet wide and 4 feet high.

(5) CONSTRUCTION. (a) All sheet metal ducts and fittings shall be constructed in compliance with standards approved by the department of industry, labor and human relations. All ducts or airways of wood or other combustible material shall be lined on the inside with sheet metal or other approved incombustible material.

*Note:* For acceptable standards, see ASHRAE Guide and Data Book, published by the American Society of Heating, Refrigeration and Air-Conditioning Engineers or as illustrated in the Duct Manual published by the Sheet Metal and Air Conditioning Contractors National Association, Inc.

(b) Ducts constructed of other than metal need not conform to subsection (5) (a), provided:

1. They are approved for such use and the method for fabricating, installing and supporting is approved by the department of industry, labor and human relations.

*Note:* The department of industry, labor and human relations accepts Class I air ducts tested (Standards for Safety D.L. 181) and listed by Underwriters' Laboratories, Inc.

2. They resist puncture, deformation or collapse.

3. They are not used where the air temperature exceeds 250 degrees Fahrenheit.

4. They do not pass through required fire-resistive construction.

5. They are not connected to a furnace, duct heater or similar heat-producing appliance unless a connecting duct of steel, having a length of not less than 6 feet is used to separate them from the appliance.

(c) Flexible duct connectors between duct systems and air outlets or air outlet units need not conform to subsections (5) (a) and (b), provided:

1. The duct material is approved for such use.

*Note:* Flame-retarded fabric or metal or mineral listed in Building Materials List published by Underwriters' Laboratories, Inc. are acceptable.

2. The construction is approved by the department of industry, labor and human relations.

3. The connector is not subject to deterioration from mildew or moisture.

4. The connector does not pass through required fire-resistive construction.

(d) The vibration isolation connectors at the joint between the duct and fan or heat-producing equipment shall conform to the following:

1. The connector shall be a type approved for such use.

*Note:* Flame-retarded fabric or metal or mineral listed in Building Materials List published by Underwriters' Laboratories, Inc. are acceptable.

2. The connector shall be not more than 10 inches wide.

3. The connector shall not be used where the air temperature is in excess of 250 degrees Fahrenheit.

(e) Spirally wound metal ducts shall be constructed to provide structural strength equal to rectangular ducts. The metal may be one standard gauge lighter than required for round ducts.

(6) **SUSPENDED CEILING PLENUM.** The plenum above suspended ceilings shall be of incombustible construction. The installation of hazardous piping is prohibited. Openings into the plenum that would affect the fire-resistive rating of the roof and ceiling are prohibited.

(7) **INSULATION.** Heating supply ducts shall be covered with not less than  $\frac{1}{2}$  inch of insulation unless an allowance is made for temperature drop in the system.

(8) **GRAVITY VENT DUCTS.** (a) Separate vent ducts from each area of similar occupancy shall extend to a plenum at the base of a siphon ventilator.

(b) The use of open pipe space for a gravity vent duct is prohibited.

(9) **TERMINATION OF VENT DUCTS.** Vent ducts used with mechanical ventilation supply systems shall not terminate in attic space, unless the space is air tight, of incombustible construction and the attic floor is smooth. All such gathering chambers shall be connected to an approved siphon type roof ventilator or to an exhaust fan discharging outside the building.

(10) **VENT DUCTS, HORIZONTAL RUN.** (a) Horizontal runs in vent ducts connected to siphon type roof ventilators shall be avoided wherever possible and the maximum practicable inclination shall be provided in all cases. In no case shall the horizontal run exceed 30% of the vertical run unless the room has a direct mechanical supply or the vent duct is connected to an exhaust fan.

(b) Dampers are prohibited in gravity vent ducts, unless automatic back draft dampers are installed.

(11) **VENT DUCTS ABOVE ROOF.** Final delivery of all vent circuits shall be protected from weather, and shall be so located and constructed as to prevent contamination of air supply for or in any occupied area. Gravity vent ducts shall extend not less than 2 feet above the high portion of the roof or parapet wall, and shall be surmounted with an approved type of siphon roof ventilator.

(12) **RELIEF VENTS.** (a) The use of barometric relief vents is prohibited where exhaust ventilation is required for occupancies classified as (c) and (d) in Table 3.

(b) Barometric relief vents may be used to exhaust an air volume equal to the mechanical ventilation supplied for occupancies classified as (a) and (b) in Table 3.

(c) Where barometric relief vents are installed on the roof, the discharge opening shall not be less than 2 feet above the roof.

(13) **FIRE DAMPERS AND FIRE DOOR ASSEMBLIES.** (a) Where heating and ventilating ducts pass through required fire-resistive walls or floor systems, such ducts shall have approved fire dampers or fire door assemblies installed in the approved tested position and located at the point where the ducts pierce the walls or floor systems. Ducts shall be protected according to the following conditions:

1. For construction requiring a fire-resistive rating of one hour or less, the damper or fire door assembly shall be rated not less than the rating of construction. See the following exception.

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a. If the above referenced duct is constructed entirely of 20 U.S. gauge sheet metal, no damper will be required. Ducts installed in combustible fire-resistive construction shall satisfy the installation requirements for smoke pipes as stated in section Ind 52.12.

2. For construction requiring a fire-resistive rating of not less than 1½ hours up to ratings not more than 2 hours, the damper or door shall be rated not less than 1½ hours.

3. For construction requiring a fire-resistive rating of 3 or 4 hours, the door assembly shall be rated not less than 3 hours.

4. Access panels shall be provided next to damper or door assembly to permit viewing and servicing.

**Note 21:** Special attention should be given to design and installation of equipment where highly corrosive conditions exist.

**Note 22:** See Wis. Admin. Code Chapters 50 through 57 for fire-resistive rated construction.

5. No openings will be permitted in fire-resistive rated doors unless such door assemblies satisfy the requirements of Ind 51.047.

6. Fire dampers are prohibited in kitchen exhaust ducts where combustion-supporting grease deposits can accumulate unless approved kitchen hood assemblies including fire dampers and extinguishing systems are used.

**Note 23:** The department will accept those hoods and systems approved by Underwriters' Laboratories.

**Note 24:** The above includes those exhaust ducts serving ranges, broilers, fryers and griddles, for example, but does not include such equipment as dishwashers and steam kettles.

(b) Where heating and ventilating ducts terminate after penetration of required fire-resistive walls or floor systems, such duct openings shall be protected by approved fire dampers or fire door assemblies installed in the approved tested position and rated to satisfy one of the following conditions:

**Notes:** The above includes transfer grilles, combustion air intakes, and supply and return air ducts.

1. Where construction of enclosure must satisfy a fire-resistive rating of one hour or less, the damper or fire door assembly shall be rated not less than the rating of construction. See the following exception.

a. Exception: If the above referenced duct is constructed entirely of 20 U.S. gauge sheet metal, no damper will be required. Ducts installed in combustible fire-resistive construction shall satisfy the installation requirements for smoke pipes as stated in section Ind 52.12.

2. Where construction of enclosure must satisfy a fire-resistive rating of one and one-half (1½) hours or two (2) hours, the damper or fire door assembly shall be rated not less than one and one-half (1½) hours.

3. Where construction of enclosure must satisfy a fire-resistive rating of three (3) or four (4) hours, the fire door assembly shall be rated not less than three (3) hours.

**Notes:** The department will accept listed fire damper and fire door assemblies tested by a nationally recognized testing laboratory and the systems recommended in publications of Sheet Metal, Air Conditioning Contractors National Association, Inc. and National Fire Protection Association Bulletin No. 90A.

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(c) Exceptions: Fire damper or fire door assemblies are not required in (a) where

1. Maximum duct area does not exceed 20 square inches.
2. Duct serves as an exhaust for kitchen range hood.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65; R. and reg. Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 59.70 Volume dampers and deflectors.** Necessary volume dampers, splitters and deflectors shall be provided in all ducts to permit accurate balancing of the system. The dampers, splitters and deflectors shall be adjusted to satisfy the heating and ventilating requirements of the conditioned space and locked in place.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65.

**Ind 59.71 History:** Cr. Register, January, 1965, No. 109, eff. 2-1-65; R. Register, September, 1973, No. 213, eff. 10-1-73.

**Ind 59.72 Equipment location and protection required.** Heating and ventilating equipment in gymnasiums, play rooms and similar occupied areas shall be fully recessed, and protected, or located not less than 7 feet above the floor. Heating and ventilating equipment shall not block any part of the required aisles, passageways and corridors.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65.

**Ind 59.74 Piping. (1) PIPE SIZES AND ARRANGEMENT.** All steam and hot water supply and return piping, air-line piping and auxiliary equipment shall be of appropriate sizes, elevations and arrangements in accordance with standard engineering practice to accomplish the calculated services in practical operation, without undue noise, stress or other detriment.

(2) **EXPANSION AND CONTRACTION.** The piping for heating system shall be equipped with anchors, expansion swings or joints, supports and similar devices to relieve stress and strains caused by temperature change of the pipe material.

(3) **PIPE INSULATION.** Steam, hot water supply and return piping in occupied areas shall be covered with not less than  $\frac{1}{2}$  inch insulating material, where the heat emission is objectionable or where piping is subject to freezing.

Note: For additional requirements see Wis. Adm. Code section Ind 62.13.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65.

**Ind 59.75 Refrigerants.** The rules covering the use of refrigerants as a function of air conditioning systems shall conform with Wis. Adm. Code chapter Ind 45 (Mechanical Refrigeration).

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## APPENDIX A

The following notes, bearing the same number as the text of the building and heating, ventilating and air conditioning code to which they apply, contain useful explanatory material to clarify the referenced definitions and rules.

A-51.01 (11) BUILDING. The intent was to consider permanent awnings as part of a building.

A-51.01 (42) FAMILY. The intent of this definition is to clarify the use of the word "family" in reference to subsection Ind 57.001 (2) (a); it is not intended as a variance to requirements stated under Ind 57.001 (2) (b).

A-51.01 (67a) HABITABLE ROOM. It is the intent that rooms designated as recreation, study, den, family room, office, etc., and providing the only space for living and/or sleeping are considered habitable rooms.

A-51.01 (115) SETBACK. The intent was to not include gutters, downspouts, outdoor lighting fixtures, signs and similar attachments as parts of a building.

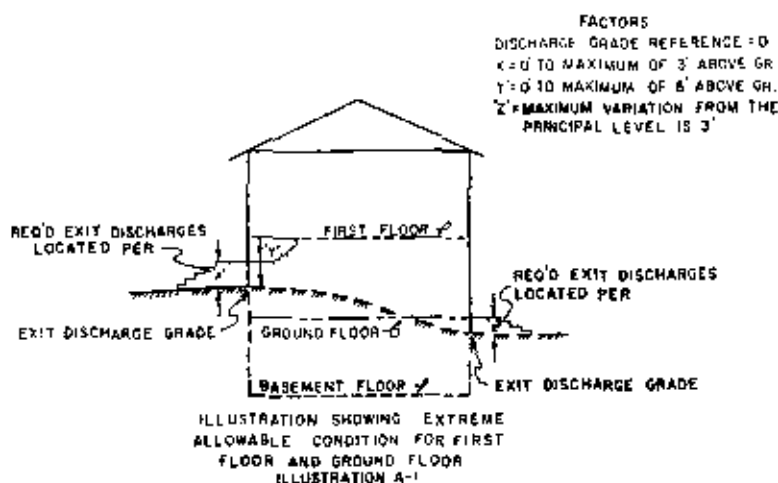
A-51.01 (121) STORIES, NUMBER OF. For further clarification, refer to A-51.02 (14).

A-51.01 (14) WALL (DIVISION).

(a) Building division wall is intended to denote a wall constructed in a manner sufficient to meet requirements for a party wall [see "Wall (Party)"] and is acceptable as a dividing wall or enclosing wall when determining the volume of a building as referred to in sections Ind 59.19, 52.001 and 59.29. Also see Chapter A-E 2 of Wis. Adm. Code—Examining Board of Architects, Professional Engineers, Designers and Land Surveyors.

(b) Fire division wall is intended to relate to construction that provides separation between portions of a building to satisfy allowable floor area limitations, separation between 2 classes of construction, or separation of hazardous occupancies. For other separations, see "occupancy separations" and isolation of hazardous sections of this code.

A-51.02 (14) DETERMINATION OF NUMBER OF STORIES. The following illustrations are provided to give visual aid to this rule and the definition of Ind 51.01 (121) Stories, Number of.



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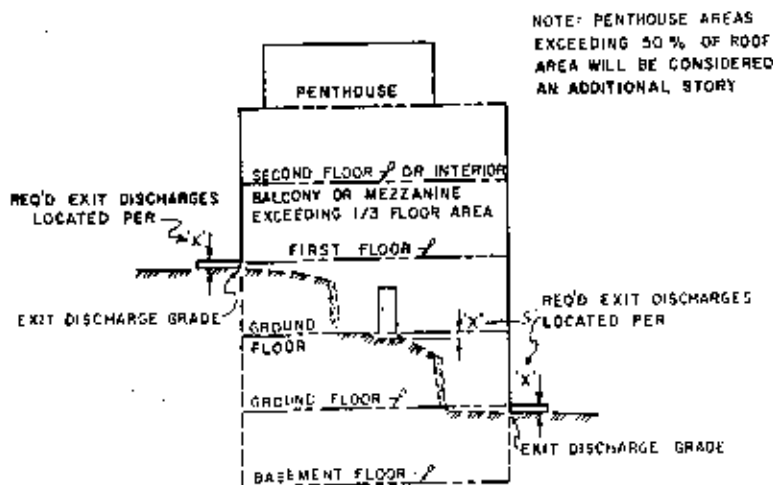
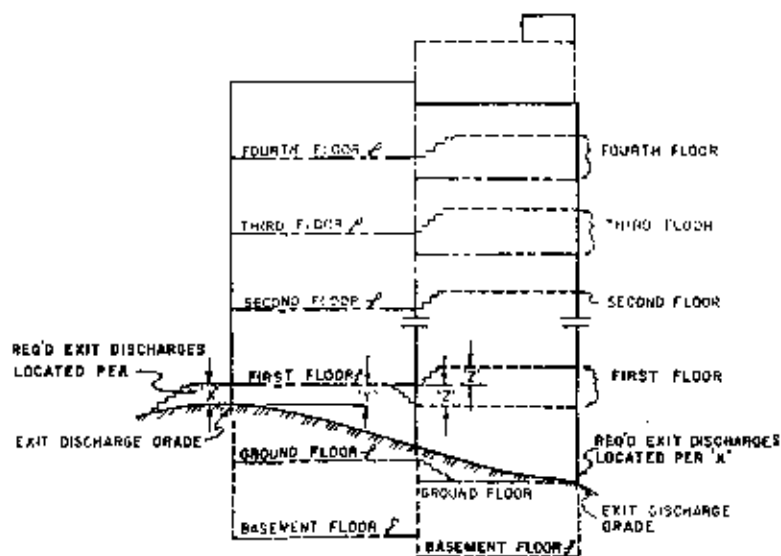


ILLUSTRATION SHOWING POSSIBLE  
2 STORY CONDITION OR 3  
STORY WITH PENTHOUSE  
NOTE: FOR ADDITIONAL VARIATIONS TO NO. OF  
STORIES SEE INC 51.02 (311b)  
ILLUSTRATION A-2



FOUR STORY BUILDING  
ILLUSTRATION A-3

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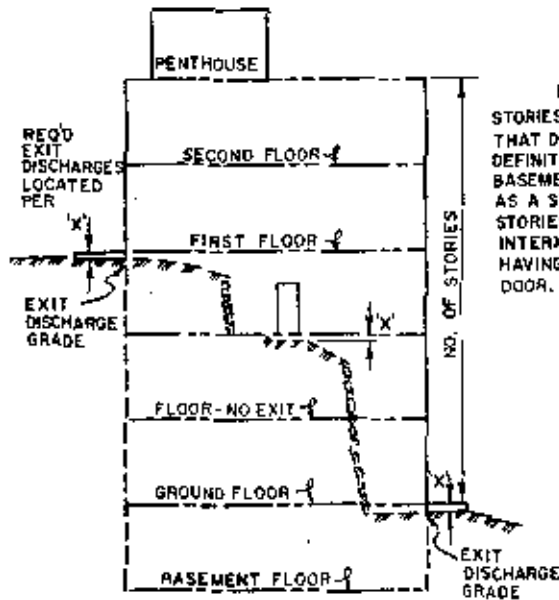


ILLUSTRATION A-4

## EXCEPTION

STORIES BELOW A FIRST FLOOR THAT DO NOT COMPLY WITH THE DEFINITION OF GROUND FLOOR OR BASEMENT SHALL BE COUNTED AS A STORY. TOTAL NUMBER OF STORIES WILL INCLUDE ANY INTERMEDIATE GROUND FLOOR HAVING AN EXTERIOR EXIT DOOR.

A-51.02 (5) The use of the term "high hazard" as referred to in this section is intended to apply to the following list of operations and occupancies:

1. Aircraft hangars.
2. Dry cleaning establishments: using or storing gasoline or other volatile flammable liquids.
3. Chumming or jacking operations.
4. Mills: sugar, starch, cereal, feed, flour and grist mills.
5. Paint and varnish: manufacturing, storing, handling, spraying, and other related operations.
6. Pyroxylin products: manufacture and storage.
7. Repair garages.
8. Smoke houses.
9. Storage of: explosive gases under pressure (15 psi and over 2,500 cubic feet) such as acetylene, hydrogen, natural gas, etc.
10. Storage of: materials with a flash point under 200° F, such as refined turpentine, kerosene, oil, etc.
11. Woodworking establishments.

A-57.18 The intent of this section is to apply to floor levels not more than one story below grade (at building).

A-57.18 (d) It is the intent of this subsection that each living unit needs only one means of exit from within the unit and that the entire building be provided with no less than 2 exits.

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