

Wisconsin Administrative Code

Rules of DEPARTMENT OF INDUSTRY LABOR AND HUMAN RELATIONS

1977

BUILDING AND HEATING VENTILATING AND AIR CONDITIONING CODE

Cite the rules in this Code as

(for example)

Wis. Adm. Code section Ind 50.01

**DEPARTMENT OF INDUSTRY, LABOR AND
HUMAN RELATIONS**

201 E. Washington Ave.

Madison, Wisconsin 53702

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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In some instances an entire code has been repealed and recreated subsequent to the original printing date.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.

Chapter Ind 50

ADMINISTRATION AND ENFORCEMENT

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Note: Chapter Ind 50 as it existed on December 31, 1976, was repealed and a new chapter Ind 50 was created effective January 1, 1977.

PART I—PURPOSE AND SCOPE

Ind 50.01 Purpose of code. The purpose of this code is to protect the health, safety and welfare of the public and employees by establishing minimum standards for the design, construction, structural strength, quality of materials, adequate egress facilities, sanitary facilities, natural lighting, heating and ventilating, energy conservation, and fire safety for all public buildings and places of employment.

Note #1: The purpose as stated can be traced to the terms used in the "safe place" statutes, chapter 101, Wis. Stats.

Note #2: This code is intended for the protection of the public and is not intended as a design manual, a textbook or a construction manual.

History: Cr. Register, December, 1976, No. 202, eff. 1-1-77.

Ind 50.02 Scope of code. The provisions of this code shall apply to all public buildings and places of employment. The term "building or structure" as hereinafter used in this code shall mean public building or place of employment. The provisions of this code are not retroactive unless specifically stated in the administrative rule. Where different sections of this code specify different requirements, the most

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restrictive requirement shall govern. The appendix provides explanatory material related to specific code requirements.

Note: For a definition of "public building" and "place of employment," see sections Ind 51.01 (102a) and 51.01 (104a) or section 101.01 (1), Wis. Stat.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77

SPECIAL NOTE

AN ASTERISK (*) FOLLOWING THE SECTION OR SUBSECTION NUMBER OR LETTER INDICATES EXPLANATORY MATERIAL ON THAT PARAGRAPH MAY BE FOUND IN APPENDIX A. EXAMPLE: IND 51.01 (16)* -- SEE A-51.01 (16) IN APPENDIX A.

PART II—APPLICATION OF BUILDING CODE

Ind 50.03 Application. (1) **NEW BUILDINGS AND ADDITIONS.** The provisions of this code shall apply to all new buildings and structures, and also to additions to existing buildings and structures, except those indicated in section Ind 50.04.

(2) **ALTERATIONS TO BUILDINGS.** The provisions of this code shall apply to all remodeling or alterations in any building or structure which affect the structural strength, fire hazard, exits, natural lighting or replacement of major equipment. These provisions do not apply to minor repairs necessary for the maintenance of any building or structure nor to buildings exempt, as listed in section Ind 50.04.

(3) **CHANGE OF USE.** (a) If the use of an existing building or structure is changed in accordance with the definition of section Ind 51.01 (87), and the requirements for the new use are more stringent than those for the previous use, the building or structure shall be made to comply with the requirements for the new use as provided in this code.

1. *Exception.* Unless the requirements for the new use are modified subject to the written approval by the department.

2. *Exception.* An existing building undergoing a change of use will not be required to comply with the provisions of section Ind 52.04—barrier-free environments, unless the building undergoes physical remodeling in accordance with the percentages established in subsection Ind 52.04 (6).

(b) If, upon inspection of an existing building or structure, it is found that its use has changed and that it does not comply with the requirements of the building code in effect at the time of change, it shall be made to comply with the code requirements in effect at the time of change in use.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 50.04 Buildings exempt from code requirements. This code does not apply to the following types of buildings:

(1) One- and two-family dwellings and outbuildings in connection therewith such as barns and private garages.

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(2) Buildings used exclusively for farming purposes, which are not within the limits of a city or an incorporated village.

Note: For a definition of "farming," see section 102.04 (2), Wis. Stats.

(3) Buildings used primarily for housing livestock or for other agricultural purposes, located on research or laboratory farms of public universities or other state institutions.

(4) Temporary buildings, used exclusively for construction purposes, not exceeding 2 stories in height, and not used as living quarters.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 50.05 Existing buildings code. 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, Wis. Adm. Code chapters Ind 160-164, issued by the department. Buildings and structures constructed after October 9, 1914 shall comply with the code in effect at the time.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 50.06 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 regulations do not conflict with this code, or with any other rule of the department, or law.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

PART III—DESIGN AND SUPERVISION

Ind 50.07 Design. Every new building, or alteration to a building, shall be designed in compliance with this code.

(1) **BUILDINGS CONTAINING NOT MORE THAN 50,000 CUBIC FEET TOTAL VOLUME.** The plans and specifications for every new building, or alteration to a building, containing not more than 50,000 cubic feet total volume, or addition to a building in which the volume of the addition results in the entire building containing not more than 50,000 cubic feet total volume, may be prepared by a registered architect, engineer, designer, contractor or owner, or his [her] authorized agent.

(2) **BUILDINGS CONTAINING MORE THAN 50,000 CUBIC FEET TOTAL VOLUME.** The plans and specifications for every new building, or alteration to a building, containing more than 50,000 cubic feet total volume, or addition to a building in which the volume of the addition results in the entire building containing more than 50,000 cubic feet total volume, shall be designed as follows:

(a) *Building or structural design.* The plans and specifications for the design of the building or structure shall be prepared by a Wisconsin registered architect or engineer.

(b) *Heating, ventilating and air conditioning design.* The plans and specifications for the heating, ventilating and air conditioning

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system shall be prepared by a Wisconsin registered architect, engineer or designer.

Note 1: See section Ind 51.01 (189a) for definition of total volume.

Note 2: The above terms "registered architect, engineer or designer" mean registered architect, registered professional engineer or registered designer as defined by laws regulating the practice of engineering and architecture found in chapter 448, Wis. Stats. Registered designers are limited to the specific designations outlined in Wis. Adm. Code section A-10.1.20.

Note 3: According to section 87.30, Wis. Stats., the construction or placement of every building, structure, fill or development placed or maintained within any flood plain is required to satisfy local or state regulations.

Note 4: According to section 101.12 (4), Wis. Stats., every architect and every engineer, submitting plans for the construction of any building or structure using public funds, is required, prior to the letting of final bids on such buildings or structures, to submit a written report to the contracting agency indicating whether such building or structure meets, or does not meet, federal fallout shelter engineering standards.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 50.08 Plans, specifications and calculations prepared outside Wisconsin. Plans, specifications and calculations for buildings and structures, in accordance with the requirements of section Ind 50.07 (2), may be prepared by an architect or engineer registered outside of the state of Wisconsin, provided the following conditions are satisfied:

(1) **SEAL.** The plans, specifications and calculations shall bear the signature and seal or stamp of the architect or engineer registered in a state other than Wisconsin.

(2) **CERTIFICATE.** A certificate, dated, signed and sealed by an architect or engineer registered in Wisconsin, shall be attached to the plans, specifications and calculations. The certificate shall indicate that the plans, specifications and calculations were prepared in a state other than Wisconsin by an architect or professional engineer registered in that state; describe the work performed by the Wisconsin registered architect or engineer; and include statements to the effect that the plans and specifications have been reviewed and comply with all applicable local and state buildings codes, and that the reviewing architect or engineer will be responsible for the supervision of construction in accordance with the requirements of section Ind 50.10.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 50.09 Changes to plans and specifications. No change in plans or specifications, which involve any provisions of this code, shall be made unless such change is signed, sealed and dated by the architect, engineer or designer who made the change, and approved by the department.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 50.10 Supervision. All constructions or installations described in section Ind 50.07 (2) shall be supervised by a Wisconsin registered architect or engineer, except that a Wisconsin registered designer may supervise the installation of heating, ventilating and air conditioning

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systems. The person responsible for supervision shall also be responsible for the construction and installation being in substantial compliance with the approved plans and specifications. Should the supervising architect, engineer, designer, or the department, be confronted with a nonconformance to the code during, or at the end of, construction, said parties, together with the designing architect, engineer or designer shall effect compliance.

(1) **DEFINITION.** Supervision of construction is a professional service, as distinguished from superintending of construction by a contractor, and means the performance, or the supervision thereof, of reasonable on-the-site observations to determine that the construction is in substantial compliance with the approved plans and specifications.

(2) **NAME OF SUPERVISING ARCHITECT, ENGINEER OR DESIGNER.** Prior to the start of construction, the owner of the building or structure, whose name must be a part of, or accompany, all plans submitted for approval, as required by section Ind 50.12, or his [her] authorized agent, shall designate to the department, in writing, the name and registration number of the architect, engineer or designer retained to supervise construction of the building or structure.

(3) * **COMPLETION STATEMENT.** Upon completion of the construction, the supervising architect, engineer or designer shall file a written statement with the department certifying that, to the best of his/her knowledge and belief, construction has been performed in substantial compliance with the approved plans and specifications.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 50.11 Owner's responsibility. No owner shall construct or alter any building or structure, or portion of a building or structure, or permit any building or structure to be constructed or altered except in compliance with the provisions of sections Ind 50.07, 50.08, 50.09, 50.10 and 50.12. Compliance with the provisions of this section does not relieve the owner from compliance with the administrative rules established in other related codes.

Note: For definition of owner, refer to chapter 101, section 101.02 (3) (i), Wis. Stats.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

PART IV--DEPARTMENT APPROVAL

Ind 50.12 Plan examination and approval. (1) **TYPES OF BUILDINGS.** Plans and specifications for all buildings and structures in the following classifications shall be submitted to the department for examination and approved before commencing work:

Note 1: See the scope of the occupancy chapters for examples of specific types of buildings covered in the categories (a) through (f).

Note 2: Section 101.12 (3) (h), Wis. Stats., prohibits total issuance of permits or licenses for construction or use of public buildings or places of employment until drawings and calculations have been examined and approved by the department.

(a) **Factories, office and mercantile buildings** (chapter Ind 54).

*See Appendix A for further explanatory material.

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1. Department examination and approval for factories, office and mercantile buildings containing less than 25,000 cubic feet total volume is waived; however, the buildings shall comply with the applicable requirements of this code.

(b) Theaters, assembly halls, and places of outdoor assembly (chapter Ind 55).

(c) Schools and other places of instruction (chapter Ind 56).

(d) Apartment buildings, hotels and places of detention (chapter Ind 57).

(e) Hazardous occupancies (sections Ind 54.50-54.53). Plan submission for hangars storing one airplane is waived.

(f) Day care facilities (chapter Ind 60).

(g) Structures [see Ind 51.02 (1.25)].

1. Department examination and approval is waived for television and radio receiving antennas, outdoor theater screens, water tanks, display signs, observation towers, docks, piers, wharves, tents or inflatable structures used temporarily, and other similar structures; however, such structures and temporary tents shall comply with the applicable structural and other requirements of this code.

Note: Tents and inflatable structures, used temporarily, are those erected for a specific event such as a circus, a fair, etc., and are removed after the event. Tents and inflatable structures erected for a month, or longer, are not considered temporary structures.

(2) TYPES OF PLAN APPROVAL. The following types of plans shall be submitted to the department for examination and approval before construction is commenced:

(a) General building plans.

(b) Structural plans.

(c) Heating and ventilating plans.

1. Approval is not required for the installation of air-cooling equipment when added to an approved heating system.

2. The replacement of a major piece of heating equipment is subject to written approval by the department.

(d) Alteration plans for existing buildings.

(e) Revisions to previously examined plans.

(f) Exhaust system plans (government-owned buildings only).

(g) Spray booth plans (government-owned buildings only).

(h) Footing and foundation plans (see section Ind 50.13).

(i) Stadium, grandstand and bleacher plans.

(j) Fire escape plans.

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(3) **PLANS AND SPECIFICATIONS.** At least 3 complete sets of plans, which are clear, legible and permanent copies, and one copy of specifications shall be submitted for examination and approval before commencing construction. The plans and specifications shall contain the following information:

(a) *General.* All plans shall contain the name of the owner and the address of the building. The name and seal of the architect(s), engineer(s) or person(s) who prepared the plans shall appear on the title sheet, in accordance with Wis. Adm. Code section A-E 1.04 (4) - registration seals.

(b) *General building plans.* The general building plans shall include the following:

1. *Plot plan.* The location of the 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 shall be indicated on the plot plan. A small scale plot plan shall be submitted on a 8½ x 11 sheet for projects containing multiple buildings.

2. *Floor plans.* Floor plans shall be provided for each floor. The size and location of all rooms, doors, windows, firewalls, toilet facilities, structural features, exit passageways, exit lights, fire alarms, standpipes, stairs and other pertinent information shall be indicated. Schematic exit plans shall be provided for large buildings, indicating normal paths of egress.

3. *Elevations.* The elevations shall contain information on the exterior appearance of the building and indicate the location and size of doors, windows, roof shape, chimneys, exterior grade, footings and foundation walls, and include information about the exterior materials.

4. *Sections and details.* Sections and details shall include information to clarify the building design.

(c) *Heating, ventilating and air conditioning plans.* Heating, ventilating and air conditioning plans shall indicate the layout of the system, including location of equipment and size of all piping, ductwork, dampers (including fire dampers), chimneys, vents and controls. The quantity of outside air introduced to each zone, and the quantity of supply air and exhaust air for each room shall be listed on the plans. The type of equipment and capacity (including the input and output) shall be indicated on the plans or equipment schedules, unless indicated in the specifications.

(d) *Specialty plans.* Specialty plans for spray booths, special exhaust systems, stadiums, grandstands and bleachers, fire escapes and special structural systems shall include pertinent information with respect to the design and construction of the specialty.

(e) *Specifications.* The specifications shall be properly identified with the drawings and describe the quality of the materials and the workmanship.

(f) *Schedules.* Schedules shall be provided which contain information pertinent to doors, room finishes, equipment, and the use of all

rooms and the number of occupants accommodated therein, unless this information is indicated on the plans.

Note #1: Original drawings are not considered a substitute for permanent prints.

Note #2: Duplicate information need not be submitted when heating, ventilating, air conditioning and building plans are submitted simultaneously.

Note #3: For pit depth and overhead clearance requirements applicable to design of elevator hoistways, see Wis. Adm. Code chapter Ind 4, Elevator Code.

Note #4: Plans for plumbing systems and swimming pool installations are examined by the department of health and social services.

(4) **DATA REQUIRED.** All plans submitted for approval shall be accompanied by sufficient data and information for the department to judge if the design of the building, the capacity of the equipment, and the performance of the system will meet the requirements of this code. The following data shall be submitted:

(a) **Structural data.** Sample structural calculations, including assumed bearing value of soil, live loads and itemized dead loads, unit stresses for structural materials, stress diagrams for trusses, typical calculations for slabs, beams, girders and columns, and diagrams indicating bracing and stability of the structure and components in rigid frames and other open type buildings shall be submitted. Complete structural calculations shall be furnished upon request of the department or other authorized approving official.

Note: Diagrams are intended to apply to the appropriate final designs of buildings regardless of materials of construction. For job leasing of buildings, see Wis. Adm. Code chapter Ind 3b, a supplement to chapters Ind 1000-2000, Wis. Safety and Health Code.

(b) **Thermal performance data.** Thermal performance calculations shall be submitted in accordance with the requirements of section Ind 51.02 (16).

(c) **Heating and ventilating data.** A description of the construction for the walls, floors, ceilings and roof, and the transmission coefficients of the construction materials shall be furnished. The calculations shall include heat losses for the individual rooms (including transmission and infiltration and/or ventilation losses, whichever are greater) and a summary of the total building heat loss expressed in Btu/hour or watts.

Note: The department will accept on 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.

(d) **Additional data.** When requested, additional data pertaining to design, construction, materials and equipment shall be submitted to the department for approval.

(5) * **APPLICATION FOR APPROVAL.** A plans approval application form shall be included with the plans submitted to the department for examination and approval.

Note: See Appendix A for an example of the plans approval application (form SB 118).

*See Appendix A for further explanatory material.

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(a) *Conditional approval.* If, upon examination, the department determines that the plans and the application for approval substantially conform to the provisions of this code, a conditional approval, in writing, will be granted. All non-code-complying conditions stated in the conditional approval shall be corrected before or during construction. A conditional approval issued by the department shall not be construed as an assumption of any responsibility for the design or construction of the building.

(b) *Denial of approval.* If the department determines that the plans or the application do not substantially conform to the provisions of this code, the application for conditional approval will be denied, in writing.

Note: A letter will be sent to the designer and the owner of record with a statement relating to the examination of the plans and citing the conditions of approval or denial. The plans will be dated and stamped "conditionally approved" or "not approved," whichever applies. At least 2 copies of the plans will be returned to the person designated on the plans approval application; one copy will be retained by the department.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 50.13 Footing and foundation approval. Upon submission of the plans approval application form, at least 3 sets of footing and foundation plans, a plot plan, schematic floor plans locating exits, elevations, itemized structural loads, structural foundation calculations, and a fee, the department may conditionally approve the footing and foundation plans to permit construction of the footings and foundations prior to the examination and approval of the complete plans.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 50.14* Permit to start construction. Upon submission of the plans approval application form, 3 complete sets of building plans and one copy of specifications, a written request by the owner to start construction, and a fee, the department may issue a permit to start construction of the footings and foundations. The holder of the permit shall proceed at his (her) own risk without assurance that a conditional approval for the building will be granted.

Note: A permit to start construction (form 811-198) is illustrated in the Appendix.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 50.15 Evidence of plan approval. The architect, engineer, designer, builder or owner shall keep at the building site one set of plans bearing the stamp of conditional approval and a copy of the specifications. The plans shall be open to inspection by an authorized representative of the department.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 50.16 Revocation of approval. The department may revoke any approval, issued under the provisions of this code, for any false statements or misrepresentation of facts on which the approval was based.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

*See Appendix A for further explanatory material.

Ind 50.17 Department limitation and expiration of plan approval. (1) EXPIRATION OF PLAN APPROVAL. Plan approval by the department or its authorized representative shall expire one year after the date indicated on the approved plans if construction has not commenced within that year.

(2) DEPARTMENT LIMITATION. A conditional approval of a plan by the department shall not be construed as an assumption of any responsibility for the design.

History: Cr. Register, December, 1976, No. 262, eff. 1-1-77.

Ind 50.18* Inspections. Inspections shall be conducted by an authorized representative of the department to ascertain whether or not the construction or installations conform to the conditionally approved plans, the conditional approval letter, and the provisions of this code.

Note: See Appendix A for an example of the inspection progress report (form SH-224B) and inspection report and orders (form SH-2).

History: Cr. Register, December, 1976, No. 262, eff. 1-1-77.

Ind 50.19 Approval of materials, equipment and devices. All materials, equipment and devices not specifically mentioned in this code will be permitted if approved in writing by the department. Sufficient data, tests and other evidence to prove that the material, equipment or device is equivalent to the standards required in this code shall be submitted. Upon receipt of a fee and a written request, the department may issue an approval number for the material, piece of equipment or device.

History: Cr. Register, December, 1976, No. 262, eff. 1-1-77.

Ind 50.20* Fees. Fees for petitions for modification, material approval, plan examination and approval, and for inspection of buildings, structures, and heating and ventilating shall be submitted in accordance with the provisions of Wis. Adm. Code section Ind 69.09. Fees shall be submitted at the time the application for approval is submitted. No plan examinations, approvals or inspections will be made until the fees are received.

Note: See Appendix A, plans approval application (form SB-118), for determination of plan examination and inspection fees.

History: Cr. Register, December, 1976, No. 262, eff. 1-1-77.

PART V—FIRST CLASS CITY AND CERTIFIED CITIES APPROVALS

Ind 50.21 First class city examination and approval. Drawings, specifications and calculations for all buildings and structures, except state-owned 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.

History: Cr. Register, December, 1976, No. 262, eff. 1-1-77.

Ind 50.22 Certified cities examination and approval. Drawings, specifications and calculations for all new buildings and structures

*See Appendix A for further explanatory material.

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containing less than 50,000 cubic feet total volume and alterations to buildings containing less than 100,000 cubic feet total volume, except state-owned buildings and structures, shall be submitted to cities certified by the department for examination and approval according to requirements of this code. Drawings, specifications and calculations submitted to said cities for examination and approval need not be submitted to the department. The buildings must be located within the city limits of the certified city.

Note: The following cities have been certified by the department:

Appleton	Janesville	Racine
Beloit	Kaukauna	Sheboygan
Brookfield	Kenosha	Stevens Point
Cudahy	La Crosse	Two Rivers
Eau Claire	Madison	Waukesha
Fond du Lac	Manitowish	Wausau
Glendale	Muskegon	West Allis
Green Bay	New Berlin	West Bend
Greenfield	Oshkosh	Wisconsin Rapids

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

PART VI—ENFORCEMENT, PETITION FOR MODIFICATION, APPEALS, AND PENALTIES

Ind 50.23 Enforcement. The provisions of this code shall be enforced by the department, or by municipal officials or other local officials who are required by law to enforce the administrative rules of the department.

History: Cr. Register, December, 1976, No. 262, eff. 1-1-77.

Ind 50.24 Appeals. Any person affected by any local order which is in conflict with a rule of the department may petition the department for a hearing on the ground that the local order is unreasonable and/or in conflict with the rule of the department.

Note: Section 101.01 (1) (g), Wis. Stats., defines "local order" as any ordinance, order, rule or determination of any common council, board of aldermen, board of trustees or the village board, of any village or city, or the board of health of any municipality, or an order or direction of any official of such municipality, upon any matter over which the department has jurisdiction.

History: Cr. Register, December, 1976, No. 262, eff. 1-1-77.

Ind 50.25* Petition for modification. The department will consider and may grant modification to an administrative rule upon receipt of a fee, a completed petition for modification form from the owner, and a position statement from the fire department having responsibility and an interest in the rule, provided an equivalent degree of safety is established in the petition for modification which meets the intent of the rule being petitioned.

Note #1: See Appendix A for an example of the petition for modification (form SB-8) and the fire department position statement (form SB-8A).

Note #2: Section 101.02 (6), Wis. Stats., outlines the procedure for submitting petitions to the department and the department procedures for hearing petitions.

History: Cr. Register, December, 1976, No. 262, eff. 1-1-77.

*See Appendix A for further explanatory material.

Ind 50.26 Penalties. Penalties for violations shall be assessed in accordance with section 101.02, Wis. Stats.

Note #1: Section 101.02 (18) (a), Wis. Stats., indicates penalties will be assessed against any employer, employee, owner or other person who fails or refuses to perform any duty lawfully enjoined, within the time prescribed by the department, for which no penalty has been specifically provided, or who fails, neglects or refuses to comply with any lawful order made by the department, or any judgment or decree made by any court in connection with sections 101.01 to 101.25. For each such violation, failure or refusal, such employee, owner or other person must forfeit and pay into the state treasury a sum not less than \$10 nor more than \$100 for each violation.

Note #2: Section 101.02 (12), Wis. Stats., indicates that every day during which any person, persons, corporation or any officer, agent or employee thereof, fails to observe and comply with an order of the department will constitute a separate and distinct violation of such order.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

²See Appendix A for further explanatory material.

Chapter Ind 61

DEFINITIONS AND STANDARDS

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Ind 51.043 General requirements	Ind 51.17 Smokeproof stair tower
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	Ind 51.25 Adoption of ASTM standards
	Ind 51.26 Adoption of ACI standards
	Ind 51.27 Adoption of miscellaneous standards

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

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

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

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

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

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

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

* See Appendix A for further explanatory material.

(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.

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

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

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

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

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

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

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

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

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

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

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

*See Appendix A for further explanatory material.

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

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

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

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

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

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

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

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

Note: See line 23 of Table 51.08-A.

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

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

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

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

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

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

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

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

*See Appendix A for further explanatory material.

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

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

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

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

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

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

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

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

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

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

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

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

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

(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

*See Appendix A for further explanatory material.

(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 door sill.

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

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

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

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

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

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

(70) HEIGHT (BUILDING). Height of a building is measured from the average of the exit discharge grade elevation of all required first story exits to the top of a level roof or to a point $\frac{1}{2}$ of the distance between

*See Appendix A for further explanatory material.

exhibit fire resistance under conditions of tests and performance as specified in ASTM E-119, ASTM E-152 and ASTM E-163.

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

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

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

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

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

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

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

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

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

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

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

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

*See Appendix A for further explanatory material.

the intersection of the exterior wall surface (extended) with the roof surface, and the highest part of the roof but not to include penthouses.

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

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

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

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

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

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

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

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

(77) LUNNY. 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."

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

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

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

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

*See Appendix A for further explanatory material.

subject to increase in combustibility or flame-spread classification (FSC) beyond the limits herein established through the effects of age, moisture or other atmospheric conditions.

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

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

(b) Materials having a structural base of noncombustible material as defined in paragraph (a), with a surfacing not more than 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) **PILASTER**. A projection of masonry for the purpose of bearing concentrated loads, or to compensate for reduction of wall section by chases, openings or recesses, or for the purpose of stiffening the wall against lateral forces. (See also "Buttress.")

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

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

(103) **PORCH**. An unenclosed exterior structure at or near grade attached or adjacent to the exterior wall 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.

*See Appendix A for further explanatory material.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

*See Appendix A for further explanatory material.

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

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

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

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

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

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

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

(130) **TERRACE.** An unenclosed exterior structure at or near grade having a paved, floored, or planted platform area adjacent to an

*See Appendix A for further explanatory material.

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.

(139a) VOLUME (TOTAL). The "total volume" (cube or cubage) of a building is the actual cubic space enclosed within the outer surfaces of the outside or enclosing walls and contained between the outer surfaces of the roof and 6 inches below the finished surfaces of the lower floors.

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

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

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

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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 sills.

(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.

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

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

History: Cr. Register, June, 1972, No. 198, eff. 1-1-73; renum. (1) to be (1a), r. and rec. (10), (54), (67) and (121), cr. (1), (5a), (22a), (58a), (57a), (67a), (76a), (106a) and (148a), Register, September, 1978, No. 213, eff. 10 1-73; cr. (102a), (104a) and (105a), Register, December, 1974, No. 228, eff. 1-1-75; cr. (7a), (41a), (138a) and (153a) and am. (126), Register, December, 1976, No. 252, eff. 1-1-77.

*See Appendix A for further explanatory material.

BUILDING ELEMENT 	MODIFYING CONDITIONS			TYPES OF CONSTRUCTION								APPLICABLE NOTES
	NUMBER OF STORIES	SEE NOTES ①② ALONG SETBACK LINES TO P/L OR TO OTHER BLDGS ON SAME PROP.	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	
				NO. 1	NO. 2	NO. 3	NO. 4	NO. 5	NO. 6	NO. 7	NO. 8	
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	②③
2. FLOOR FRAMING (BEAMS, GIRDERS, JOISTS, SLABS, DECK)	1 STORY OR LESS			NC-3	NC-2	SEE IND. 51.03(3) NC-1	SEE IND. 51.03(4) H.T. OR I	SEE IND. 51.03(5) C	SEE IND. 51.03(6) NC-C	SEE IND. 51.03(7) 3/4	SEE IND. 51.03(8) 5	③④⑤
3. FLOOR FRAMING (BEAMS, GIRDERS, JOISTS, SLABS, DECK)	MORE THAN 2 STORIES			NC-3	NC-2	SEE IND. 51.03(3) NC-1	SEE IND. 51.03(4) H.T. OR I	SEE IND. 51.03(5) C	SEE IND. 51.03(6) NC-C	NP	NP	④
4. FLOOR FRAMING (BEAMS, GIRDERS, JOISTS, SLABS, DECK)	2 STORIES OR LESS			NC-2	NC-1	NC-1	SEE IND. 51.03(4) H.T. OR I	0	SEE IND. 51.03(6) NC-C	3/4	0	③④
5. ROOF FRAMING	OVER 8 STORIES OR MORE THAN 85' IN HEIGHT			NC-2	NP	NP	NP	NP	NP	NP	NP	④
6. (TRUSSES, BEAMS, GIRDERS, JOISTS, FRAME RAFTERS, PURLINS, DECK)	1 TO 2 STORIES OR LESS			NC-2	NC-1 1/2	SEE IND. 51.03(3) NC-1	SEE IND. 51.03(4) H.T. OR I	SEE IND. 51.03(5) C	SEE IND. 51.03(6) NC-C	NP	NP	④
7. (TRUSSES, BEAMS, GIRDERS, JOISTS, FRAME RAFTERS, PURLINS, DECK)	2 STORIES OR UNDER 35' IN HEIGHT			NC-1	NC-1	NC-1	SEE IND. 51.03(4) H.T. OR I	SEE IND. 51.03(5) C	NC-C	SEE IND. 51.03(7) 3/4	0	③⑤
8. (TRUSSES, BEAMS, GIRDERS, JOISTS, FRAME RAFTERS, PURLINS, DECK)	1 STORY - ROOF FRAMING MORE THAN 20' ABOVE P.L.			NC-0	SEE IND. 51.03(2) NC-0	NC-0	SEE IND. 51.03(4) H.T. OR I	0	0	0	0	④
9. (TRUSSES, BEAMS, GIRDERS, JOISTS, FRAME RAFTERS, PURLINS, DECK)	1 STORY - ROOF FRAMING 20' OR LESS ABOVE P.L.			NC-1	NC-1	NC-1	SEE IND. 51.03(4) H.T. OR I	0	0	SEE IND. 51.03(7) 3/4	0	③④
10. ROOF COVERING	OVER 8 STORIES OR MORE THAN 85' IN HEIGHT			CLASS A	NP	NP	NP	NP	NP	NP	NP	③
11. ROOF COVERING	8 STORIES OR UNDER 35' IN HEIGHT OR LESS			CLASS A	CLASS A	CLASS A	CLASS B	CLASS B	CLASS C	CLASS C	CLASS C	③
12. EXTERIOR WALLS & COURT WALLS	LESS THAN 10 FT.	BEARING		NC-4	NC-3	NC-2	NC-2	NC-2	NC-2	NP	NP	②③④⑤
13. EXTERIOR WALLS & COURT WALLS	10 FT. TO 30 FT. INCLUSIVE	BEARING		NC-3	NC-2	NC-3/4	I	NC-1	NC-0	3/4	0	②③④⑤⑦⑧
14. EXTERIOR WALLS & COURT WALLS	OVER 30 FT.	BEARING		NC-2	NC-1	NC-0	I	NC-1	NC-0	3/4	0	②③④⑤⑦⑧
15. EXTERIOR WALLS & COURT WALLS	LESS THAN 10 FT.	NON-BEARING		NC-2	NC-2	NC-1	NC-1	NC-1	NC-1	NP	NP	②③④⑤
16. EXTERIOR WALLS & COURT WALLS	10 FT. TO 30 FT. INCLUSIVE	NON-BEARING		NC-1	NC-1	NC-0	I	NC-1	NC-0	3/4	0	②③④⑤⑦⑧
17. EXTERIOR WALLS & COURT WALLS	OVER 30 FT.	NON-BEARING		NC-0	NC-0	NC-0	3/4	NC-0	NC-0	3/4	0	②③④⑤⑦⑧
18. INTERIOR WALLS BEARING				NC-3	NC-2	NC-1	I	I	NC-0	3/4	0	②③④
19. PARTITIONS				NC-0	NC-0	NC-0	0	0	0	0	0	③④
20. REQUIRED EXIT CORRIDOR ENCLS.				NC-2	NC-2	NC-1	I	I	I	3/4	3/4	③④
21. FIRE ENCLOSURE (STAIRWAYS, ELEVATORS, VERTICAL SHAFTS)	2 STORIES OR MORE			NC-2	NC-2	NC-1	I	I	I	NP	NP	③④
21. FIRE ENCLOSURE (STAIRWAYS, ELEVATORS, VERTICAL SHAFTS)	1 OR MORE FLOOR LEVELS			NC-2	NC-2	NC-1	I	I	I	3/4	3/4	③④
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	③④

KEY TO ABBREVIATIONS :

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

KEY EXAMPLE TO READING CHART :

C = 0 (NO HOUR RATING)
I = COMBUSTIBLE OR NONCOMBUSTIBLE 1 HOUR RATING
NC-0 = NONCOMBUSTIBLE 0 HOUR RATING

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 (b)(6)(i)) WILL BE ACCEPTED IN PLACE OF 3/4-HOUR FIRE-RESISTIVE RATINGS.

⑨ - FOR OPENINGS IN PARTITIONS AND INTERIOR BEARING WALLS, SEE SECTION 51.02, INTERIOR WALL CONSTRUCTION.

TABLE B102-B
MAXIMUM TOTAL ALLOWABLE AREA OF WINDOWS OR OTHER WALL OPENINGS
IN PERCENT OF TOTAL EXPOSED EXTERIOR WALL SURFACE

Setback from Property Line, or Other Walls on Same Property ¹	Class of Construction				
	1. Fire-Resistive "A" 2. Fire-Resistive "B" 3. Metal Frame Protected 4. Heavy Timber 5. Exterior Masonry		6. Metal Frame Unprotected	7. Wood Frame Protected	8. Wood Frame Unprotected
	Bearing Wall	Nonbearing Wall			
Less than 6'	No Openings	No Openings	No Openings	Not Permitted	Not Permitted
6' to less than 10'	20% ² Fire window reqd. ³	80% ² Fire window reqd. ³	33% ³	Not Permitted	Not Permitted
10' to less than 30'	30% ²	40% ²	40% ²	40% ²	40% ³
30' or over	No Limit	No Limit	No Limit	No Limit	No Limit

¹ Does not apply to property lines along streets.

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

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

History: Cr. Register, June, 1972, No. 193, eff. 1-1-73; am. table A, Register, September, 1973, No. 213, eff. 10-1-73; am. table B, Register, July, 1974, No. 223, eff. 8-1-74.

⁴ See Appendix A for further explanatory material.

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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: Civ. Register, June, 1972, No. 193, eff. 1-1-77; renum. Register, September, 1973, No. 218, eff. 10-1-73.

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

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

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

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

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

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

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

(4) **Exterior wall construction:**

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

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

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

*See Appendix A for further explanatory material.

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

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

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

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

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

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

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

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

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

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

*See Appendix A for further explanatory material.

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

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

(16) THERMAL PERFORMANCE STANDARDS. (a) The design heat loss, excluding infiltration and ventilation, through above grade gross walls and roofs facing heated interiors shall not exceed 13 BTU per hour per square foot for the total building envelope.

(b) A building may exceed the requirements of paragraph (a) above, provided the designer can demonstrate additional innovative building or system designs that will achieve energy savings which equal the additional energy being used because the requirements of paragraph (a) are exceeded.

Note #1: The intent of this department is to develop data to implement a total connected energy budget concept as soon as possible. The department requests voluntary participation from designers in establishing realistic energy allotment values for the state of Wisconsin.

Note #2: Copies of the recommended code for the energy budget concept, as outlined in Appendix A of the Report of the Special Study Committee to Review Thermal Performance Standards, may be obtained from the Department of Industry, Labor and Human Relations, Division of Safety and Buildings, P. O. Box 7946, Madison, Wisconsin 53707.

(c) The thermal performance standards need not apply to special use buildings such as greenhouses, inflatable and similar types of designs, or any building presently exempt from the heating and ventilating requirements.

(17) INFILTRATION STANDARDS. All exterior windows and doors shall be designed to limit air leakage into or from the building and shall be weatherstripped.

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

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

History: Cr. Register, June, 1972, No. 198, eff. 1-1-73; r. (9) and (10), renum. (9) to be (4), (4), (6), (6), (7), (8) to be (6), (7), (8), (9), (10), am. (9) to (3), (5), (11), (12), (13) and (14), Register, September, 1973, No. 218, eff. 10-1-73; am. (14) (d), Register, February, 1974, No. 218, eff. 3-1-74; v. and recr. (12) (a); am. (13) (c), Register, May, 1974, No. 231, eff. 6-1-74; cr. (11) (c) and (15), Register, July, 1974, No. 223, eff. 8-1-74; cr. (16) and (17), Register, December, 1974, No. 228, eff. 1-1-76; am. (5) (a) 1 and (14) (c) 1, cr.

*See Appendix A for further explanatory material.

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fixtures shall have protection boxes built above the fixture, constructed of approved fire-resistant material of rating equal to that of the ceiling, to cover the opening in case fixture is displaced. Duct openings in ceilings shall be protected by fire dampers.

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

(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 other than rated exit corridors shall be noncombustible or 20-minute fire door assemblies, or equivalent, unless otherwise specified above.

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

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

(g) Mansards shall be of noncombustible construction.

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

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

²See Appendix A for further explanatory material.

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

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

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

(e) Roof framing:

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

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

(f) Floors:

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.

*See Appendix A for further explanatory material.

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(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. (7)

(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. (8)

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

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

History: Cr. Register, June, 1972, No. 198, eff. 1-1-73; am. (1) (d), resubm. (1) (e) 1. to be (f), (1) (f) 1. a. to be (1) (f) 1., (1) (f) (g) (h) (i) to be (1) (g) (h) (i) (j), (2) (f) 1. to be (2) (g), (2) (g) 1. a. to be (2) (g) 1., (2) (g) (h) (i) to be (2) (h) (i) (j), (3) (d) 1. to be (e), (3) (e) 1. a. to (3) (e) 1., (7) (h) to be (e), (7) (e) to be (h), am. (3) (e), r. (4) (e) 3., r. and rec. (6) (a), cr. (7) (d), Register, September, 1978, No. 218, eff. 10-1-78; r. and rec. (6) (a), Register, May, 1974, No. 221, eff. 6-1-74; cr. (5) (a) 1. and 2.; am. (5) (f) and r. and rec. (5) (g), Register, July, 1974, No. 223, eff. 8-1-74; am. (1) (d) 1. and (2) (e) 1., Register, December, 1974, No. 228, eff. 1-1-75.

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

*See Appendix A for further explanatory material.

(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-168
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 testing tests.

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

History: Cr. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71, and 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).

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

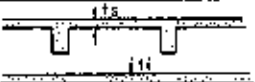
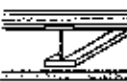
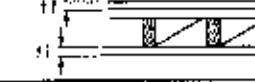
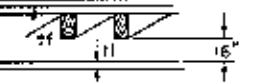
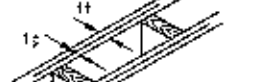
2. Type II—normal weight concrete with siliceous gravel, granite or quartz aggregate containing more than 40% quartz, chert or flint. Values given for type I apply except where values are tabulated for type II.

*See Appendix A for further explanatory material.

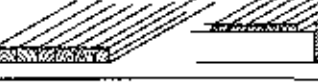
TYPICAL EXAMPLES OF FIRE RESISTIVE STRUCTURAL COMPONENTS, TABLE 2

TYPE OF CONSTRUCTION		R.O.W. NO.	STRUCTURAL COMPONENTS	SKETCHES	INSULATING MATERIAL	DESCRIPTION	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 (3) (6)	REINF. COVER MIN. DIM. & AREA-SQ. IN.	I II III 2 2 2	I II III 2 2 2	I II III 2 2 2	I II III 2 2 2	I II III 2 2 2	I II III 2 2 2	I II III 2 2 2	I II III 2 2 2				
		2.	GIRDERS AND BEAMS		CONCRETE TYPE I II & III (3) (6) (7)	REINF. COVER WIDTH (W)	2 2 2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2					
		3.	JOISTS & WAFFLES WITHOUT FILLERS OR PARTIAL FILLERS OF TYPE I OR II MASONRY OR CLAY TILE		CONCRETE TYPE I II & III (3) (6) (7) (8) (9)	REINF. COVER WIDTH WEB (W) TH. TOP SLAB (H)	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2					
		4.	SLABS OR JOISTS & WAFFLES WITH TYPE I OR II MASONRY OR CLAY TILE FILLER		CONCRETE TYPE I II & III (3) (6) (7) (8) (9)	REINF. COVER TOP SLAB (H)	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2					
		5.	WALLS AND PARTITIONS BR'S. & NON-BR'S.		CONCRETE TYPE I II & III (3) (6)	REINF. COVER TH. THICKNESS (T)	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2	1 1/2 1 1/2 1 1/2					
	CONCRETE PRECAST CAST IN PLACE POST-TENSIONED OR PRETENSIONED SIMPLE SPAN	6.	GIRDERS AND BEAMS		CONCRETE TYPE I II & III (3) (6) (7)	AVE. COVER (W)	I II III 3 1/2 3 3	I II III 3 1/2 3 3	I II III 3 1/2 3 3	I II III 3 1/2 3 3	I II III 3 1/2 3 3	I II III 3 1/2 3 3	I II III 3 1/2 3 3	I II III 3 1/2 3 3				
		7.	JOISTS AND WAFFLES		CONCRETE TYPE I II & III (3) (6) (7) (8) (9)	AVE. COVER AVE. WEB TH. (W) SLAB TH. (H)	3 1/2 3 3 1 1 10 5 1/2 5 1/2 5 1/2	3 1/2 3 3 1 1 10 5 1/2 5 1/2 5 1/2	3 1/2 3 3 1 1 10 5 1/2 5 1/2 5 1/2	3 1/2 3 3 1 1 10 5 1/2 5 1/2 5 1/2	3 1/2 3 3 1 1 10 5 1/2 5 1/2 5 1/2	3 1/2 3 3 1 1 10 5 1/2 5 1/2 5 1/2	3 1/2 3 3 1 1 10 5 1/2 5 1/2 5 1/2					
		8.	SINGLE TEE		CONCRETE TYPE I II & III (3) (6) (7) (8) (9)	AVE. COVER AVE. WEB TH. (W) TOP THICKS (H)	2 3/4 2 3/4 2 3/4 8 8 8 6 1/2 7 5 1/2	2 3/4 2 3/4 2 3/4 8 8 8 6 1/2 7 5 1/2	2 3/4 2 3/4 2 3/4 8 8 8 6 1/2 7 5 1/2	2 3/4 2 3/4 2 3/4 8 8 8 6 1/2 7 5 1/2	2 3/4 2 3/4 2 3/4 8 8 8 6 1/2 7 5 1/2	2 3/4 2 3/4 2 3/4 8 8 8 6 1/2 7 5 1/2	2 3/4 2 3/4 2 3/4 8 8 8 6 1/2 7 5 1/2					
		9.	MULTI-TEE UNITS		CONCRETE TYPE I II & III (3) (6) (7) (8) (9)	AVE. COVER AVE. WEB TH. (W) TOP THICKS (H)	2 3/4 2 3/4 2 3/4 8 8 8 6 1/2 7 5 1/2	2 3/4 2 3/4 2 3/4 8 8 8 6 1/2 7 5 1/2	2 3/4 2 3/4 2 3/4 8 8 8 6 1/2 7 5 1/2	2 3/4 2 3/4 2 3/4 8 8 8 6 1/2 7 5 1/2	2 3/4 2 3/4 2 3/4 8 8 8 6 1/2 7 5 1/2	2 3/4 2 3/4 2 3/4 8 8 8 6 1/2 7 5 1/2	2 3/4 2 3/4 2 3/4 8 8 8 6 1/2 7 5 1/2					
		10.	SOLID & CORED SLABS		CONCRETE TYPE I II & III (3) (6) (7) (8) (9)	1 OR 2 AVE. COVER	6 1/2 7 5 1/2 2 1/2 2 1/2	5 3/4 8 4 2 1 1 1/2	4 1/2 5 3 3/4 1 1/2 1 1	3 3/4 3 3/4 3 3/4 1 1 1	3 3/4 3 3/4 3 3/4 1 1 1	3 3/4 3 3/4 3 3/4 1 1 1	3 3/4 3 3/4 3 3/4 1 1 1					
	MASONRY BEARING AND NON BEARING	11.	UNREINFORCED CONCRETE WALLS & PARTITIONS		CONCRETE TYPE I II & III (3) (6)	WALL TH. (H)	6 1/2 5	5 5 1/2 4 1/2	4 4 1/2 4	3 3 3 3								
		12.	HOLLOW MASONRY WALLS & PARTITIONS...BLOCK TILE CORED BRICKS CAVITY WALLS		MASONRY TYPE I MASONRY TYPE II (3) (6) (7)	EQUIV. THICK'S.	5.7	5.7	4.8	3.8								
		13.	SOLID MASONRY BRICK BLOCK...CLAY TILE WITH LESS THAN 25% VIDS OR WITH THE CORES FILLED		MASONRY TYPE I & II CLAY, SHALE, CONCRETE, SAND OR LIME (3) (6)	WALL TH. (H)	10"	8"	6"	4"								
COMPONENTS WITH DIRECT APPLIED PROTECTION	STEEL	14.	COLUMNS		CONCRETE TYPE I II & III (3) (6) SOLID MASONRY (1)	THICKNESS OF (H) PROTECTION	I II III 2 2 2	I II III 1 1/2 2	I II III 1 1/2 2	I II III 1 1/2 2	I II III 1 1/2 2	I II III 1 1/2 2	I II III 1 1/2 2					
		15.	GIRDERS...BEAMS...TRUSSES		CONCRETE TYPE I II & III (3) (6)	THICKNESS OF (H) PROTECTION	I II III 2 2 2	I II III 1 1/2 2	I II III 1 1/2 2	I II III 1 1/2 2	I II III 1 1/2 2	I II III 1 1/2 2	I II III 1 1/2 2					
		16.	COLUMNS...BEAMS...GIRDERS...TRUSSES...JOISTS & STEEL FLOOR UNITS		SPRAYED FIBER...CEMENTITIOUS MIXTURE...INTUMESCENT PAINTS		BY TESTS...OR LISTING BY APPROVED TESTING LAB											

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

TYPE OF CONSTRUCTION	ROW NO.	STRUCTURAL COMPONENTS	SKETCHES	INSULATING MATERIAL	DESCRIP-TION	MINIMUM REQUIREMENTS			
						4 HR.	3 HR.	2 HR.	1 HR.
COMPONENTS WITH SUSPENDED OR ATTACHED PROTECTION	17.	CONC.		④ ⑥ ⑧ CONCRETE TYPE I, II OR III 3/4" COVER VERMICULITE...GYPSUM...OR PERLITE GYPSUM ON METAL LATH	1/2" THICK OF SLAB 1" THICK OF INSULATION	3"	2"		
	18.	STEEL COLUMNS		TYPE I & II MASONRY ① 1 1/2" AIR SPACE ①	THICK OF INSULATION	4" SOLID			
	19.	STEEL GIRDERS...BEAMS... TRUSSES...JOISTS, COLUMNS INDIVIDUALLY PROTECTED		SPRAYED FIBRE...CEMENTITIOUS MIXTURE...LATH & PLASTER		BY TESTS...OR APPROVED TEST		LISTING LAB.	BY
	20.	STEEL BEAMS, GIRDERS, TRUSSES & JOISTS...W/CEILING PROTECTION & MINIMUM 2 1/2" TH. TYPE I, II OR III CONCRETE SLAB ④ ⑥ ⑧		SPRAYED FIBRE...CEMENTITIOUS MIXTURE...LATH & PLASTER ACOUSTICAL TILE		BY TESTS...OR APPROVED TEST		LISTING LAB.	BY
	21.	STEEL STUD PARTITION NON BEARING		GYPSUM...PERLITE PLASTER ON PER- FORATED GYP. LATH... 2 1/2" STUD GYPSUM WALL BOARD... 3 5/8" STUD	1/2" PLASTER 1" LATH NO. LAYERS THICK. EACH			3/4" / 3/8" TWO 5/8" ONE 5/8"	
	22.	WOOD JOISTS MIN. 2" X 10", WOOD FLOOR ATTACHED CEILING		GYPSUM WALLBOARD BELOW 2-2"x10"s 4'-0" W, 1-1/8" PLYWOOD FLOORING OR GYPSUM WALLBOARD BELOW 2"x10"s 16" W 1/2" PLYWOOD OR 1"x6" T&G SUB-FLRG	1/2" INSUL. 1" FLOORING			5/8" 5/8" PLYWD OR 1"x3" T&G	
	23.	WOOD JOISTS MIN. 2" X 10", WOOD FLOOR SUSPENDED CEILING		NONCOMBUSTIBLE ACOUSTICAL TILE BELOW 2"x10"s 16" W 5/8" PLYWOOD OR 1"x4" T&G SUB-FLRG	1/2" INSUL. 1" FLOORING			5/8" 1/2" PLYWD OR 1"x6" T&G	
	24.	WOOD STUD PARTITION MIN. 2" X 4" STUD		GYPSUM WALLBOARD GYPSUM PERLITE PLASTER ON 3/8" GYPSUM LATH GYPSUM & SAND PLASTER ON U.L. LISTED WIRE LATH GYPSUM & VERMICULITE PLASTER ON METAL LATH	NO. LAYERS / TH. OF EACH 1/2" 1" 1"			TWO 5/8" 1" PLASTER W/ 1/2" HEX. MESH 9/16" 3/4" 3/4"	TWO 3/8" 3/16" 3/4"

① HEAVY TIMBER CONSTRUCTION TABLE

HEAVY TIMBER SOLID OR LAMINATED	25.	COLUMNS		WOOD ALL SPECIES	FLOOR...WIDTH X DEPTH (NOM.) ROOF...WIDTH X DEPTH (NOM.)				8" X 8" 6" X 6"
	26.	GIRDERS & BEAMS		WOOD ALL SPECIES	MIN. WIDTH X DEPTH (NOM.)				6" X 10"
	27.	ARCH & TRUSS FOR ROOF ONLY		WOOD ALL SPECIES	MIN. WIDTH X DEPTH EACH MEMBER				4" X 6"
	28.	FLOOR & ROOF DECK		WOOD ALL SPECIES	ROOF FLOOR				2" T & G. OR 3" SOLID 5" T & G. OR 1" T & G. OR 4" SOLID

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

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

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

History: Cr. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71, and recr. eff. 1-1-72, Register, July, 1971, No. 187; am. (1) (1), Register, March, 1972, No. 196, eff. 4-1-72.

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

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

1. Time—temperature relationship ASTM E-119.
2. The temperature—strength characteristics of the structural components.
3. The time—temperature characteristics of the insulating material, at temperature range designated by ASTM E-119.
4. The expansion characteristics of the materials comprising the member, at the temperature range designated by ASTM E-119.

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

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

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

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

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

*See Appendix A for further explanatory material.

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

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

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

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

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

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

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

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

(5) DOOR CLEARANCES. The maximum swinging-door clearances to frame shall be ¼ inch on sides and top and ¾ inch at bottom between sill or floor.

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

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

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

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

*See Appendix A for further explanatory material.

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

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

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

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

History: Civ. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71 and rec. off. 1-1-72, Register, July, 1974, No. 187; am. (1) (intro.), r. and rec. (2) (a) 1, Register, September, 1973, No. 213, eff. 10-1-73; cr. (1) (a) 1, Register, December, 1974, No. 228, eff. 1-1-76; r. and rec., Register, December, 1975, No. 240, eff. 1-1-76; r. and rec. (6), Register, December, 1976, No. 262, eff. 1-1-77.

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

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

Note: The windows have been classified for either moderate or light fire exposure. For moderate fire exposure, the individual glass size is limited to 720 square inches. (Size limitation either 48 inches maximum width or 64 inches maximum height.) For light fire exposure, the individual glass size is limited to 1,296 square inches. (Size limitations either 64 inches maximum width or 54 inches maximum height.) Please refer to sections for classes of construction and/or occupancy chapters for fire window classifications.

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

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

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

(b) *Wired glass.* The wired glass shall be labeled wired glass, ¾-inch thick, and shall be well bedded in approved glazing compound. All exposed joints between the metal shall be struck and pointed. The clearance between the edges of the glass and metal framing shall not exceed ¼ inch.

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

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

*See Appendix A for further explanatory material.

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

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

Ind 51.049 Miscellaneous openings in fire-rated construction.

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

(2) **FIRE DAMPERS.** Duct openings in required fire-resistive rated floor and wall assemblies shall be protected as specified under section Ind 64.12.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76.

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

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

History: Cr. Register, February, 1971, No. 182, eff. 7-1-71; r. eff. 8-1-71, and rec. eff. 4-1-72, Register, July, 1971, No. 187; renun. from 51.048 to be 51.050, Register, December, 1976, No. 240, eff. 1-1-76.

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

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

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

(b) A special occupancy separation shall have walls and floors of not less than 3-hour fire-resistive construction as specified in section Ind 51.04. All openings in walls forming such separation shall be protected on each side thereof by self-closing fire-resistive doors as specified in section Ind 51.047, and such doors shall be kept normally closed. The total width of all openings in any such separating wall in any one story shall not exceed 25% of the length of the wall in that story and no single opening shall have an area greater than 120 square feet.

1. All openings in floors forming this type of separation shall be protected by vertical enclosures extending above and below such openings. The walls of such vertical enclosures shall be of not less

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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 recr. (2) (c), Register, October, 1967, No. 142, eff. 12-1-67; am. (2) (a), (b) and (c), Register, February, 1971, No. 182, eff. 7-1-71; r. and recr. (2) (a), (b) and (c) eff. 8-1-71 and expiring 1-1-72 and et. (2) (a), (b) and (c) eff. 1-1-72, Register, July, 1971, No. 187.

Ind 51.14 Glazing. (1) **SAFETY GLAZING.** All glazing material used in hazardous impact locations shall be safety glazing material. All replacements of glazing material in hazardous impact locations made after November 30, 1976, shall be safety glazing, except the replacement of glazing outlined in section Ind 51.14 (2) (c).

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

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

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

(b) **Material.** Safety glazing means any glazing material such as tempered glass, laminated glass, wired glass, safety plastic, or safety insulating units which meet the test requirements of the American National Standards Institute (ANSI) standard Z 97.1 [Ind 51.27 (5)], or an equivalent standard, and which are so constructed, treated or combined with other materials to minimize the likelihood of cutting and piercing injuries resulting from human impact with the glazing material.

(c) **Labeling.** Safety glazing material shall be labeled with a permanent label by such means as etching, sand blasting, firing of ceramic material, or hot die stamping. Labels identifying safety glazing materials may be omitted provided that a notarized affidavit is submitted

*See Appendix A for further explanatory material.

to the department certifying the installation of safety glazing material. The label or affidavit shall identify the seller, manufacturer, fabricator, or installer, the nominal thickness and type of safety glazing material, and the fact that the material meets the test requirements of the American National Standards Institute (ANSI) standard Z 97.1 [Ind 51.27 (5)], or other equivalent standard. The label shall be legible and visible after installation.

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

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

(b) Safety glazing materials shall conform with the requirements of Ind 51.14 (1) (b).

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

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

(b) All interior doors with glass lights less than 8 inches in the least dimension shall be provided with ¼-inch glazing material.

(c) Safety glazing materials shall conform with the requirements of Ind 51.14 (1) (b).

(4) **SKYLIGHTS AND SLOPED GLAZING.** (a) *Skylights.* All glazing in skylights shall be safety glazing material and shall comply with the requirements of Ind 51.02 (6).

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

(5) **FIRE WINDOW ASSEMBLIES.** All glazing in fire window assemblies shall be designed and installed in accordance with the requirements of Ind 51.048.

*See Appendix A for further explanatory material.

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(6) **STRUCTURAL REQUIREMENT.** Glazing material shall be designed and installed to safely withstand the loads specified in chapter Ind 53 of this code.

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

History: Cr. Register, December, 1974, No. 228, eff. 1-1-76; am. (5), Register, December, 1976, No. 240, eff. 1-1-76; am. Register, December, 1978, No. 262, eff. 1-1-77.

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

Note: For required exits see Wis. Adm. Code sections Ind 54.06, 55.10, 56.08 and 57.09.

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

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

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

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

Note #1: Subsection and 51.15 (8) (a) 1. is intended to apply only to jails, prisons, mental institutions, asylums, nursing homes with senile patients, and similar type occupancies.

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

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

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

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

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

(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:

*See Appendix A for further explanatory material.

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 5 inches in height and in such other places as may be necessary to direct the occupants to exit doorways.

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

1. 50% of the occupant load of each first-adjacent level (s);
2. 25% of the occupant load of each second-adjacent level (s).

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

1. Types No. 1 through No. 4 construction unsprinklered, 40 inches per 100 persons;
2. Types No. 5 through No. 8 construction unsprinklered, 50 inches per 100 persons;
3. Types No. 1 through No. 4 construction sprinklered, 30 inches per 100 persons;
4. Types No. 5 through No. 8 construction sprinklered, 40 inches per 100 persons.

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. 180, eff. 1-1-71; r. and rec. (3), Register, February, 1971, No. 182, eff. 3-1-71; am. (7) (a) 1., Register, September, 1973, No. 213, eff. 10-1-73; r. (7), r. and rec. (8), Register, December, 1974, No. 228, eff. 1-1-75; emerg. cr. (7) (b) 1., eff. 6-20-75; cr. (3) (a) 1. and (3) (b) 1., Register, November, 1975, No. 239, eff. 12-1-75.

Ind 51.16 Stairways. (1) **DEFINITION.** A stairway is one or more flights of steps, and the necessary platforms or landings connecting them, to form a continuous passage from one elevation to another, including exterior porches, platforms and steps providing means of ingress or egress.

(2) **REQUIRED AGGREGATE WIDTH.** (a) The required aggregate width of stairway exits from any level shall be as determined in accordance with the requirements of Ind 51.15 (6).

(b) In no case shall the minimum width of an exit stair be less than that specified in Ind 51.16 (3).

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

(3) **MINIMUM WIDTH.** (a) Every required exit stairway shall be not less than 3 feet 8 inches wide, except as provided in the occupancy

*See Appendix A for further explanatory material.

chapters, of which not more than 4 inches on each side may be occupied by a handrail. The clear dimension between handrails, or stringers, shall not be less than 3 feet 0 inches.

(b) Nonrequired stairways need not conform to the width requirements of this code.

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

(a) All stairways and steps required as exits by this code shall have a rise of not more than 7 $\frac{1}{4}$ inches and a tread not less than 9 $\frac{1}{2}$ inches, measured from tread to tread and from riser to riser. Treads and risers shall be uniform in any one flight. Winders shall not be used.

Note #1: The department recommends that steps be proportioned so the sum of 2 risers and a tread, exclusive of its nosing or projection, should be not less than 24 inches or more than 26 inches.

Note #2: The department will accept stairways not normally used by the public to be designed with uniform risers not more than 8 inches in height and a uniform tread of not less than 8 inches. Winders may be used if the tread is at least 7 inches in width at a point one foot from the narrow end.

Note #3: Round or smooth nosings are recommended as they are not difficult to negotiate for individuals with restrictions in the knee, ankle or hip, or with artificial legs or long leg braces.

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

(c) Where an exit door leads to an outside platform or sidewalk, the level of the platform or sidewalk shall not be more than 7 $\frac{1}{4}$ inches below the doorsill.

(d) Every stairway flight shall have at least 3 risers (unless additional safety is provided which meets the approval of the department).

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

(5) **HANDRAILS.** Handrails shall be designed and provided in accordance with the following:

(a) All stairways of more than 3 risers shall have one handrail on the left side as one mounts the stairs, and on the open side, if any. Stairways and steps 6 feet, or more, in width shall have a handrail on each side. One handrail shall extend at least 6 inches beyond the top and bottom riser.

Note: The handrail extension is intended for support prior to ascending or descending the stairs. The ends of the rails should not constitute a projecting hazard.

(b) Stairways which are more than 8 feet wide shall be divided by center handrails into widths of not more than 8 feet nor less than 3 feet 8 inches.

(c) Exterior stairways with more than 3 risers, and an integral part of the building, shall have a handrail on each side. Exterior stairways

*See Appendix A for further explanatory material.

more than 50 feet wide shall be provided with one or more intermediate handrails.

(d) Handrails shall be not less than 2 feet 6 inches above the nose of the treads on stairways and 3 feet 6 inches above platforms, walks, balconies and mezzanines.

(e) All railings shall be designed to withstand a load of at least 200 pounds applied in any direction at any point.

(f) Railings guarding differences of elevation (i.e., open sides of stairways, elevated platforms, walks, balconies, mezzanines) shall be designed to prevent the passage of an object with a diameter larger than 9 inches.

Note: The requirement of 9 inches is not intended to apply to utility stairs, utility exit stairs, storage mezzanines and platforms. In such cases, an intermediate rail(s) at mid height, or its equivalent in safety, will be accepted.

(6) **TOEBOARDS.** A toeboard shall be provided at exposed edges of all elevated platforms, walks, balconies, mezzanines, ramps and floor openings to prevent the fall of materials. The toeboard shall extend 4 inches above the finished floor. Where material is stockpiled to a height where the toeboard does not provide adequate protection, additional measures shall be taken to prevent the fall of materials.

(7) **HEADROOM.** Every stairway shall be provided with a headroom clearance of not less than 7 feet 0 inches. The clearance shall be established by measuring vertically from the edge of the tread nosing to the ceiling or soffit above the tread nosing.

(8) **STAIRWAY LANDINGS AND PLATFORMS.** (a) If a door is provided at the head and/or foot of a stairway, a landing or platform shall be placed between the door and the stairway regardless of the direction of swing of the door.

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

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

History: 1-2-53; am. (2); (2) (a); (2) (b); Register, June, 1956, No. 6, eff. 7-1-56; r. and rect. Register, September, 1959, No. 45, eff. 10-1-59; r. (4) (b), remant. (c) to be (b), and cr. (6); Register, February, 1973, No. 182, eff. 3-1-73; am. (2) (a), Register, September, 1973, No. 213, eff. 10-1-73; r. and rect. Register, December, 1974, No. 226, eff. 1-1-75.

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 noncombustible material throughout. The enclosing walls shall be of not less than 4-hour fire-resistive construction, and the floors and ceilings of not less than 2-hour fire-resistive construction as specified in section Ind 51.04.

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(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 rec. (1) and (2) eff. 8-1-71 and exp. 1-1-72, and ex. (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 51.048 except in outside walls.

History: 1-2-56; am. (1) and (3), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (1) and (3), eff. 8-1-71 and exp. 1-1-72, and ex. (1) and (3), eff. 1-1-72, Register, July, 1971, No. 187; r. and rec. (1), Register, June, 1972, No. 198, eff. 1-1-72; am. (3), Register, December, 1976, No. 240, eff. 1-1-78.

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 51.08.

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

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

(4) All doors and windows within 10 feet of any balcony or bridge shall be fire-resistive windows for moderate fire exposure or fire-resistive doors as specified in sections Ind 51.047 and 51.048, except

*See Appendix A for further explanatory material.

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: 1-2-55; am. (2) and (4), Register, February, 1971, No. 182, eff. 7-1-71; c. and recn. (2) and (4) eff. 8-1-71 and exp. 1-1-72, and c. (2) and (4) eff. 1-1-72, Register, July, 1971, No. 187; am. (4) Register, June, 1972, No. 198, eff. 7-1-72; am. (4), Register, December, 1973, No. 240, eff. 1-1-75.

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

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

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

(3) **DESIGN AND FABRICATION.** Each part of every fire escape (except counterweights for balanced stairways) shall be designed and constructed to carry a live load of 100 pounds per square foot of horizontal area over the entire fire escape. Each part of every fire escape shall be designed and constructed in accordance with the requirements of section Ind 53.50, except that the unit stresses therein specified shall be reduced by one-fourth. The minimum sections and sizes specified below shall be increased whenever necessary so that under full load the allowable unit stresses will not be exceeded.

(a) No other material than wrought iron, soft steel or medium steel shall be used for any part of a fire escape, except for weights, separators and ornaments. No bar material less than 1/4 inch thick shall be used in the construction of any fire escape, except for separators, ornaments, structural shapes over 3 inches and rigidly built up trends 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

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required width of the fire escape. Every platform shall consist of either,

(a) Flat bars on edge, not less than $1 \times \frac{1}{4}$ inch, but not less than $1\frac{1}{4} \times \frac{1}{4}$ inch where bolts and separators are used except that platforms and treads constructed of flat bars on edge may be made of material $3/16$ inch in thickness provided the material is galvanized after fabrication. Bars shall not be spaced more than $1\frac{1}{4}$ inches, center to center.

(b) $\frac{1}{2}$ inch or $\frac{3}{4}$ inch square bars with sharp edge up, not more than $1\frac{1}{2}$ 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 $2 \times \frac{1}{4}$ 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.

*See Appendix A for further explanatory material.

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

(c) Stairway stringers shall consist of either:

1. A 5 inch channel or larger.
2. Two angles 2 x 2 x 1/4 inch or larger.
3. Two flat bars 2 x 3/4 inch or larger.
4. One flat bar 6 x 1/4 inch or larger.

5. If 2 angles or 2 flat bars are used, they shall be properly tied together by lattice bars, vertical as well as horizontal. If flat bars are used, every stairway of more than 10 risers shall have lateral bracing. The connection of stringers to platform, at top and bottom, shall be at least equal in strength to the stringers and shall safely carry the full live and dead loads. If stringers are carried by intermediate brackets, the stringers shall have a horizontal bearing on the brackets and shall be properly and securely connected thereto.

6. Treads shall consist of either flat or square bars, (not round), of the size and spacing specified for platforms. An "A" tread shall consist of at least 6 square bars, or 7 flat bars. A "B" tread shall consist of at least 7 square bars, or 8 flat bars. A "B" tread made of flat bars shall have separators and bolt through the center. A "B" tread made of square bars shall be trussed.

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

(7) **BALANCED STAIRWAY.** All "B" fire escapes, and all fire escapes on schools, theaters, assembly halls, hospitals, nursing homes, residential care institutions, group foster homes, and homes for the elderly either shall reach to the ground or shall have a balanced stairway reaching to the ground. "A" fire escapes which are not on schools, theaters, assembly halls, hospitals, nursing homes, residential care institutions, group foster homes and homes for the elderly may terminate in a platform at least 3 feet long, located not more than 10 feet above the ground and does not serve more than 8 persons.

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

(a) Every railing shall have posts, not more than 5 feet apart made of not less than 1 1/2 x 1 1/2 x 1/4 inch angles or tees, or 1 1/2 inch pipe; top rail not less than 1 1/4 x 1 1/4 x 1/4 inch angle or equivalent; center rail not less than 1 1/4 x 5/16 flat bar or equivalent. All connections shall be such as to make the railing stiff; 2 bolts (3/8 inch or larger) shall be used at the foot

*See Appendix A for further explanatory material.

of each post wherever possible, or at least one ½ inch bolt shall be used. Railing shall be continuous. No projections on the inside of the railing shall be permitted. Where a railing returns to the wall, it shall be fastened thereto with a through bolt (at least ¾ inch diameter), nut, and washer; or (in reinforced concrete) with an approved insert; or the railing shall be made equally secure with a diagonal brace extending at least 3 feet horizontally and 3 feet vertically.

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

(9) LADDER TO ROOF. Every fire escape which extends higher than the second floor shall be provided with a ladder leading from the upper platform to the roof, unless the fire escape stairway leads to the roof. The ladder shall have stringers not less than 1¼ inch pipe, or not less than 2 x ¾ 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, 1962, No. 84, eff. 1-1-63; am. (1) (a), Register, February, 1971, No. 182, eff. 7-1-71; am. (7), Register, February, 1971, No. 182, eff. 3-1-71; r. and recr. 51.20 (1) (a) eff. 8-1-71 and exp. 1-1-72 and cr. (1) (a) eff. 1-1-72, Register, July, 1971, No. 187; am. (1) (a), Register, June, 1972, No. 198, eff. 7-1-72; am. (3) (intro. par.), Register, December, 1974, No. 228, eff. 1-1-75; am. (1) (a), Register, December, 1975, No. 240, eff. 1-1-76.

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

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

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

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

*See Appendix A for further explanatory material.

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

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

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

(b) *Number of standpipes.* Standpipes shall be sufficient in number so that any part of every floor area can be reached within 30 feet by a nozzle attached to 100 feet of hose connected to the standpipe in an unsprinklered building and 150 feet of hose in a sprinklered building.

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

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

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

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

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

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

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

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

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

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

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

1. Public waterworks system where pressure and discharge capacity are adequate.
2. Approved automatic fire pump (or pumps).
3. Pressure tank.
4. Gravity tank.
5. Approved manually controlled fire pump operated by remote control devices at each hose outlet.
6. Reservoirs.

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

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

Note: See sections Ind 54.16, 55.88, 56.20 and 57.21.

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

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

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

*See Appendix A for further explanatory material.

less than 2½ inches in diameter for buildings exceeding 4 stories or 50 feet in height.

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

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

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

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

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

Note #3: See Plumbing Code, chapter 11 02, rules of the department of health and social services, for requirements pertaining to cross connections.

(5) CLASS III - COMBINED FIRE DEPARTMENT AND FIRST-AID STANDPIPES.

(a) *Where permitted.* The features of class I and II service may be combined in a single system if served by an acceptable automatic water supply conforming to the requirements of section Ind 51.21 (3) (j).

(b) *Requirements.* Class III standpipes shall conform to the requirements of class I service except that 1½-inch outlets with a hose and 2½-inch outlets shall be provided on each floor and shall be installed to the requirements of the respective classes of service.

(6) COMBINED AUTOMATIC SPRINKLER AND STANDPIPE SYSTEM.

Definition. A combined system is a system where the vertical water piping serves both the automatic sprinkler system and the 2½-inch hose outlets of the standpipes used by the fire department. The combined system shall comply with the automatic sprinkler requirements of section Ind 51.23 and the standpipe and hose requirements of section Ind 51.21.

(b) *Water supply and riser size.* The minimum water supply and riser size for a combined system shall comply with the requirements of sections Ind 51.21 (3) (f) and (j), except the minimum water supply for a combined system for a completely sprinklered, light hazard

*See Appendix A for further explanatory material.

occupancy building shall be 500 gallons per minute. When the building is completely sprinklered, the risers may be sized by hydraulic calculations.

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

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

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

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

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

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

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

Ind 51.23 Automatic sprinklers. (1) **GENERAL REQUIREMENTS.** All required automatic sprinkler systems shall be designed and constructed in accordance with NFPA No. 13, Standard for the Installation of Sprinkler Systems [Ind 51.27 (7a)]. Reinstallation of used sprinkler heads is prohibited. Approved secondhand devices may be installed by special permission of the department.

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

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

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

*See Appendix A for further explanatory material.

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

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

(4) **FIRE DEPARTMENT CONNECTION.** Every sprinkler system shall have an approved siamese connection. The siamese connection shall be marked and readily accessible to the fire department and shall conform to the requirements of section Ind 51.21 (2) (e).

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

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

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

(a) *Exception.* The department will permit any partial sprinkler system containing 15 or less sprinkler heads to be connected to the domestic water supply service or a first-aid standpipe, provided the connection is equipped with an approved indicating valve and a check valve. The water pressure and volume shall be adequate to supply the required flow and the system shall be hydraulically calculated. An audible alarm is recommended. A fire department connection is not required.

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

History: 1-2-56; r. and tech. Register, December, 1974, No. 288, eff. 1-1-75; cr. (7) (a), Register, December, 1976, No. 262, eff. 1-1-77.

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

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

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except in the case of a presignal system. Fire alarms shall be readily distinguishable from any other signalling devices used in the building. A system designed for fire alarm and paging service may be used if the design is such that fire alarm signals will have precedence over all others.

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

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

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

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

(4) Operating stations shall be prominently located in an accessible position at all required exit doors and required exit stairways. Operating stations shall be of an approved type and shall be conspicuously identified. All such operating stations shall be of a type, which after being operated, will indicate that an alarm has been sent therefrom until reset by an authorized means. (Operating stations having a "Break Glass" panel will be acceptable. On coded systems having a 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 6 feet above the finished floor as measured from the floor to the center of the box.

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

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

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

*See Appendix A for further explanatory material.

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 600 pounds per square inch shall be used. The maximum length of 3/16" tubing shall not exceed 300 feet between charged cylinders. All tubing and other component parts shall be installed by skilled workmen in accordance with the provisions of this code.

Note: See Wisconsin Administrative Electrical Code, Volume 2.

History: 1-2-50; am. (4) (a), Register, November, 1963, No. 96, eff. 12-1-63; am. Register, August, 1964, No. 104, eff. 9-1-64; r. (10), (11) and (12), Register, December, 1976, No. 240, eff. 1-1-76; cr. (1) (a) and am. intro. and (2), Register, December, 1976, No. 262, eff. 1-1-77.

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

Note: Part numbers refer to 1973 set of standards.

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

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

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

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

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

(6) **DEFORMED AND PLAIN BILLET-STEEL BARS FOR CONCRETE REINFORCEMENT.** Part 4 ASTM Designation A 616-72.

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

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

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- (9) GYPSUM. Part 9 ASTM Designation C 22-50 (1972).
- (10) CHEMICAL ANALYSIS OF LIMESTONE, QUICKLIME, AND HYDRATED LIME. Part 9 ASTM Designation C 25-72.
- (11) STRUCTURAL CLAY LOAD-BEARING WALL TILE. Part 12 ASTM Designation C 34-62 (1970).
- (12) COMPRESSIVE STRENGTH OF CYLINDRICAL CONCRETE SPECIMENS. Part 10 ASTM Designation C 39-72.
- (13) OBTAINING AND TESTING DRILLED CORES AND SAWED BEAMS OF CONCRETE. Part 10 ASTM Designation C 42-68.
- (14) SAMPLING, INSPECTION, PACKING, AND MARKING OF LIME AND LIMESTONE PRODUCTS. Part 9 ASTM Designation C 50-57 (1968).
- (15) GYPSUM PARTITION TILE OR BLOCK. Part 12 ASTM Designation C 52-54 (1972).
- (16) CONCRETE BUILDING BRICK. Part 12 ASTM Designation C 55-71.
- (17) STRUCTURAL CLAY NON-LOAD-BEARING TILE. Part 12 ASTM Designation C 56-71.
- (18) STRUCTURAL CLAY FLOOR TILE. Part 12 ASTM Designation C 57-67 (1972).
- (19) BUILDING BRICK (SOLID MASONRY UNITS MADE FROM CLAY OR SHALE). Part 12 ASTM Designation C 62-69.
- (20) SAMPLING AND TESTING BRICK. Part 12 ASTM Designation C 67-66.
- (21) HOLLOW LOAD-BEARING CONCRETE MASONRY UNITS. Part 12 ASTM Designation C 90-70.
- (22) MASONRY CEMENT. Part 9 ASTM Designation C 91-71.
- (23) ABSORPTION AND BULK SPECIFIC GRAVITY OF NATURAL BUILDING STONE. Part 12 ASTM Designation C 97-47 (1970).
- (24) MODULUS OF RUPTURE OF NATURAL BUILDING STONE. Part 12 ASTM Designation C 99-52 (1970).
- (25) PHYSICAL TESTING OF QUICKLIME AND HYDRATED LIME. Part 9 ASTM Designation C 110-71.
- (26) SAMPLING AND TESTING STRUCTURAL CLAY TILE. Part 12 ASTM Designation C 112-60 (1970).
- (27) Not used.

*See Appendix A for further explanatory material.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(45) LOAD-SETTLEMENT RELATIONSHIP FOR INDIVIDUAL PILES UNDER STATIC AXIAL LOAD. Part 11 ASTM Designation D 1148-69.

*See Appendix A for further explanatory material.

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

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

(48) FIRE TESTS OF ROOF COVERINGS. Part 14 ASTM Designation E 108-68 (1970).

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

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

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

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

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

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

History: Cr. Register, October, 1967, No. 142, eff. 11-1-67; cr. (88) to (98), Register, February, 1971, No. 182, eff. 7-1-71; r. (88) to (93) eff. 8-1-71 and rect. (88) to (98) eff. 1-1-72, Register, July, 1971, No. 187; r. and rect., Register, July, 1974, No. 223, eff. 1-1-75.

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

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

(2) RECOMMENDED PRACTICE FOR MANUFACTURED REINFORCED CONCRETE FLOOR AND ROOF UNITS. ACI 612-67.

(3) MINIMUM REQUIREMENTS FOR THIN-SECTION PRECAST CONCRETE CONSTRUCTION. ACI 625-63.

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

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

*See Appendix A for further explanatory material.

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

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

(3) American Institute of Timber Construction, 338 West Hampden Ave., Englewood, Colorado 80110, STANDARD SPECIFICATIONS FOR STRUCTURAL GLUED LAMINATED TIMBER OF DOUGLAS FIR, WESTERN LARCH, SOUTHERN PINE AND CALIFORNIA REDWOOD, AITC 117-71; STANDARD SPECIFICATIONS FOR HARDWOOD GLUED LAMINATED TIMBER, AITC 119-71; STANDARD SPECIFICATIONS FOR STRUCTURAL GLUED LAMINATED TIMBER USING "E" RATED AND VISUALLY GRADED LUMBER OF DOUGLAS FIR, SOUTHERN PINE, HEM-FIR, AND LODGEPOLE PINE, AITC 120-71.

(4) American Iron and Steel Institute, 160 East 42nd St., New York, N. Y. 10017, SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL STRUCTURAL MEMBERS, 1968 edition, including Addendum No. 1, Nov. 19, 1970; SPECIFICATION FOR THE DESIGN OF LIGHT GAGE, COLD-FORMED STAINLESS STEEL STRUCTURAL MEMBERS, 1968 edition.

(5) American National Standards Institute, Inc., 1430 Broadway, New York, N. Y. 10018, SPECIFICATION FOR REINFORCED GYPSUM CONCRETE, ANSI A 59.1-1968; SPECIFICATION FOR VERMICULITE CONCRETE ROOFS AND SLABS ON GRADE, ANSI A 122.1-1965; PERFORMANCE SPECIFICATIONS AND METHODS OF TESTING FOR SAFETY GLAZING MATERIALS USED IN BUILDINGS, ANSI Z 97.1-1972.

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

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

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NFPA No. 72C-1974; STANDARD FOR PROPRIETARY PROTECTIVE SIGNALING SYSTEMS, NFPA No. 72D-1974; STANDARD ON AUTOMATIC FIRE DETECTORS, NFPA No. 72E-1974.

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

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

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

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

History: Cr. Register, July, 1974, No. 228, eff. 1-1-76, am. (5) and (10), cr. (7a), Register, December, 1974, No. 228, eff. 1-1-76; am. (2) and 7. (7), Register, December, 1976, No. 252, eff. 1-1-77.

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Chapter Ind 52

GENERAL REQUIREMENTS

Ind 52.01	Fire prevention, detection and suppression	Ind 52.50	Toilet rooms
Ind 52.02	Windows	Ind 52.52	Sex designation
Ind 52.03	Window cleaning	Ind 52.53	Location, light and ventilation
Ind 52.04	Requirements for barrier-free environments	Ind 52.54	Location without outside windows when permitted
Ind 52.05	Size of courts	Ind 52.55	Artificial light
Ind 52.06	Ventilation of courts	Ind 52.56	Size
Ind 52.13	Steam and hot water pipes	Ind 52.57	Floor and base
Ind 52.16	Floor protection	Ind 52.58	Walls and ceilings
Ind 52.17	Wall and ceiling protection	Ind 52.59	Enclosure of fixtures
Ind 52.18	Gas and oil lamps; gas service	Ind 52.60	Fixtures
Ind 52.20	Electrical work	Ind 52.61	Protection from freezing
Ind 52.21	Location and maintenance of exits	Ind 52.62	Disposal of sewage
Ind 52.22	Television and radio receiving antenna	Ind 52.63	Outdoor toilets
		Ind 52.64	Maintenance and housekeeping

Ind 52.01 Fire prevention, detection and suppression. (1) SPRINKLER SYSTEM. A complete automatic sprinkler system, as specified in section Ind 51.23, shall be provided in every building more than 60 feet in height, the initial construction of which is commenced after July 2, 1974.

(a) *Additions to existing buildings.* Building additions more than 60 feet in height shall have an automatic sprinkler system installed. The sprinkler protection shall be provided throughout the existing building unless the addition is separated from the existing building by a fire division wall as specified in section Ind 51.02 (13).

(b) *Substitute suppression systems.* When approved by the department, substitute automatic suppression systems may be used in lieu of a sprinkler system in areas where the use of water could cause unusual damage to equipment, or where water may have a limited effect or may be hazardous to use because of the nature of processes involved.

Note: The department will accept design and installation in accordance with the latest edition of the National Fire Protection Association standards for special extinguishing systems.

(c) *Alternate methods.* When approved by the department, alternate methods of fire prevention, detection and suppression may be provided in lieu of a complete automatic sprinkler system.

Note #1: The department will request a position statement regarding the proposed method to be submitted by the fire chief of the municipality wherein the building is located.

Note #2: The department will consider alternate methods of fire prevention, detection and suppression to include, but not limited to, fire-resistant construction, compartmentation, automatic detection systems, interior finish restriction, and partial sprinkler protection.

(2) ADDITIONAL REQUIREMENTS FOR HIGH-RISK BUILDINGS. The following requirements apply to all buildings more than 100 feet in height or having more than 10 stories. Buildings used for low hazard industrial processes, including the production and distribution of gas, steam or

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electric power, foundries and similar uses which require unusual heights to accommodate cranes, special machinery or equipment, are exempt from the provisions of this subsection.

(a) *Smoke control.* Natural or mechanical ventilation for the removal of products of combustion shall be provided in every story and shall consist of one or more of the following methods. Controlling devices may be automatic or manual as approved by the local fire department.

1. Panels or windows in the exterior wall which can be opened from a location other than the fire floor. Such venting facilities shall be provided at the rate of at least 20 square feet per 50 lineal feet of exterior wall in each story, and distributed around the perimeter at not more than 50-foot intervals. Such panels shall be clearly identified as required by the fire department.

2. Openable windows in habitable rooms of residential units.

3. When an automatic sprinkler system is installed in compliance with section Ind 61.23, the mechanical air handling equipment may be designed to assist smoke removal. Under fire conditions, the return and exhaust air shall be taken directly to the outside without recirculation to other sections of the building.

4. A mechanical ventilation system which will prevent the transfer of smoke from the fire source to other floors of the building. The design shall be substantiated by calculations or tests showing that a pressure differential of 0.10 inch of water column will be produced.

5. Any other design which will produce equivalent results.

(b) *Exit stairways.* 1. All stairways shall be pressurized. The pressure across each door shall be at least 0.15 but not more than 0.20 inch of water column with all doors closed. Pressurization shall be activated by the fire alarm system, the detection systems, and the sprinkler system. In lieu of pressurization, a smokeproof stair tower, as defined in section Ind 51.17, will be accepted.

Note: The department will accept alternate designs which will produce equivalent results.

2. All stairway doors which are to be locked from the stairway side shall have the capability of being unlocked without unlatching upon a signal from the central control station.

(c) *Elevators.* There shall be provided at least one elevator suitable for fire department access to any floor. If the building is not provided with an approved automatic sprinkler system, the elevator lobby at each level shall be separated from the remainder of the building by an effective smoke barrier.

Note: Refer to chapter Ind 4, Elevator Code, for additional requirements.

(d) *Fire alarm and detection system.* 1. A manual fire alarm box shall be located adjacent to exit doors into stairway shafts and in every elevator lobby.

2. An approved system which will provide for automatic detection of products of combustion other than heat shall be installed in every

air-handling equipment room, unless sprinklered, and in the return air portion of every air conditioning and mechanical ventilation system. Approved heat detectors may be installed in boiler rooms and furnace rooms in lieu of product of combustion detectors.

a. Detectors shall be located in the main return air and supply air ducts of each ventilation system and at each opening into a vertical vent shaft or duct.

b. The detectors shall actuate an alarm or signaling system and shut down the ventilation system except where automatic smoke control is incorporated in the system.

3. The manual alarm and automatic detection system shall conform to the Wisconsin State Electrical Code and one of the following standards [Ind 61.27 (7a)]:

a. Standard for Central Station Protective Signaling Systems, NFPA No. 71;

b. Standard for Auxiliary Protective Signaling Systems, NFPA No. 72B;

c. Standard for Remote Station Protective Signaling Systems, NFPA No. 72C;

d. Standard for Proprietary Protective Signaling Systems, NFPA No. 72D.

4. Detectors shall conform to the Standard for Automatic Fire Detectors, NFPA No. 72E.

(e) *Alarm and communication systems.* The following alarm and communication systems shall be provided. The systems shall be supervised and exposed wiring shall be encased in a metal conduit.

1. *Voice alarm system.* The detection system, sprinkler water flow device and the fire alarm system shall actuate a prerecorded message or voice alarm capable of being operated from the central control station on a general as well as a selective basis to the area involved. The alarm shall be designed to be heard by all occupants within the building or designated portions.

2. *Voice communication system.* There shall be a voice communication system between the central control station and the following areas:

Note: The department will accept systems installed in accordance with the Standard for the Installation, Maintenance and Use of Local Protective Signaling Systems for Watchmen, Fire Alarm and Supervisory Service, NFPA No. 72A.

a. Elevators, elevator lobbies, in stairways at every fifth floor, and all fire alarm operating stations (2-way communication system).

b. Every office area exceeding 1,000 square feet in area (one-way address system).

c. Each dwelling unit and hotel guest room (one-way address system).

3. *Fire department communication system.* A system providing 2-way communication shall be provided at all floor levels, stairways, the central control station, and other locations required by the fire department.

a. The system shall be designed so the fire department communication system will override the other communication systems.

b. Wiring shall be arranged so that open circuits or short circuits on individual floors will not interfere with communications on another floor.

4. *Combined system.* When approved by the local fire department, the fire department communication system may be combined with the voice communication system and the voice alarm system.

(f) *Central control station.* A central control station for fire department operations shall be provided in a location approved by the fire department. It shall contain the voice communication system panel; fire detection and alarm system panels; status indicators and controls for elevators, smoke venting and air handling systems; controls for unlocking stairway doors; a public telephone; sprinkler valve and water flow detectors; and standby power controls. All fire alarm and water flow signals shall be transmitted directly to the systems indicated in Ind 52.01 (2) (d) 3.

(g) *Standby power and light.* An approved permanently installed standby power generating system shall be provided. The system shall be equipped with suitable means for automatically clearing the generator set upon failure of the normal electrical service and for automatic transfer and operation of the required electrical functions at full power within 60 seconds of such normal service failure. System supervision with manual start and transfer features shall be provided at the central control station.

1. An on-premise fuel supply sufficient for not less than 2 hours full demand operation of the system shall be provided.

2. The power requirement shall be determined so as to provide service to, but not limited to the following:

a. Fire alarm system.

b. Exit and other emergency lighting.

c. Fire protection equipment.

Notes: Standby power to service fire pumps may be omitted if approved by the local fire department.

d. Mechanical ventilation required by this section.

e. Fire department elevator.

f. Communication systems.

(h) *Maintenance.* All life safety systems required under this section shall be tested and maintained in an operable condition. A copy of the test report shall be kept on the premises. The local fire department

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shall be notified whenever the life safety systems are shut down for repair.

History: Emerg. or. eff. 1-1-75; ex. (1), Register, April, 1975, No. 232, eff. 5-1-75; ex. (2), Register, April, 1975, No. 232, eff. 1-1-76; (2), eff. 1-1-77; am. (2), Register, December, 1976, No. 252, eff. 1-1-77.

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 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 64.07 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: 1-2-56; am. Register, December, 1962, No. 84, eff. 1-1-63; r. and rec. (1) (a), Register, October, 1967, No. 142, eff. 11-1-67; am. (1) (a) Register, May, 1974, No. 186, eff. 6-1-74; r. and rec., Register, September, 1978, No. 213, eff. 10-1-79.

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,

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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, swinging 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. 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 section Ind 1.16 (J), scaffolds as specified in chapter Ind 35, 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 employe 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: 1-2-66; am. Register, December, 1982, No. 84, eff. 1-1-83.

Ind 52.04 Requirements for barrier-free environments. (1) **Scope.** The requirements of this section are intended to insure that all public buildings and places of employment shall be accessible and usable by all citizens, including those with functional limitations.

(2) **DEFINITIONS.** (a) *Access or accessible.* Access or accessible means the ability of a person with a functional limitation caused by impairments of sight, hearing, incoordination, perception, semiambulatory or nonambulatory disabilities to enter and leave a public building, circulate through a public building, and use the public toilet facilities without assistance. Functional limitations may require aids such as wheelchairs, crutches, braces or canes.

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(3) **SITE REQUIREMENTS.** A means of access from an ancillary parking facility, street or alley to the building shall be provided.

Note: Section 66.616, Wis. Stats., requires curb ramps for persons with physical disabilities at intersection crosswalks on any city or village street, connecting street, or town road provided with curbs and sidewalks.

(a) **Parking spaces.** Where parking spaces are provided, accessible parking spaces shall be designated and provided at the rate of 2% of the total number of parking spaces provided, with a minimum of one.

1. **Width.** Parking spaces shall be at least 12 feet wide.

2. **Identification and location.** All accessible parking spaces shall be identified and located as close as possible to an accessible building entrance. Parking spaces in a parking ramp shall be located as close as possible to the main entrance of the parking ramp, to an adjacent accessible public walk, or to an accessible elevator.

(b) **Walks.** Walks leading to accessible entrances shall comply with the following:

1. **Width.** Walks shall have a slip-resistant surface and shall be at least 48 inches wide.

2. **Gradients.** Walks shall have a side slope not greater than 2.5% ($\frac{1}{4}$ inch per foot). Walks with a gradient greater than 5% (1:20), but less than 8.3% (1:12), shall be provided with rest platforms at 30-foot intervals and shall have a handrail on one side of the walk. Walks with a gradient of 8.3% (1:12) shall comply with the requirements for ramps [Ind 52.04 (7)].

3. **Handrails.** Handrails shall be provided at walks where the adjacent terrain exceeds a 25% (1:4) downward slope away from the walk.

Note: The requirements for accessible walks are not intended to apply to public walks controlled by city datum, nature trails, or walks not required by this code.

(c) **Communication between buildings or properties.** Walks or enclosed passageways which connect 2 or more properties or buildings and are intended for public use shall provide access to each building or property.

(4) **NEW CONSTRUCTION.** All new public buildings and places of employment shall be provided with access to a primary floor, interior circulation and toilet facilities in accordance with Table 52.04 and the requirements of section Ind 52.04 (4). All buildings with multiple uses shall comply with section Ind 52.04 (5).

Note: The footnotes to Table 52.04 designate specific exemptions and/or requirements for access to the primary floor, interior circulation, and toilet facilities for the occupancies listed.

(a) **Access to the primary floor.** Access from the exterior grade to a primary floor, via a public entrance, shall be provided by means of ramps, grade-level entrances, or other means of access approved by the department.

TABLE S2.04

REQUIREMENTS FOR NEW CONSTRUCTION

Occupancy and Type of Construction	Access to Primary Floor	Interior Circulation	Toilet Facilities
I. All public buildings and places of employment not listed in categories II-XI.	Yes	Yes ¹	Yes
II. Government-owned buildings	Yes	Yes ²	Yes ³
III. Factories, office and mercantile buildings . .	Yes	Yes ⁴	Yes ⁵
A. Dental and medical clinics and offices. . .	Yes	Yes	Yes
IV. Theaters and assembly halls.	Yes	Yes ¹	Yes
A. Churches (Ch. Ind 54 and 55).	Yes ³	Yes ^{4, 6}	Yes ⁵
B. Auditoriums, theaters, stadiums and permanent bleachers	Yes	Yes ⁶	Yes
C. Night clubs, bars, restaurants and recreational facilities (Ch. Ind 54 and 55)	Yes	Yes ^{1, 7}	Yes
V. Schools and other places of instruction. . . .	Yes	Yes ^{1, 7}	Yes
VI. Libraries, museums and art galleries	Yes	Yes ¹	Yes
VII. Residential occupancies.	Yes	Yes ¹	Yes
A. Apartments.	Yes ⁸	Yes ⁹	Yes ¹⁰
B. Row houses.	Yes ¹¹	Yes ⁹	Yes ¹⁰
C. Hotels and motels	Yes	Yes ^{7, 12}	Yes ¹³
D. Group foster homes.	Yes	Yes ¹⁴	Yes
E. Garden apartments	Yes ¹⁵	Yes ⁹	Yes ¹⁰
F. Condominiums.	Yes ¹⁶	Yes ⁹	Yes ¹⁰
VIII. Day care centers ¹⁷	Yes	Yes	Yes
IX. Hospitals and other health care facilities . .	Yes	Yes	Yes ¹⁸
X. Places of detention.	Yes	Yes ^{1, 19}	Yes
XI. Garage occupancies	Yes	Yes ¹	Yes
XII. Mechanical equipment rooms, maintenance equipment and other storage rooms, janitor closets, storage warehouses, saw and feed mills, motion picture booths, portable bleachers and similar occupancies determined by the department.	No	No	No

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General

- ¹If the total gross area of the building, including all floors, is greater than 20,000 square feet, interior circulation is required to all floors. If the total gross area of the building, including all floors, is less than 20,000 square feet, interior circulation is required only on the primary floor.
- ²In buildings accommodating 15 or less employees and 25 or less patrons, a separate toilet room, accessible to the physically disabled, will be acceptable if the toilet room is located on an accessible floor, contains one lavatory and water closet, and is provided with a privacy lock.
- ³Churches require access to the principal nave and chapel. Access is required to a primary floor in remodeling and/or adding to existing churches, except that access is not required to a primary floor if the remodeling is less than 25%.
- ⁴Interior circulation is not required between floor levels.
- ⁵In remodeled churches, a separate accessible toilet room to accommodate both sexes will be acceptable providing the toilet room is located on an accessible floor, contains one lavatory and water closet, and is provided with a privacy lock.
- ⁶Interior circulation is required on the primary floor. Seating spaces shall be an integral part of the seating plan and not segregated. The seating spaces shall be provided at the rate of 5% of the total capacity. The maximum number of seating spaces required shall not exceed 30. One-half of the accessible seating spaces shall be designed for patrons using wheelchairs and shall be located on level floor; the other half of the accessible seating spaces shall be designed for patrons using braces, crutches or similar aids. Ramp details [Int 52.04 (1)] do not apply to the aisles in theater auditoriums.
- ⁷Interior circulation shall be provided to any level containing the only facility of its kind.
- ⁸Access, via a public entrance, shall be provided to a primary floor with living units.
- ⁹Interior circulation within all living units on the primary floor shall be accomplished through the use of 32 inch doors. All corridors shall be at least 36 inches wide. If laundry facilities are provided, the facilities shall be accessible in buildings with more than 20 living units per building.
- ¹⁰Grab bars and special lavatories or water closets are not required.
- ¹¹In row houses, or similar living units with individual exterior entrances, accessible entrances to a primary floor shall be provided at the rate of 10% of the total number of living units, with a minimum of one per complex. The accessible units shall be integrated throughout the complex.
- ¹²Accessible sleeping units shall be provided at a rate of 10% of the total number of units, with a minimum of one. Thirty-two-inch doors are required throughout the living units. All corridors shall be at least 36 inches wide.
- ¹³Self-rising toilet seats and glass tub enclosures are prohibited.
- ¹⁴In group foster homes, common-use areas and 10% of the sleeping rooms shall be accessible.
- ¹⁵A garden apartment building contains a series of 3 or more modules having no more than 4 living units per floor. Each module contains individual exterior entrances which serve a common corridor. Accessible living units shall be provided at the rate of at least 10% of the total number of living units in each building. Interior circulation is required to all living units located on the primary floor of the accessible modules.
- ¹⁶Condominiums, 2 stories or less in height, are exempt from the accessibility requirements relating to parking spaces, ramps and grade level entrances. All doors throughout each living unit are required to be at least 32 inches wide.
- ¹⁷Access, interior circulation, and toilet facilities do not apply to a change of use.
- ¹⁸Twenty percent of all rooms designated for patient use, and the toilet rooms provided in or for these rooms, shall be designed to permit unimpeded use by a person using a standard wheelchair, plus ample room for an attendant.
- ¹⁹In penal institutions, 10% of the total number of required institutional living units shall be accessible. Vertical transportation between tiers of cells is not required.

(b) *Interior circulation.* Access shall be provided to all public-use areas of the building, both horizontally and vertically. Interior circulation between floor levels shall be accomplished by the use of ramps, elevators, approved chair lifts, or other means of access approved by the department.

Note: The department recommends that elevator control buttons and emergency call systems be accessible. Raised lettering is recommended for elevator call buttons and control buttons.

(c) *Toilet facilities.* Accessible toilet facilities shall be provided on a primary floor or accessible from a primary floor. Every floor which is accessible, and which is provided with required toilet facilities, shall be provided with accessible toilet facilities which comply with the requirements of section Ind 52.04 (8) and the following distribution:

1. Accessible water closets shall be integrated throughout the building at the rate of 10% of the total number of required water closets, with a minimum of one for each sex.

2. One accessible toilet room is required in buildings accommodating 5 or less employees and less than 25 patrons per Ind 54.12 (1).

(5) *BUILDINGS WITH MULTIPLE USES.* (a) *Buildings greater than 20,000 square feet.* Multiple-use buildings with a total gross area greater than 20,000 square feet, including all floors, shall comply with the criteria established in Table 52.04 for each specific use.

(b) *Buildings less than 20,000 square feet.* Multiple-use buildings with a total gross area less than 20,000 square feet, including all floors, shall be provided with a means of access to the primary floor, interior circulation and toilet facilities on the primary floor. Government-owned buildings, medical and dental clinics, schools and other places of instruction, hospitals and other health care facilities shall comply with the criteria established in Table 52.04 for each specific use.

Note: Floors used entirely for storage or mechanical purposes need not be included in determining the total gross area.

(6) *ADDITIONS, REMODELED BUILDINGS, AND CHANGE OF USE.* All existing public buildings or places of employment, and all additions, shall be provided with access to a primary floor, interior circulation and toilet facilities in accordance with the following:

(a) *More than 50% remodeled or added.* If more than 50% of the gross interior area of a building is remodeled and/or added, the entire building shall be provided with the requirements of Table 52.04 and section Ind 52.04 (4).

(b) *25% to 50% remodeled or added.* If 25% to 50% of the gross interior area of a building is remodeled and/or added, that part of the building which is remodeled and/or added shall be provided with the requirements of Table 52.04 and section Ind 52.04 (4).

(c) *Less than 25% remodeled or added.* If less than 25% of the gross interior area of a building is remodeled and/or added, the requirements of Table 52.04 and section Ind 52.04 (4) need not be

provided unless the remodeling or addition involves an entrance or exit or toilet facilities.

(d) *Toilet facilities in remodeled buildings.* If an existing building having passenger elevators is remodeled in accordance with the percentages above, accessible toilet room facilities for each sex shall be provided to serve each 5 floors, or fraction thereof, and shall comply with the requirements of section Ind 52.04 (8).

(e) *Change of use.* If the use of an existing building is changed to a new use and the building undergoes physical remodeling, the building shall comply with the percentages established in section Ind 52.04 (6).

(f) *Remodeling in stages.* The percentage requirements established in this subsection shall apply to the accumulative sum of any remodeling and/or additions undertaken after May 15, 1974.

(7) *RAMP DETAILS.* (a) *Ramp slope.* Ramps shall have a slope of not more than one foot of rise in 12 feet of run. An interior ramp with a slope of one foot of rise in 8 feet will be permitted. The ramps shall have a slip-resistant surface and shall have no side slope.

(b) *Ramp width.* Ramps shall be at least 4 feet wide, of which not more than 4 inches on each side may be occupied by a handrail.

(c) *Ramp handrails.* Ramps shall have a handrail on each side which shall be at least 2 feet 6 inches high (preferable height, 2 feet 8 inches). Handrails on unenclosed ramps shall include an intermediate parallel rail at mid height.

(d) *Ramp clearance.* Where ramps are provided to accessible doorways, the floor on each side of the doorway shall be level for a distance of 5 feet from the door.

(e) *Ramp platforms.* Ramps having a 1:8 slope shall have a 5-foot long level platform at 16-foot intervals. Ramps having a 1:12 slope shall have a level platform at 30-foot intervals. Both types of ramps shall have a level platform at least 5 feet long where they turn and at least 6 feet of level clearance at the bottom of the ramps.

(8)* *TOILET FACILITY DETAILS.* (a) *Accessible toilet rooms and compartments.* Accessible toilet rooms and toilet compartments shall be sized to provide ease of access, usability and uninterrupted mobility. Fixtures, doors, and other obstructions shall be arranged to insure accessibility.

(b) *Water closet compartments.* Water closet compartments with a front entrance approach shall be at least 36 inches by 72 inches, or at least 48 inches by 57 inches. Partitions between water closet compartments shall provide 12 inches of clear space from the floor to the bottom of the partition. The compartment door shall be outswinging and at least 32 inches wide. Sufficient clearance must be maintained to permit the door to open at least 95 degrees.

*See Appendix A for further explanatory material.

(c) *Grab bars.* Each grab bar shall be designed and anchored to support a weight of at least 250 pounds, applied at the bar. The grab bars in a 36" x 72" compartment shall be installed on each side of the water closet at 33 inches high and parallel to the floor. The 48" x 57" compartment shall have a horizontal grab bar, 33 inches high, located on the wall nearest the water closet. The grab bars shall have a smooth finish, with an approximate outside diameter between one inch to 1-1/2 inches, and with 1-1/2 inches clearance between rail and wall.

(d) *Water closets.* The seat height of the water closet shall be 16 inches to 20 inches above the floor.

(e) *Lavatory.* At least one lavatory, mounted at a height which allows 29 inches clear space at the bottom of the apron and a maximum rim height of 34 inches, shall be provided.

Note: It is recommended that water supply controls be single lever controls and that exposed hot water pipes be insulated.

(f) *Mirror and towel dispensers.* At least one mirror and towel dispenser or hand dryer, when provided, shall be mounted not more than 40 inches above the floor.

Note: The department will accept toilet rooms, individual toilet compartments and grab bars as illustrated in the Appendix.

(9) *MISCELLANEOUS DETAILS.* (a) *Doors.* 1. Door sizes. All accessible doors shall be at least 32 inches wide.

2. Door thresholds. Threshold at exterior doors shall not extend more than 3/8-inch above the finished floor. Weather-stripped thresholds shall not exceed one inch above the finished floor, including the weather-stripping. All exterior thresholds shall be not less than 4 inches in width. Interior thresholds shall extend not more than 1/2-inch above the finished floor or carpeting. All thresholds shall be beveled to provide smooth, unbroken, rounded surfaces.

Note: Automatic power-operated doors are recommended at entrances. Time-delay door closers are recommended at all accessible doors. The manual pull or push of a door is recommended not to exceed 15 pounds. Lever handles or door handles are recommended over conventional door knobs. Kickplates, 18 inches high, are recommended on the accessible side of doors.

(b) *Platforms.* At least 18 inches of clear platform space shall be provided on the door knob side of all exterior doors. The platform shall have a side slope not greater than 2.5% (1/4 inch per foot) and shall be at least 4 feet in length when the door swings inward or 5 feet in length when the door swings outward.

(c) * *Identification signs.* 1. The international symbol for barrier-free environments shall identify all accessible entrances, toilet facilities, drinking fountains, telephones and parking spaces.

2. The international symbol for barrier-free environments shall be placed at all entrances indicating the location of the nearest accessible entrance(s) and accessible toilet facilities. The symbol at the exterior of the building shall be legible from adjacent streets, driveways or public walks.

*See Appendix A for further explanatory material.

(d)* *Wheelchair functions.* All 90-degree, 180-degree, 360-degree and S-turns shall be designed to provide ease of access, usability and uninterrupted mobility.

Note: #1: The standard wheelchair dimensions are: length including footrest and feet, 42 inches; width, including hands and knuckles, 31 inches.

Note: #2: The minimum space required to turn 90-degree, 180-degree, 360-degree and S-turns is illustrated in the Appendix.

(e) *Grates.* All openings in gratings that will be in the path of access shall not exceed $\frac{3}{8}$ -inch in width, and shall be installed perpendicular to the direction of travel. Spacers perpendicular to the grate and flush with the top of the grate shall be provided at not more than 18-inch intervals.

(f) *Water fountains.* Water fountains shall be accessible and installed at or adapted to a usable height.

Note: Conventional floor-mounted water coolers can be serviceable to patrons with functional limitations if a small fountain is mounted on the side of the cooler 30 inches above the floor. Fully recessed water fountains are not recommended and should not be recessed into alcove unless the alcove is wider than a wheelchair.

(g) *Public telephones.* Where coin telephone(s) are provided for public use, a minimum of one telephone shall be accessible.

Note: It is recommended that the height of the telephone coin slot be not more than 54 inches above the floor, with the dial no more than 48 inches from the floor. An adjustable volume control should be provided in areas where such service is appropriate.

History: Cr. Register, December, 1974, No. 228, eff. 1-1-75; r. and corr. (2) (h), (4), (5) and (6) (a) and (b), am. (8), (7) (a), (7) (e), (8) (c) and (d), r. (9) (d) 3., Register, December, 1975, No. 240, eff. 1-1-76; am. table, (4) (c) 2 and (6) (c), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 52.05 Size of courts. (1) In applying the following requirements, a building from 30 to 43 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 6 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.

*See Appendix A for further explanatory material.

(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 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 the 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: 1-2-58; am. (2) and (5), Register, September, 1978, No. 217, 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 52.13 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 52.16 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

*See Appendix A for further explanatory material.

any combustible material, then the fire-resistant 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.

(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 52.19 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

^aSee Appendix A for further explanatory material.

guard or stop so that the light cannot come nearer to the partition or wall than one foot. In aisles and public passageways, every such light shall be protected by an incombustible guard unless the light is at least 7 feet above the floor. Gas and oil lights shall be kept at least 2 feet from any drape or window curtain.

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

History: 1-2-66; am. (1), Register, September, 1973, No. 23, off. 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 E 400 of the Wisconsin state electrical code.

History: 1-2-66; am. Register, January, 1968, No. 61, off. 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 $\frac{1}{2}$ inch in radial thickness. The ice load shall be computed only upon the wires, cables, messengers and antenna.

(a) 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.

*See Appendix A for further explanatory material.

(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.

(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 lines.

(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.

SANITATION REQUIREMENTS

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

History: 1-2-56; am. Register, December, 1962, No. 84, eff. 1-1-63; am. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 52.52 Sex designation. Where separate toilet rooms for each sex are required by this code, each toilet room shall be marked with regard to the sex which uses it; words such as MEN or WOMEN, in letters not less than one inch high, or symbols may be used.

History: 1-2-56; am. Register, September, 1973, No. 213, eff. 10-1-73; am. Register, December, 1976, No. 252, eff. 1-1-77.

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.

(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 section Ind 54.65, except that this requirement shall not apply to chemical or septic toilets which are installed in accordance with the

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provisions of the chemical toilet code or the septic toilet code issued by the state department of health and social services.

(a) The size of gravity vent ducts, if surmounted with effective siphon type hoods, may be determined as follows: $\frac{AX^2}{300}$ = 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; am. (4) (intra.), Register, December, 1976, No. 240, eff. 1-1-78.

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 section Ind 64.65.

History: 1-2-56; r. and rec. Register, October, 1967, No. 142, eff. 11-1-67; am. Register, December, 1976, No. 240, eff. 1-1-78.

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.

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 $\frac{5}{8}$ 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.

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(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 corr. Register, September, 1959, 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 5½ to 6 feet above the floor. Doors with the top 5½ 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 Ind 52.04 (8). Compartment doors which are hung to swing inward shall clear the fixture not less than 2 inches.

(4) No admission fee shall be charged for the use of any toilet facility in a public building or place of employment. Key-locking of toilet rooms is prohibited in all buildings except service stations and filling stations having exterior toilet room access.

Note: Section 146.085, Wis. Stats., prohibits charging a fee for the use of toilet facilities and imposes a fine of \$10 to \$50 for violations.

History: 1-2-50; am. (3) and cr. (4), Register, November, 1953, No. 95, eff. 12-1-53; am. (2), Register, February, 1974, No. 218, eff. 3-1-74; r. (1), Register, December, 1974, No. 228, eff. 1-1-76; am. (8), Register, December, 1976, No. 246, eff. 1-1-78; cr. (2), Register, December, 1976, No. 262, eff. 1-1-77.

Ind 52.60 Fixtures. (1) **WATER CLOSETS.** Only water closets of porcelain, vitreous china, stainless steel or other nonabsorbent materials shall be used. All water closets in public buildings and places of employment shall have elongated bowls and hinged, open-front seats without cover. Water closets in apartments, day care centers, individual executive offices, and sleeping units of hotels and motels may be of the round bowl type, provided with a hinged, closed-front seat, with or without cover.

(2) **URINALS.** (a) *Stall type.* Stall-type urinals shall be set into the floor, and the floor shall be graded toward the fixture. Spaces between stall-type urinals, or urinals and sidewalls, shall be filled in flush with

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the front and top of the urinal with nonabsorbent material if the space is less than 12 inches.

(b) *Wall type.* Wall-hung urinals may be installed in all buildings except elementary schools (kindergarten through 8th grade).

Note #1: The definitions and general classifications for schools are found in section 115.01, Wis. State.

Note #2: The department recommends that wall-hung urinals be installed at a height between 22 inches to 24 inches above the floor.

(c) *Flushing devices.* The urinals shall be equipped with an effective automatic or manual foot-operated flushing device.

(d) *Multiple urinals.* Batteries of urinals shall be spaced not less than 30 inches center-to-center. The center line of a single urinal shall be at least 16 inches from the nearest sidewall or partition.

(e) *Materials.* Only individual urinals of porcelain, vitreous china, stainless steel, or other nonabsorbent materials approved by the department shall be used.

(f) *Floor drain.* A stall-type urinal, or floor drain located not more than 12 inches from a wall supporting wall-hanging urinals, shall be provided for each group of 4, or less, urinals.

(3) **HAND-WASHING AND DRYING FACILITIES.** Hand-washing facilities shall be provided in all places of employment and public buildings in accordance with the requirements of this subsection.

(a) *Lavatories.* Lavatories shall be of an approved type and shall be provided with hot and cold running water. The lavatories may be equipped with a hot and cold regulating device. If a multiple-use lavatory is installed, 24 lineal inches of wash sink or 20 inches measured along the edge of a circular basin will be considered equivalent to one lavatory.

(b) *Hand-drying facilities.* Individual hand towels, sections of cloth or paper, or clean individual sections of continuous toweling, convenient to the lavatories, shall be provided. Hand-drying facilities shall be provided at the ratio of at least one unit for every 3 lavatories. Warm-air blowers may be substituted for up to one-half of the required hand-drying units. Warm-air blowers shall provide air at not less than 90° F, nor more than 140° F.

Note: The department will accept the qualified blowers listed by Underwriters' Laboratories, Inc.

(c) *Toilet soap.* Soap or similar cleansing agents shall be provided.

(d) *Receptacles.* Receptacles shall be provided for the disposal of used towels and other waste materials.

(4) **DRINKING FACILITIES.** Drinking facilities shall be provided in all buildings except in areas where food and drinks are served. Drinking facilities shall not be installed in toilet rooms, except in residential

*See Appendix A for further explanatory material.

occupancies. Drinking fountains, coolers or individual cups at a potable water source may be provided. Common drinking cups are prohibited.

Note: Where running water is not available, a covered drinking water container, equipped with a faucet or bubbler, may be provided. The container should be cleaned and sanitized at frequent intervals.

(5) **BATHING FACILITIES.** Bathing facilities shall be provided for the specific occupancies outlined in the occupancy chapters of this code.

(a) **Showers.** Shower compartments shall have at least 1,024 square inches of floor area and shall be at least 30 inches in the minimum dimension. Each shower room or compartment shall be constructed of material impervious to moisture. The floor of the shower room or compartment shall be provided with a slip-resistant finish.

(b) **Hot and cold water.** Bathing facilities shall be provided with hot and cold water and be equipped with a hot and cold water regulating device. The device shall be plainly marked. Supply or feed pipes to showers shall be placed overhead or protected to avoid the probability of a person coming in contact with the hot water pipes.

(c) **Toilet soap and towels.** Employees who use showers shall be provided with soap or other appropriate cleansing agents and clean individual towels.

Note: See chapter H 62, rules of the department of health and social services, for special fixture requirements.

History: 1-2-56; r. and rec., Register, September, 1959, No. 45, eff. 10-1-59; am. (1), Register, September, 1972, No. 213, eff. 10-1-73; r. and rec., Register, December, 1974, No. 228, eff. 1-1-75; am. (1) and (2) (d), r. and rec. (2) (b), cr. (2) (f), (3), (4) and (5), Register, December, 1976, No. 252, eff. 1-1-77.

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 52.62 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 52.53, 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

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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 52.63 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.

(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.

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.

¹See Appendix A for further explanatory material.

(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, toweling and other equipment for sanitary upkeep of toilet rooms.

History: 1-2-E6; r. and rec. (4), Register, October, 1967, No. 142, eff. 11-1-67.

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Chapter Ind 53

STRUCTURAL REQUIREMENTS

Ind 53.01 Scope	Ind 53.322 Empirical method of design
Part I Minimum Allowable Loads	Ind 53.323 Engineered masonry
Ind 53.10 Dead loads	Ind 53.33 Construction
Ind 53.11 Live loads	Ind 53.34 Miscellaneous design-construction details
Ind 53.12 Wind loads	Ind 53.35 Tiles
Ind 53.13 Impact loads	Ind 53.36 Veneer, furring and trim
Ind 53.14 Load combinations	Part IV Concrete
Part II Foundations	Ind 53.40 Concrete requirements
Ind 53.20 General	Ind 53.41 Gypsum concrete requirements
Ind 53.21 Soil bearing capacity	Ind 53.42 Vermiculite concrete requirements
Ind 53.22 Unprepared fill material, organic material	Part V Metals
Ind 53.23 Frost penetration	Ind 53.50 Structural steel requirements
Ind 53.24 Piling	Ind 53.51 Cold-formed steel requirements
Ind 53.25 Settlement	Ind 53.52 Steel joint requirements
Ind 53.27 Cut or fill slopes	Ind 53.53 Structural welding of steel
Ind 53.28 Pole foundations	Ind 53.54 Aluminum framing requirements
Part III Masonry	Ind 53.55 Stainless steel requirements
Ind 53.30 General	Ind 53.56 Other metals
Ind 53.31 Materials	Part VI Wood and Wood Fiber Products
Ind 53.311 Masonry units	Ind 53.60 General
Ind 53.312 Mortar	Ind 53.61 Materials and design of structural elements
Ind 53.313 Masonry grout	Ind 53.62 Special systems
Ind 53.314 Cementitious materials	Ind 53.63 Minimum construction requirements
Ind 53.315 Water	
Ind 53.316 Reinforcing, ties and anchors	
Ind 53.32 Design	
Ind 53.321 Types of masonry	

History: Chapter Ind 53 as it existed on December 31, 1974, was repealed and a new chapter Ind 53 was created Register, July, 1974, No. 223, effective January 1, 1976.

Ind 53.01 Scope. This chapter provides the minimum requirements for the structural design of all buildings, structures and foundations to provide safe support of all dead loads, superimposed live and special loads, without exceeding the prescribed allowable stresses or departing from accepted engineering practice.

Note: Wis. Adm. Code chapters Ind 1000.2000, Safety and Health, provides requirements for the safe assembly of materials at the construction site.

Note: References. All standards referred to in this chapter will be identified by the designation and the number of standard followed by a cross-reference. The cross-reference will give full detail of the subject name and year of standard. Example: ASTM C-55 [Ind 53.35 (16)].

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

PART I MINIMUM ALLOWABLE LOADS

Ind 53.10 Dead loads. All buildings and structures, and parts thereof, shall be designed and constructed to support the actual dead weight of all component members in addition to the weight of partitions, ceiling finishes, floor finishes, stairways, safes and service equipment such as sprinkler systems, plumbing stacks, heating and air conditioning equipment, electrical equipment, elevators, flues and similar fixed equipment which become a part of the building.

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Note: Unless the project owner submits a written application for waiver, the department will consider 3 pounds per square foot as minimum service equipment load.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-76.

Ind 53.11 Live loads. (1) All buildings and structures, and parts thereof, shall be designed and constructed to support the superimposed live loads, specified in Table 53-I, uniformly distributed in pounds per square foot of horizontal area. These load requirements shall be considered only as a minimum. In every case where the loading is greater than this minimum, the design of the building or structure, or part thereof, shall be for the actual load and loading conditions. The most severe distribution, concentration and combination of design loads and forces shall be taken into consideration.

**TABLE 53-I
FLOOR LOADINGS**

Occupancy	PSF
(a) Business	
1. Offices	50
2. Offices with heavy business machines, heavy files, book stacks	100
(b) Mercantile	
1. Retail stores, shops, banks, restaurants, taverns, funeral homes	100
2. Wholesale stores	125
(c) Industrial	
1. Manufacturing, light	100
2. Manufacturing, heavy	150
(d) Storage	
1. Warehouse, light	125
2. Warehouse, heavy	250
3. Paper storage	
a. Compact	50 psf per ft. of ht.
b. Loose	30 psf per ft. of ht.
4. Garages—storage or repair	80
or 8,000 pound axle load in any possible position (whichever produces larger stresses).	
5. Parking decks	
a. All areas for passenger cars	50
b. Top floors, if open to sky, shall comply with Ind 53.11 (4) (roof loads) in addition to	50
c. Express lanes and ramps with a slope of 12% or more, the vertical loading (50 psf) shall be increased by 25%	
d. All areas for trucks and buses	80
or 8,000 pound axle load in any possible position (whichever produces larger stresses)	
(e) Assembly areas	
1. Armories, drill rooms	150

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Table 53-I (cont.)

Occupancy	PSF
2. Assembly halls, auditoriums, lecture halls, churches, lodge rooms, theaters, courtrooms, balconies, with:	
a. Fixed seats.....	60
b. Movable seats.....	100
3. Dance floors, gymnasiums, exhibition rooms, passenger stations, skating rinks, restaurant serving and dining areas.....	100
4. Recreational areas such as bowling alleys and pool rooms.....	75
5. Floors supporting portable roving stands, grandstands or bleachers.....	130
Notes: See Ind. 55.56 for designing of portable units.	
6. Stage floors.....	150
(f) Educational	
1. Schools and related facilities	
a. Classrooms, study rooms, laboratories, display areas, offices.....	50
b. Floors of open plan schools.....	75
c. Industrial arts, home economics, music and band rooms.....	80
d. Gymnasiums, cafeteria areas.....	100
2. Libraries (public or in schools)	
a. Reading areas.....	60
b. Stack areas (20 psf per foot of height) but not less than.....	150
3. Museums and art galleries.....	80
(g) Residential	
1. Apartments, dormitories, guest rooms in hotels and motels.....	40
(h) Institutional	
1. Ward and private rooms in hospitals, nursing homes, asylums, cells in penal institutions.....	40
2. Operating rooms in hospitals, clinics.....	60
(i) Miscellaneous (applies to all occupancies above)	
1. Stairways, corridors, vestibules, lobbies	
a. in residential and institutional buildings.....	80
b. in all other buildings.....	100
2. Rest rooms and toilet rooms in public places.....	50
3. Equipment rooms (heating-ventilating, mechanical, electrical) equipment weight plus 40 psf, but not less than.....	75
4. Structural sidewalks and promenade decks	
a. with no vehicular restriction.....	250
or 12,000 pounds concentrated load in any position	
b. with vehicular restriction.....	100

(2) Loads not specified in Table 53-I. See Ind. 53.11 (1).

(3) Live load reductions.

(a) No reduction of live load shall be allowed in the design of any slab or joist.

(a) *Special purpose roofs.* Greenhouses shall be designed for not less than one-half the value specified for roof loads.

(b) *Increase in roof loads.* When there are elevation differences on roof levels, parapets, canopies or valleys which may cause excess snow, ice and/or water accumulation, the designer shall make special provisions for increased loading at such locations.

Note: The department will accept special provisions such as outlined in, but not limited to "Structural Information for Building Design in Canada," Supplement No. 3, National Building Code of Canada; or the recommendations of the Metal Building Manufacturers Association.

History: Cf. Register, July, 1974, No. 227, eff. 1-1-75; am. (3) (d) and (4) (a), Register, December, 1974, No. 228, eff. 1-1-75.

Ind 53.12 Wind loads. (1) **LOADING.** Every building (including all components of the exterior wall) and structure shall be designed to resist a minimum total wind load in accordance with the following table:

Up to 50 feet.....	20 psf
Over 50 to 100 feet.....	25 psf
Over 100 to 150 feet.....	30 psf
Over 150 to 200 feet.....	35 psf
Over 200 feet.....	40 psf

The wind pressure shall be taken on the gross area of the vertical projection of the building or structures facing the wind. No allowance shall be made for the shielding effect of other buildings and structures. For purposes of wind load design, the height shall be measured above the average level of the adjoining ground.

(2) **UPLIFT AND SUCTION FORCES.** Buildings and structures, including attachment of roof to building or structure and anchorage of building or structure to the foundation, shall be designed and constructed to withstand a wind pressure acting outward normal to the surface equal to the values set forth in Ind 53.12 (1). These suction and uplift forces need not be considered as additive to the design wind loads in the overall analysis of the building or structure. Roof overhangs, eaves, cornices, canopies and buildings open on one or more sides shall be designed and constructed to withstand an upward pressure of at least 80 PSF, unless a higher value is indicated in Ind 53.12 (1).

(3) **OVERTURNING MOMENT.** The overturning moment due to wind load shall not exceed $\frac{1}{4}$ of the moment of stability due to dead load only, unless the building or structure is anchored to foundations of sufficient weight to resist this force. The weight of earth superimposed over footings may be used to calculate the dead load resisting moment. Sufficient diaphragm bracing, diagonal bracing or rigid connections between uprights and horizontal members shall be provided to resist distortions.

(4) **SHAPE FACTORS.** The following shape factors may be used for the design of structures such as chimneys, tanks and solid towers in conjunction with Ind 53.12 (1).

<i>Horizontal cross-section</i>	<i>Shape factors</i>
square or rectangular.....	1.0
hexagonal or octagonal.....	0.8
round or elliptical.....	0.6

(5) **WIND LOAD ANALYSIS.** More exact wind load analysis will be acceptable if a recognized procedure is used.

Note: The department will accept recognized procedures such as, but not limited to Department of Navy, Bureau of Yards and Docks, NAVFAC DM-2 (Dec. 1967); or "Wind Forces on Structures," by the Structural Division of ASCE Test Committee on Wind Forces (ASCE Transactions, Vol. 128, Part II, Paper No. 3269).

History: Cr. Register, July, 1974, No. 223, eff. 1-1-76; am. (2), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 53.13 Impact loads. (1) **LOADING.** Structural elements carrying live loads which induce impact shall have the live loads increased by the following minimum percentages in the structural design consideration of such forces:

For supports of elevators.....	100
For traveling crane support girders and moving loads.....	25
For supports of light machinery.....	20
For supports of vibrating machinery or power driven units.....	50
For hangers supporting floors and balconies.....	33

(2) **HORIZONTAL AND LONGITUDINAL CRANE FORCES.** The lateral force on crane runways shall be equal to 20% of the sum of the crane capacity and the crane trolley (but exclusive of other parts of the crane). The force shall be assumed to be applied at the top of the rail, one-half on each side of the runway, and shall be considered acting in either direction normal to the runway rail. The longitudinal force (in the direction of rail) shall be taken as 10% of the maximum wheel loads of the crane applied at the top of the rail.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-76.

Ind 53.14 Load combinations. Allowable stresses may be increased 33 1/3 % when wind loads are acting in combination with dead, live and impact (if any) loads. The section computed on this basis shall be not less than that required for the design dead, live and impact (if any) loads, computed without the 33 1/3 % stress increase. The most severe distribution, concentration and combination of design loads and forces shall be taken into consideration, as specified in section Ind 53.11.

History: Cr. Register, July, 1974, No. 233, eff. 1-1-75; am. Register, December, 1975, No. 240, eff. 1-1-76.

PART II FOUNDATIONS

Ind 53.20 General. All submittals for plan examination of new buildings or structures, and for the alteration of a permanent structure which requires changes in foundation loads and distribution, shall have the soil types and bearing capacities (indicating verified or presumptive) used in the design of footing and foundations shown on

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the plans. Sufficient records and data to establish the soil character, nature and load-bearing capacity shall be available to the department upon request.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-76.

Ind 53.21 Soil bearing capacity. Bearing capacity of soils shall be determined by one of the following methods:

(1) **VERIFIED.** The soil shall be subjected to field or laboratory tests to determine its bearing capacity. A report, certified by a registered architect or registered professional engineer, shall be available to the department upon request.

(2) **PRESUMPTIVE.** (a) The type of soil under buildings shall be assigned a value not exceeding the bearing capacity, in pounds per square foot, as specified in Table 53-II. The type of soil shall be determined by explorations made at or adjacent to the site. The actual loading of the soil shall not exceed the specified bearing capacity unless verified by a written report (as explained in subsection (1) above).

**TABLE 53-II
PRESUMPTIVE SOIL BEARING VALUES**

Type of Soil	PSP
1. Wet soft clay; very loose silt; silty clay	Verified method Ind 53.21 (1)
2. Loose fine sand; medium clay; loose sandy clay soils	2,000
3. Stiff clay; firm inorganic silt	3,000
4. Medium (firm) sand; loose sandy gravel; firm sandy clay soils; hard dry clay	4,000
5. Dense sand and gravel; very compact mixture of clay, sand and gravel	6,000
6. Rock	12,000

(b) The presumed soil bearing values shall be confirmed by exploring the type of soil to a depth of at least 5 feet below the footings during or before construction. The designer shall submit a report of confirmation to the department upon request.

(c) Where the bearing materials directly under a foundation overlie a stratum having smaller allowable bearing values, such smaller values shall not be exceeded at the level of such stratum.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-76; am. (2) (b), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 53.22 Unprepared fill material, organic material. No foundation of buildings or structures shall be placed upon unprepared fill material, organic soil, alluvial soil or mud unless evidence has been presented to the department showing that the proposed load will be adequately supported. This evidence shall be in the form of a written report and shall be based on soil analyses, load tests or other acceptable criteria.

Note: The decomposition of organic material in landfill sites established for the disposal of organic wastes may produce odorous, toxic and explosive concentrations of gas which may seep into buildings through storm sewers and similar underground utilities unless provisions are taken to release the gases to the atmosphere.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

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Ind 53.23 Frost penetration. (1) Footings and foundations shall be placed below the frost penetration level, but in no case less than 42 inches below adjacent ground. Such footings shall not be placed over frozen material.

(2) Exceptions. (a) The edges of floating slabs constructed on grade need not be installed below the minimum frost penetration line provided adequate measures have been taken to prevent frost forces from damaging the structure.

(b) Grade beams need not be installed to the minimum frost penetration line, provided adequate measures are taken to prevent frost forces from damaging the structure.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

Ind 53.24 Piling: (1) **GENERAL REQUIREMENT.** Pile foundations shall be designed and installed to adequately transfer the structure loads to underlying or adjacent soil bearing strata.

(2) **INSTALLATION.** Piles shall be handled and installed to the required penetration by methods which leave their strength unimpaired and that develop and retain the required load bearing capacity. Any damaged pile shall be satisfactorily repaired or the pile shall be rejected.

(3) **ALLOWABLE LOADS BASED ON SOIL CONDITIONS.** (a) *By driving formula.* For individual pile design loads not exceeding 40 tons per pile, the safe working load may be determined by a recognized formula or by the following formula:

$$P = \frac{2WH}{S+1} \text{ for drop hammer}$$

$$P = \frac{2E}{S+0.1} \text{ for double-acting hammer}$$

in which:

P = safe load (lbs.)

W = weight of striking part of hammer (lbs.)

H = fall of striking part of hammer (ft.)

E = manufacturer's rated energy (ft. — lbs.)

S = average penetration of pile under last 6 blows (inches/blow)

(b) *Substantiation of higher allowable loads.* Allowable loads greater than 40 tons will be permitted when substantiating data justifying such higher loads is submitted to the department by a foundation designer knowledgeable in the field of soil mechanics and pile foundations and familiar with the locale of the proposed project. Substantiating data such as test borings, laboratory test results, soil profiles, and pile load tests may be required by the department. The load test shall be in accordance with the procedure outlined in ASTM D-1143 [Ind 51.25 (45)].

(c) *Group pile action.* When friction piles are placed in groups, consideration shall be given to the reduction of load per pile.

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(d) *Piles in subsiding areas.* Where piles are driven through subsiding fills or other subsiding strata and derive support from underlying firmer material, consideration shall be given to the downward frictional forces which may be imposed on the piles by the subsiding upper strata.

(e) *Lateral support.* Water, air and fluid soils shall not be considered as offering lateral support to piles. In any other type of material the piles may be designed as a short column. Positive permanent lateral support shall be provided at or near the top of all piles.

(4) **ALLOWABLE LOADS BASED ON PILE MATERIAL STRENGTH.** (a) The compressive stress in any cross-section of a pile shall not exceed the normal allowable compressive stress of the material used for the pile, except as given in Ind 53.24 (5). The piles may be designed as short columns except as stated in section Ind 53.24 (3) (c).

(b) *End-bearing piles.* For end-bearing piles more than 40 feet in length, it may be assumed that 75% of the load is carried by the tip, except for piles installed in a material referred to in section Ind 53.22.

(c) *Friction piles.* For friction piles, the full load shall be computed at the cross section located at two-thirds of the embedded length of the pile measured up from the tip.

(5) **TYPE OF PILES.** (a) *Timber piles.* Timber piles shall conform to National Design Specifications, Part X [Ind 51.27 (8)]. In addition, the tops of treated piles, at cutoff, shall be given 3 coats of hot creosote, followed by a coat of coal-tar pitch; and the cutoff shall be encased not less than 4 inches in concrete footing of the foundation.

(b) *Precast concrete piles.* Precast concrete piles shall be cast in one piece and shall attain a compressive strength of not less than 3,000 psi prior to driving. There shall be a minimum concrete covering of 2 inches over all reinforcing bars. Precast concrete piles shall be designed to resist stresses induced by handling, driving and super-imposed loads.

(c) *Cast-in-place concrete piles.* All concrete for cast-in-place piles shall develop a compressive strength of not less than 3,000 psi. Reinforcement shall have a concrete cover of one inch in cased piles and 2 inches in uncased piles.

1. *Uncased piles.* Cast-in-place piles in contact with earth shall be limited in length to 30 times the average diameter of the pile. The allowable compressive stress in concrete shall not exceed 0.83 f'_c . The concrete shall be deposited in a shaft free of foreign matter in a continuous operation so as to insure a full sized pile without voids or segregation.

2. *Metal formed piles.* Cast-in-place piles in contact with a steel shell or casing shall have a minimum tip diameter of 8 inches and a minimum average diameter of 10 inches. The shell and casing shall be sufficiently strong to resist collapse and sufficiently watertight to exclude water and foreign material during the placing of concrete. The shell or casing cannot be considered as a load carrying part of the pile. The allowable compressive stress in concrete shall be as stated for

uncased piles, but it may be increased to a maximum value of 0.40 f'_c if the following conditions are satisfied:

a. The thickness of casing is not less than 0.0747 inches (14 ga AISI).

b. The casing is seamless or is provided with seams of strength equal to that of the casing.

c. The pile diameter is not greater than 18 inches.

(d) *Concrete-filled pipe and tapered tubular piles.* Concrete-filled pipe and tapered tubular piles may be driven open-ended or closed-ended. Pipe or tapered tube piles driven with closed ends shall be treated as a cast-in place concrete pile with metal casing and shall be governed by the same regulations applicable thereto with suitable load-bearing allowance made for the metal casing. When driven open-ended to rock, no concrete shall be deposited until the pipe is cleaned free of all soil or loose rock chips and satisfactory proof furnished of the condition of the rock. The allowable stress in steel is .35 F_y but shall not exceed 12,600 psi. The minimum wall thickness of all load-bearing pipe, tube and shells shall be 1/10 inch. When the soil surrounding the pile contains destructive chemical elements, the pile shall be provided with an approved protective jacket or coating which will not be rendered ineffective by driving.

(e) *Structural steel piles.* No section shall have a nominal thickness of metal less than 3/8 inch. When an H-shaped section is used, the flange projection shall not be more than 14 times the minimum thickness of metal. The steel stress shall not exceed 0.35 F_y.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-76.

Ind 53.25 Settlement. Where footings or floating slabs are placed upon clays or other materials which are subject to settlement, an analysis for such buildings shall include consideration of total and differential settlements anticipated.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

Ind 53.27 Cut or fill slopes. (1) **PERMANENT CUT OR FILL SLOPES.** Cuts or fills adjacent to any building, structure or property line shall be so constructed or protected that they do not endanger life and/or property. Permanent cut slopes shall not be steeper than 1½ horizontal to one vertical and permanent fill slopes shall not be steeper than 2 horizontal to one vertical unless substantiating data justifying steeper slopes are submitted.

(2) **TEMPORARY CUT OR FILL SLOPES.** For temporary cuts and fills, refer to Wis. Adm. Codes chapter Ind 6—Trench, Excavation and Tunnel Construction, and chapter Ind 35—Safety in Construction.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-76.

Ind 53.28 Pole foundations. Structures that use poles embedded in earth or embedded in concrete footings in the earth to resist axial and lateral loads shall have their depth of embedment determined as specified in this section.

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(1) **CONSTRUCTION BACKFILL REQUIREMENTS.** The space around the pole shall be backfilled in accordance with one of the following methods:

(a) The hole shall be made 4 inches larger than the diameter or diagonal dimension of rectangular or square poles. It shall be backfilled with 2,000 psi concrete.

(b) The backfill shall be of thoroughly compacted clean sand.

(2) **DESIGN-NONRESTRAINED POLES.** The following formula shall be used in determining the depth of embedment required to resist lateral loads where no restraint is provided at the ground surface, unless other methods are approved by the department.

$$d = \frac{A}{2} \left(1 + \sqrt{1 + \frac{4.36 h}{A}} \right)$$

where: d = depth of embedment, ft.

$$A = \frac{2.34 P}{S, B}$$

P = applied horizontal force on pole, lb.

S, B = $pd/3$, see Table 53-III

Note: For first approximation of " d ", the following formula may be used:

$$d = 8 \sqrt{\frac{12 h P}{B p}}$$

B = diameter of concrete casing, ft.; when noncircular in concrete, diameter or diagonal dimension of square or rectangular pole, ft.

h = height above the ground, in feet, at which the force " P " is applied. If the pole has fixity at the top, such as provided by a knee brace, the force " P " acts at the inflection point. The inflection point may be assumed at $\frac{1}{3}$ of the distance from the ground to the knee brace for round poles, or $\frac{1}{2}$ of the distance from the ground to the knee brace for square poles.

p = allowable lateral passive soil pressure, † psf.

† Unless a more exact soil analysis method is used, the allowable passive soil pressure shall be determined as follows:

TABLE 53-III
ALLOWABLE LATERAL SOIL PRESSURE

Soil Types (see Table 53 - II)	Allowable Passive Soil Pressure, psf per foot of depth below grade††	S , and B , values shall not exceed, psf
1 and 2 (not well drained)	100	1,500
3 and 4 (well drained)	200	2,500
5 and 6 (well drained)	400	5,000

†† Values may be increased 33-1/3% for wind loads.

(3) **DESIGN—RESTRAINED POLES.** Where restraint is provided at the ground surface, such as a rigid floor or pavement, the depth of embedment shall be in accordance with the following formula:

$$d = \sqrt{\frac{4.25 h P}{S, B}}$$

where: S, B = pd , see Table 53-III.

(4) **MOISTURE.** A preservative treatment shall be applied to poles subjected to moisture.

Note: The department will accept poles treated in accordance with the standards of the American Wood Preservers Association for preservative treatments.

History: Cr. Register, July, 1974, No. 228, eff. 1-1-75; am. (2) and (3), cr. (4), Register, December, 1976, No. 252, eff. 1-1-77.

PART III MASONRY

Ind 53.30 General. (1) **Scope.** The requirements of Ind 53.30 through 53.36 herein shall apply to the design, construction and materials used in all masonry and similar work under this code.

(2) **DEFINITION.** Masonry as used herein shall be considered as any built-up construction or combination of building units or materials of clay, shale, concrete, stone, gypsum, glass, metal or other approved units.

(3) **DIMENSIONS.** Dimensions specified herein are nominal unless otherwise stated. The actual dimensions may vary from the nominal by the thickness of a mortar joint, but not more than one-half inch.

History: Cr. Register, July, 1974, No. 228, eff. 1-1-75.

Ind 53.31 Materials. (1) **GENERAL REQUIREMENTS.** Components used in the construction of masonry shall be as required in sections Ind 53.311 through Ind 53.316.

(2) **LABELING.** All packaged materials shall be clearly identified by name (portland cement, masonry cement, lime, gypsum, etc.) and applicable standards which are met.

History: Cr. Register, July, 1974, No. 228, eff. 1-1-75.

Ind 53.311 Masonry units. (1) **GENERAL.** (a) *Solid and hollow units.* A solid masonry unit is a unit whose net cross-sectional area in every plane parallel to the bearing surface is 75% or more of its gross cross-sectional area measured in the same plane. A hollow masonry unit has a net cross-sectional area less than 75% of its gross cross-sectional area.

(b) *Quality.* All masonry units shall be free from cracks, laminations and other defects or deficiencies, including admixtures and coatings, which may interfere with proper laying of the unit or impair the strength or permanence of the structure.

(c) *Used masonry units.* Masonry units may be reused when clean, whole and conforming to requirements for new masonry units.

(d) *Marking requirements.* Masonry units shall be of distinctive design or appearance, or marked so that the manufacturer is identified, as required by the department.

(e) *Surface condition at time of use.* Every masonry unit shall have all surfaces, to which mortar or grout is to be applied, capable of developing the required strength and bond. Coating or facings permitted and applied to masonry unit surfaces prior to their installation shall not supersede this requirement.

(f) *Positioning in structure.* Hollow masonry units shall be laid only in positions as tested for compliance.

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(2) **CLAY AND SHALE UNITS.** Clay and shale units shall be made of burned clay or shale or mixtures thereof with or without admixtures.

(a) *Solid units (brick).* Units shall conform to grade SW requirements of ASTM C-62 [Ind 51.25 (19)].

(b) *Hollow units (tile and hollow brick).*

1. **Load-bearing units.** Units for use in load-bearing and exterior walls shall conform to grade LBX requirements of ASTM C-34 [Ind 51.25 (11)], or grade SW requirements of ASTM C-652 [Ind 51.25 (41)].

2. **Non-load-bearing units.** Units for use in non-load-bearing partitions shall be specially marked and shall conform to the requirements of ASTM C-66 [Ind 51.25 (17)]. Such units may also be used for non-structural purposes in concrete floor construction.

3. **Units for floor construction.** Units for structural use in floor construction shall conform to grade FT 1 requirements of ASTM C-57 [Ind 51.25 (18)].

(3) **CONCRETE UNITS.** Concrete units shall be made with portland cement, water and suitable mineral aggregates, with or without admixtures.

(a) *Solid units.* 1. **Small units (brick).** Units shall conform to grade N requirements of ASTM C-56 [Ind 51.25 (16)].

2. **Large units (solid block).** Units shall conform to grade N requirements of ASTM C-145 [Ind 51.25 (30)].

(b) *Hollow units (blocks).* Units shall conform to grade N requirements of ASTM C-90 [Ind 51.25 (21)].

(4) **NATURAL STONE.** All natural building stone for use in masonry shall be sound and free from loose or friable inclusions, and shall meet the strength and fire resistance requirements for the proposed use. Where the cleavage plane of stone units is pronounced, the stone shall be laid only on its natural bed. Stone exposed to soil, weather or frost action shall be such that the strength and structure of the stone will not be affected when so exposed.

(5) **CAST STONE.** Units covered under this category are homogeneous or faced, dry cast concrete products other than conventional concrete masonry units (brick or block), but of similar size.

(a) *Composition.* Units shall be made with portland cement, water and suitable mineral aggregates, with or without admixtures, and reinforced if required.

(b) *Standards.* Units shall have a minimum compressive strength of 6500 psi and a maximum water absorption of 6% when tested as 2 x 2 inch cylinders or cubes.

(6) **ARCHITECTURAL PRECAST CONCRETE.** Units covered under this category are homogeneous or faced, wet cast non-load-bearing concrete products. Load-bearing precast concrete units shall conform to the requirements of Ind 58.40.

(a) *Composition.* Units shall be made with portland cement, water and suitable aggregates, with or without admixtures, and reinforced as required.

(b) *Standards.* Units shall conform to the requirements of Table 53-IV.

TABLE 53-IV
ARCHITECTURAL PRECAST CONCRETE PHYSICAL REQUIREMENTS

Use	Compressive Strength ¹ Minimum (psi)		Water Absorption	Purposefully Entrained Air
	Avg. of 3	Individual	Maximum (%)	Minimum (%)
Exposed to freeze-thaw cycles (exterior)	4,500	3,900	8	3
All others (interior)	3,800	3,000	10	—

¹Compressive strength shall be determined by procedures outlined in ASTM C-39 [Ind 51.25 (12)] or C-42 [Ind 51.25 (18)].

(7) **GYPSUM UNITS.** Units shall conform to the requirements of ASTM C-52 [Ind 51.25 (15)]. Gypsum units shall not be used in exterior or load-bearing walls or locations exposed to frequent or continuous wetting.

(8) **MISCELLANEOUS UNITS.** See Ind 50.12 for all other potential masonry units.

History: Cr. Register, July, 1974, No. 228, eff. 1-1-75.

Ind 53.312 Mortar. (1) **GENERAL.** Mortar as used herein shall be considered as a mixture containing cementitious materials used to permanently bond masonry or other structural elements.

(2) **MORTAR FOR UNIT MASONRY.** (a) *Composition.* Conventional mortar shall be composed of cementitious materials, fine aggregates and water. Suitable admixtures are allowed.

(b) *Standards.* All materials used as ingredients in mortar when delivered to the mixer shall conform to the requirements outlined below:

1. Cementitious materials. See Ind 53.314.

2. Aggregates. Aggregates shall conform to the following requirements and to the requirements of ASTM C-144 [Ind 51.25 (29)].

a. Aggregates shall be graded within the limits of Table 53-V.

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TABLE 53-V
MASONRY SAND GRADATION REQUIREMENTS

Sieve Size	Percentage Passing	
	Natural Sand	Manufactured Sand
No. 4	100	100
No. 8	95 to 100	95 to 100
No. 16	70 to 100	70 to 100
No. 80	40 to 75	40 to 75
No. 50	10 to 35	20 to 40
No. 100	2 to 16	10 to 25
No. 200	—	0 to 10

b. The aggregate shall have not more than 50% retained between any 2 consecutive sieves of those listed in Table 53-V, nor more than 25% between the No. 50 and No. 100 sieves.

c. If the fineness modulus varies by more than 0.20 from the value assumed in selecting proportions for the mortar, suitable adjustments shall be made in proportions to compensate for the change in grading.

3. Water. See Ind 53.315.

4. Admixtures. Where metal ties, anchors or reinforcement are imbedded in masonry, chloride, nitrate and sulphate base salts or materials containing same shall not be used in masonry construction.

(c) *Requirements.* Mortar for masonry shall conform to the property requirements of Table 53-VI and to the requirements of ASTM C-270 [Ind 51.25 (34)] unless otherwise noted in this section. If approved laboratory testing is not conducted to indicate compliance with Table 53-VI, the mortar mix shall be restricted to the provisions of Table 53-VII.

TABLE 53-VI
MORTAR PROPERTY REQUIREMENTS

Mortar Type	Compressive Strength† Min. (psi)	Water Retention Min. (%)	Air Content Max. (%)
M	2,500	75	18
S	1,800	75	18
N	750	75	18
O	350	75	18

†See Ind 53.35 (3).

TABLE 53-VII
MORTAR PROPORTION RESTRICTIONS

Mortar Type	Cementitious Materials (Proportions by Volume)			Aggregate (Measured in a dump loose condition)
	Portland Cement	Masonry Cement	Lime	
Lime Cement Mortar				
M	1	—	1/4	Not less than 2 1/4 and not more than 8 times the sum of the separate volumes of cementitious materials.
S	1	—	over 1/4 to 1/2	
N	1	—	over 1/2 to 1 1/4	
O	1	—	over 1 1/4 to 2 1/2	
Masonry Cement Mortar				
M	1	1	—	
S	1/2	1	—	
N	—	1	—	
O	—	1	—	

(3) GYPSUM MORTAR. (a) *Standards.* Gypsum mortar shall be composed of one part of unfibred calcined neat gypsum to not more than 3 parts sand by weight, with sufficient water added for workability.

(b) *Use restrictions.* Gypsum mortar shall be used only with gypsum tile and block units or as fireproofing.

(4) MISCELLANEOUS MORTARS. (a) *High bond mortars.* See section Ind 50.12 for all such mortars, glues and special additives.

(b) *Special use mortars.* See Table 53-VIII.

(5) BOND. It is required that sufficient bond be developed to hold the masonry assemblage together and let it act as a single unit.

Note: Initial rate of absorption of masonry units and quantity of entrained air in mortar are factors affecting bond strength.

(6) MORTAR USE. Masonry shall be laid in mortar of the types listed in Table 53-VIII.

TABLE 53-VIII
MORTAR USE REQUIREMENTS

Kind of Masonry	Types of Mortar Permitted
Load-bearing or non-load bearing masonry in contact with earth	M or S
All other load-bearing masonry.	M, S or N
Non-load-bearing masonry in exterior and exposed locations where a high degree of resistance to frost action is desired	M, S or N
All other non-load-bearing walls and partitions	M, S, N or O
Fireproofing	M, S, N, O or gypsum
Special masonry:	
Gypsum partition tile or block	Gypsum
Firebrick or tile	Refractory air setting
Stack or chimney walls	Composed of portland cement, hydrated lime putty and aggregate

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

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Ind 53.313 Masonry grout. Masonry grout for non-engineered masonry shall be type M, S or N mortar, as used in the construction, to which water is added to produce a consistency for pouring without segregation.

Note: Masonry grout for reinforced masonry shall conform to the requirements of ASTM C-476 [Ind 51.25 (40)].

History: Cr. Register, July, 1974, No. 293, eff. 1-1-75.

Ind 53.314 Cementitious materials. (1) **PORTLAND CEMENT.** Portland cement shall conform to the requirements of ASTM C-150 [Ind 51.25 (31)].

(2) **MASONRY CEMENT.** Masonry cement shall conform to the requirements of ASTM C-91 [Ind 51.25 (22)].

(3) **HYDRATED LIME.** Hydrated lime shall conform to Type S requirements of ASTM C-207 [Ind 51.25 (33)].

(4) **GYP SUM.** Gypsum shall conform to the requirements of ASTM C-22 [Ind 51.25 (9)].

History: Cr. Register, July, 1974, No. 288, eff. 1-1-75.

Ind 53.315 Water. Water shall be clean and free from injurious amounts of oil, acid, alkali, salt, organic matter and other deleterious substances.

History: Cr. Register, July, 1974, No. 228, eff. 1-1-75.

Ind 53.316 Reinforcing, ties and anchors. (1) **REINFORCING BARS.** Reinforcing bars shall conform to the requirements of ASTM A-165 [Ind 51.25 (6)], A-616 [Ind 51.25 (7)], and A-617 [Ind 51.25 (8)].

(2) **CONTINUOUS JOINT REINFORCEMENT.** (a) **Material.** Ties shall be fabricated from the equivalent of cold drawn wire conforming to the requirements of ASTM A-82 [Ind 51.25 (3)].

(b) **Coating.** Ties in exterior walls and potentially wet areas shall have noncorrodible cross wires for the intended use. Conformance with Class 3 requirements of ASTM A-116 [Ind 51.25 (4)] is acceptable.

(c) **Assembly.** Ties shall consist of the equivalent of at least 2 No. 9 steel wire gage longitudinal wires or rods with No. 9 steel wire gage cross wires or rods spaced not over 16 inches apart along each longitudinal wire or rod electrically flush or butt welded to tie the outside wires or rods together and provide mechanical bond.

(d) **Limitations.** Ties shall be of such dimensions that they provide the following:

1. Overlap of at least 6 inches at splices.

2. Engagement of both adjacent wythes; out-to-out spacing of side rods to be approximately 2 inches less than the total wall thickness.

3. Minimum actual cover over all but the cross wires or rods of 5/8 inch clear from all masonry unit faces and their joint surfaces.

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(3) **INDIVIDUAL TIES AND ANCHORS.** (a) *Material.* Ties and anchors shall be fabricated from steel, brass, bronze or other approved material. See Ind 53.322 (5) (c) 1.b.

(b) *Coating.* Ties and anchors for use in exterior walls and potentially wet areas shall be noncorrodible for the intended use. Zinc coating (hot dip) conforming to the requirements of ASTM A-153 [Ind 51.25 (5)] is acceptable.

(c) *Limitations.* Ties and anchors shall be of such a dimension as to engage masonry units a minimum of 2 inches on each wythe in which the tie is placed and retain a minimum actual cover of 5/8 inch clear from all exposed masonry faces and joints.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

Ind 53.32 Design. (1) **GENERAL REQUIREMENTS.** Design of plain (non-reinforced) masonry shall be based either on the empirical method and limitations of section Ind 53.322 or on a detailed engineering analysis according to the provisions of section Ind 53.323. Design of reinforced masonry shall be based on the provisions of section Ind 53.323.

(2) **PRACTICE.** All masonry shall be designed with adequate strength and proportions to support all intended superimposed loads, resist all vertical or horizontal loads as required by this code, and comply with the fire-resistive construction requirements set forth in section Ind 51.04.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

Ind 53.321 Types of masonry. (1) **VENEER, FURRING AND TRIM.** Veneer, furring and trim comprise a facing of weather-resistant non-combustible materials securely attached to a backing, but not so bonded as to exert common action under load. See section Ind 53.36 for requirements.

(2) **PANEL WALL.** A panel wall is composed of weather resisting noncombustible large masonry units, or small masonry units prefabricated into larger assemblages, securely anchored to the framing of the structure.

(3) **SINGLE WYTHE WALL.** A single wythe wall is one masonry unit in thickness and is built of conventional size masonry units.

(4) **MULTI-WYTHE WALL.** A multi-wythe wall is composed of 2 or more wythes of conventional size masonry units of the same or different materials all tied or bonded together.

(a) *Grouted wall.* A grouted wall is a multi-wythe wall with all spaces between wythes solidly filled with masonry grout, as defined in section Ind 53.313.

(b) *Slushed or parged wall.* A slushed or parged wall is a multi-wythe wall with all spaces between wythes nominally filled with mortar.

(c) *Hollow wall (includes conventional cavity wall).* A hollow wall is a multi-wythe wall with an air space maintained between wythes. A

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water-repellent or water-resistant insulation may be placed between wythes. The description of a hollow wall is determined by its nominal out-to-out dimension.

(5) **SPECIAL WALLS** (a) *Stack or chimney walls.* See section Ind 64.46 and Table 53-VIII for general requirements.

(b) *Special use walls.* See section Ind 53.34 for special requirements.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-76.

Ind 53.322 Empirical method of design. (1) **STRESSES.** (a) *General.* 1. In determining the stresses in masonry, the effects of all loads and conditions of loading and the influence of all forces affecting the design and strength of the several parts shall be taken into account.

2. When the effects of eccentricity of vertical loads, including loads produced by the deflection of floor and roof units, are likely to cause tensile stresses in the masonry, the masonry shall be designed in accordance with the requirements of section Ind 53.323.

(b) *Allowable stresses.* 1. Compressive stresses. The compressive stresses in masonry shall not exceed the values given in Table 53-IX.

2. Bearing stresses. See Ind 53.34 (3) (b).

3. Composite masonry. In composite masonry with different kinds or grades of units or mortars, the maximum stress shall not exceed the allowable stress for the weakest combination of units and mortar of which the masonry is composed.

4. Stone flexural members. The maximum allowable flexural stress for natural stone shall be 1/6 of its modulus of rupture.

5. Bolts and anchors. See Ind 53.34 (5).

(2) **THICKNESS AND HEIGHT.** (a) *Height of masonry.* The height of a wall is defined for purposes of limitation as the maximum vertical distance between structural members completely supporting the weight of the wall or between the upper such support and the top of the wall, whichever is greater.

(b) *Thickness of load-bearing walls.* The minimum thickness of load-bearing masonry walls shall be at least 12 inches for the upper 36 feet of their height, and shall be increased 4 inches for the lower 36 feet or fraction thereof. Where a masonry load-bearing wall is made up of 2 or more wythes, the thickness of the wall shall not include any wythe less than 4 inches thick.

TABLE 53-IX
ALLOWABLE COMPRESSIVE STRESSES IN UNIT MASONRY¹

Type of Masonry	Type of Masonry Units	Average Ultimate Compressive Strength of Masonry Unit ² (psi)	Allowable Compressive Stresses on Gross Cross-Sectional Area ³ (psi)			
			Type M Mortar and Grout	Type S Mortar and Grout	Type N Mortar and Grout	Type O Mortar ⁴ and Grout ⁴
Single wythe and grouted multi-wythe masonry	Rubble stone.....		140	120	100	80
	Ashtlar granite.....		800	720	640	500
	Ashtlar limestone and marble.....		500	450	400	325
	Ashtlar sandstone and cast stone.....		490	360	320	250
	Solid units except concrete block.....	10,000 and over	450	400	350	250
		8,000 to 10,000	400	350	300	200
		6,000 to 8,000	300	275	250	175
		4,000 to 6,000	250	225	200	150
		2,500 to 4,000	175	150	140	100
	Solid concrete block.....	1,800 and over	175	160	140	100
	Hollow load-bearing units.....	1,000 and over	90	80	75	60
Flushed or parged multi-wythe masonry	All allowable compressive stress values to be 20% less than those for equivalent types of single-wythe and grouted multi-wythe masonry.					
Hollow multi-wythe masonry	Solid units except concrete block.....	2,500 and over	140	130	110	80
	Solid concrete block.....	1,800 and over	140	130	110	80
	Hollow load-bearing units.....	1,000 and over	70	60	55	40

¹ Where a type of masonry unit, mortar or grout is not provided for in Table 53-IX, it will be the practice of the department to allow a maximum compressive stress in the masonry which is no more than 15% of the ultimate compressive strength of a masonry assemblage as determined by an approved test.

² No individual masonry unit shall have a compressive strength less than 80% of the average ultimate compressive strength.

³ Stresses shall be calculated on actual dimensions rather than nominal dimensions, with consideration for reductions such as raked joints and cavities.

⁴ Type O mortar is permitted only in certain non-load-bearing masonry. See Table 53-VIII.

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(bm) *Exceptions to thickness of load-bearing walls* [Ind 53.322 (2) (b)]. 1. *Stiffened walls*. Where single wythe or grouted multi-wythe masonry load-bearing walls composed of units of the same material are laterally supported at distances not greater than 12 feet apart by masonry crosswalls or by reinforced concrete floors, they may be of 12-inch thickness for the whole 72 feet.

2. *Top-story walls*. Top-story walls may be of 8-inch thickness provided that they are not over 12 feet in height and the roof construction imparts no lateral thrust to the walls.

3. *One-story walls*. In one-story buildings not exceeding 9 feet in height, the walls may be of 6-inch thickness provided that the roof span does not exceed 18 feet.

4. *Penthouses and roof structures*. Masonry walls above the main roof level, 12 feet or less in height, enclosing stairways, machinery rooms, shafts or penthouses may be of 8-inch thickness, and may be considered as neither increasing the height nor requiring any increase in the thickness of the masonry below.

5. *Walls of apartment buildings*. In buildings defined as places of abode (Ind 57.001 (2) not including hospitals) not more than 3 stories in height, walls may be of 8-inch thickness when not over 36 feet in height and the roof imparts no horizontal thrust.

6. *Walls below grade*. Foundation walls shall be not less than 8 inches in thickness nor less than the thickness of the wall which it supports. When subject to lateral pressures, foundation walls shall be limited to a height over thickness (h/t) ratio of 9 and shall also have lateral support from vertical elements at a spacing required by Table 53-X.

7. *Metal tied hollow walls*. Hollow walls shall not exceed 36 feet in height. The space (cavity) between wythes shall be not more than 4 inches. The backing wythe shall be at least as thick as the facing wythe. When both the facing and backing wythes have a thickness of 4 inches, the height of such hollow walls shall not exceed 24 feet.

8. *Masonry bonded hollow walls*. Not allowed.

Note: For definition of hollow walls, see Ind 53.321 (4) (c).

9. *Rubble stone walls*. All rubble stone walls shall be 4 inches thicker than required in (b) above, but in no case less than 16 inches in thickness. Other exceptions above do not apply to rubble stone walls.

10. *Composite walls*. Walls containing clay and concrete masonry units shall not exceed 48 feet in height.

(c) *Thickness of exterior non-load-bearing walls and parapets*. Non-load-bearing exterior masonry walls may be 4 inches less in thickness than required for load-bearing walls [including the exceptions under (bm)], but the thickness shall not be less than 8 inches except where 6-inch walls are specifically permitted.

(cm) *Exceptions to thickness of exterior non-load-bearing walls and parapets* [Ind 53.322 (2) (c)]. 1. *Panel walls*. Panel walls shall be designed with sufficient strength and thickness and anchored to

the structure so as to insure adequate support and resistance to wind or other lateral forces. Panel walls shall not be less than 2 inches in actual thickness and the maximum ratio of height to thickness shall not exceed 30.

2. *Parapet walls.* Parapet walls shall not exceed 3 times their thickness in clear height.

(d) *Thickness of interior non-load-bearing walls (partitions).* Non-load-bearing interior partitions shall be not less than 4 inches in thickness. Where partitions designed for lateral support at the top are not in tight contact with at least a 2-hour fire-resistive construction at the top, such partitions shall be not more than 24 times their thickness in clear height (see Ind 53.322 (3) (a) 3.).

(3) **LATERAL SUPPORT.** (a) *Requirements.* All masonry shall be laterally supported in conformance with the following:

1. *Exterior walls.* Exterior masonry walls, whether they be load-bearing or non-load-bearing, shall be laterally supported either horizontally or vertically at intervals not exceeding those indicated in Table 53-X.

TABLE 53-X
MAXIMUM RATIO OF LATERALLY UNSUPPORTED HEIGHT OR
LENGTH TO THICKNESS FOR ALL EXTERIOR WALLS

Type of Masonry	Mortar Type			
	M	S	N	O
Single wythe walls of solid units or grouted walls of solid units	22	22	20	18
Flushed or parged walls of solid units	20	20	18	16
Hollow walls† or walls containing hollow units	18	18	16	12

†In computing the ratio for hollow walls, the value for thickness shall be the sum of the nominal thickness of the inner and outer wythes.

2. *Load-bearing interior walls.* Load-bearing interior walls shall have lateral supports at either vertical or horizontal intervals not exceeding 24 times the wall thickness for solid masonry units and 20 times the wall thickness for hollow masonry units.

3. *Non-load-bearing interior walls (partitions).* Non-load-bearing partitions shall have lateral supports at either vertical or horizontal intervals not exceeding 30 times the thickness of the wall.

4. *Special masonry walls.* Exterior masonry walls having no lateral support at the top or at the ends (free standing), shall have their height limited to 4 times their thickness. (See Ind 53.322 (2) (c) 2. for parapet walls.) Similar interior walls (free standing), shall have their height limited to 6 times their thickness.

(b) *Methods of lateral support.* 1. *General.* Lateral support shall be provided by cross walls, pilasters or vertical structural members of sufficient strength to provide the required support when the limiting distance is measured horizontally; and/or by floors, roofs or horizontal structural elements which are of sufficient strength to provide the required support when the limiting distance is measured vertically.

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Provisions shall be made to transfer all lateral forces to the foundation.

2. *Limitations.* When horizontal structural elements are depended upon for lateral support, lateral support by vertical elements shall also be provided at intervals of not more than 72 times the wall thickness.

(c) *Pilasters.* A pilaster is a reinforced or nonreinforced masonry section which is thicker than and integrally bonded or mechanically keyed to the adjoining wall by alternate course bonding of masonry or by the use of pilaster blocks. A mechanically keyed control joint will be permitted on only one side of a pilaster which is used to provide lateral support. The projecting portion of the pilaster shall be bonded to the wall portion of the pilaster by lapping at least 50% of the units at the intersection or using special pilaster units.

1. All pilasters relied upon to provide lateral support shall not be less than 4 inches thicker than the wall supported nor less than $1/12$ times the pilaster height. The width of pilasters shall be not less than 16 inches.

2. Where a pilaster is needed to carry a concentrated load from a flexural element, the least dimension shall be not less than $1/40$ of the span of such an element and the height of the pilaster shall not exceed 12 times the least dimension of the pilaster. All voids, within and between masonry units, shall be fully grouted.

Note: The intent of this rule is to permit the empirical method of design for masonry pilasters carrying concentrated loads provided the pilaster details eliminate the eccentricity and provided the actual stresses are less than or equal to the allowable stresses. Pilasters may also be designed through engineering analysis in accordance with section Bud 53.328.

(d) *Piers.* A pier is an isolated column of masonry. A load-bearing wall not bonded at the sides into associated masonry shall be considered a pier when its horizontal dimension measured at right angles to the thickness does not exceed 4 times its thickness.

1. All piers shall have lateral supports so that the vertical distance between such supports does not exceed 10 times their least dimension for single wythe or grouted masonry walls of solid masonry units, 8 times their least dimension for skushed or parged masonry walls of solid masonry units, and 6 times their least dimension for other masonry.

2. The least dimension of piers carrying flexural members shall be not less than $1/30$ of the span of the flexural members.

3. Piers shall be laid in running bond unless reinforced as required for stack bond walls.

(4) *OPENINGS.* Unless evidence is provided to show that openings do not cause lateral stability and stress requirements to be exceeded, the amount of openings in a masonry wall shall not exceed the limits set forth in Table 53-XI.

(5) *BONDING.* (a) *General.* All types of masonry shall be adequately bonded.

TABLE 53-XI
MAXIMUM RATIO OF Laterally Unsupported Height or
Length to Thickness for Exterior Walls
with Openings

Type of Masonry	Percent of Openings at any Horizontal Plane of Wall			
	20	40	60	Over 60
Single wythe walls of solid units or grouted walls of solid units	20	18	12	Submit design calculations
All other masonry	18	14	10	

†The percentage of openings shall be calculated for each 100 lineal feet of wall or portion thereof at any horizontal plane of wall. See Table 53-X for additional restrictions when type "N" or "O" mortar is used.

(b) *Longitudinal bond.* 1. Running bond. In each wythe of masonry, not less than 60% of the units in any transverse vertical plane shall lap the ends of units above and below a distance not less than 2 inches or $\frac{1}{2}$ the height of the unit, whichever is greater. Masonry not lapped as required above will be considered as stack bond and shall be reinforced longitudinally as required in 2. below for masonry units laid in stack bond.

2. Stack bond. In each wythe of masonry with units laid in stack bond, the masonry shall be reinforced by a continuous tie assembly, as defined in Ind 53.316 (2), at vertical intervals not exceeding 16 inches. For interior non-load-bearing partitions this spacing may be increased to 24 inches. (For load-bearing walls, see also Ind 53.34 (3) (b) 4.)

3. Single wythe exterior concrete masonry walls. Where units are laid in running bond, such masonry wall shall be reinforced by a continuous tie assembly, as defined in Ind 53.316 (2), at vertical intervals not exceeding 24 inches. The requirement for tie assemblies is waived when the spacing of control joints is reduced to 80% of the values indicated in Table 53-XII, or if the spacing between control joints is 20 feet or less.

(c) *Transverse bond.* In multi-wythe masonry, adjacent wythes shall be bonded with either metal ties or headers in accordance with the following:

1. Bonding with metal ties. Adjacent wythes of masonry shall be bonded by embedment of reinforcement in the horizontal mortar joints with one of the following methods:

a. Continuous tie assemblies, as defined in Ind 53.316 (2), spaced at vertical intervals not exceeding 16 inches.

b. Individual ties, the equivalent of not less than 3/16 inch diameter steel rods, with one tie for not more than each 4½ square feet of wall area. Ties in alternate courses shall be staggered. The maximum vertical distance shall not exceed 18 inches. The maximum horizontal distance shall not exceed 36 inches. Ties bent to rectangular shape shall be used with hollow masonry units. With solid masonry units, either rectangular ties or ties bent to 90 degree angles, Z shaped, to provide hooks not less than 2 inches long shall be used. In hollow walls, additional ties shall be provided at all openings, spaced not

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more than 3 feet apart around the perimeter and within 12 inches of the opening.

2. Bonding with masonry bond units (headers). a. Adjacent wythes of masonry shall be bonded by the equivalent of a full header course overlapping both wythes at least 3 inches and spaced at intervals not greater than every seventh course. The clear distance between bond courses shall not exceed 16 inches for solid units and 24 inches for hollow units. One-seventh of the wall surface shall be header or bond units.

b. In ashlar masonry, bond stones uniformly distributed shall be provided to the extent of not less than 10% of the area of exposed faces.

c. Rubble stone masonry shall have not less than one bond stone for each 8 square feet of wall surface on both sides. Such walls, 24 inches or less in thickness, shall have bond stones with a maximum spacing of 3 feet vertically and 3 feet horizontally.

d. Hollow walls shall not be bonded with headers.

Note: For definition of hollow walls, see Ind 53.821 (4) (c).

3. *Interrupted bond.* Where a structural member interrupts a backing wythe such that transverse bond otherwise required cannot be achieved, the facing wythe shall be bonded to that structural member as in 1. above.

(d) *Bond at intersections and corners.* Masonry that changes direction, or meets or intersects other masonry, where dependent for lateral support, shall be bonded by one of the following methods:

1. *Walls laid separately.* Provide joints with not less than the following:

a. For load-bearing elements, the equivalent of 1 1/4 inch by 1/4 inch anchors with ends turned up not less than 2 inches and not less than 24 inches between turned ends, embedded equally into each adjacent wall and spaced not more than 2 feet vertically. Where there is not sufficient thickness of masonry to embed such anchors properly, equivalent anchorage shall be provided by cross-pins or other means.

b. For non-load-bearing elements, the equivalent of 3/4 inch by 22 U.S. gage anchors, 8 inches or more in length, embedded equally into each adjacent wall and spaced not more than 16 inches vertically.

c. When regularly toothed or blocked, the vertical spacing of anchors required above may be doubled.

2. *Walls laid simultaneously.* Provide joints satisfying one of the following:

a. Lap at least 50% of the units at the intersection.

b. Use details which are designed to permit differential movement at the intersection of interior and exterior masonry, provided such details are consistent with the requirements for lateral stability of the masonry.

(6) **ANCHORAGE.** (a) *General.* All masonry dependent upon structural elements for continuity or lateral support shall be securely anchored thereto in such a manner as to resist all forces, especially wind and all lateral forces acting either inward or outward.

(b) *Load-bearing masonry.* 1. *Floor anchorage.*

a. All types of concrete floor systems which bear continuously on masonry with concrete to masonry contact may be considered to provide adequate lateral support.

b. All other structural elements intended to provide lateral support shall be securely anchored to the masonry.

2. *Roof anchorage.* Roof structures shall be securely anchored to load-bearing masonry with the equivalent of at least ½-inch diameter bolts spaced not more than 8 feet on center and embedded in the masonry according to one of the following methods:

a. A steel plate having a minimum surface area of 6 square inches securely attached to the head of each bolt and completely embedded in the masonry at least 12 inches.

b. A continuous bond beam the equivalent of not less than 8-inch lintel (bond beam) blocks with 2 continuous No. 4 bars embedded in 2,500 psi concrete fill provided at the top of the masonry. The bolts shall be embedded at least 6 inches and hook beneath the longitudinal reinforcement.

(c) *Exterior non-load-bearing masonry.* 1. Anchorage of masonry to the structural framework. Where masonry is dependent upon the structural framework for lateral support or transmission of lateral loads, the masonry shall be anchored to the framework on at least 2 opposite sides of the perimeter of the wall, with the equivalent of a one-inch wide by ½-inch thick anchor for each 18 square feet of wall surface, embedded at least 8 inches into the masonry, and spaced not more than 36 inches on center. Wedging will not be considered as an equivalent method.

2. Anchorage of panel walls suspended from the structural framework. Exterior prefabricated masonry assemblages and other elements, larger than conventional size masonry units shall be anchored to their weight supports with the equivalent of ¾ inch minimum diameter stainless steel bolts or ¾ inch minimum diameter corrosion resistant plated steel bolts.

(d) *Interior non-load-bearing masonry.* Where masonry is dependent upon the structural framework for lateral support, such masonry shall be anchored with the equivalent of a flexible 3/16 inch diameter anchor for each 12 square feet of wall surface, embedded at least 4 inches into the masonry, and spaced not more than 48 inches on center. Wedging may be used to anchor the top of a masonry partition to its top horizontal support.

(7) **JOINTING.** Joints commensurate with lateral stability requirements shall be installed in all exterior masonry to allow for expected growth of clay products and shrinkage of concrete products.

(a) *Vertical jointing.* Vertical control joints shall be provided at a spacing in compliance with Table 53-XII.

TABLE 53-XII
MAXIMUM SPACING OF EXTERIOR MASONRY CONTROL JOINTS
BETWEEN UNRESTRAINED ENDS (FEET)

Loading Conditions	Type of Material	Openings (Percentage of total wall area)			
		0 to 20		More than 20	
		Joint to Joint	Joint to Corner	Joint to Joint	Joint to Corner
Load-bearing	Clay units	140	70	100	50
	Concrete units	60	30	40	20
Non-load-bearing walls	Clay units	100	50	60	40
	Concrete units	60	25	30	20

Jointing required is a minimum and is not intended to prevent minor cracking. The spacings given for maximum spacing of joints are for a single wall plane. For composite walls, the maximum spacing of joints shall be governed by the masonry material type used in the exterior wythe.

Notes: To accomplish the intended purpose, joints should be located at critical locations such as (but not limited to) changes in building heights, changes in framing systems, columns built into exterior walls, major wall openings and changes in materials.

(b) *Horizontal jointing.* Where supports such as shelf angles or plates are required to carry the weight of masonry above the foundation level [see Ind 53.322 (2) (a) and Ind 53.36 (4) (b)], a pressure-relieving joint shall be provided between the structural support and any masonry which occurs below this level. The joint width shall be such as to prevent any load being transmitted from the support to any element directly below. All mortar and rigid materials shall be kept out of this joint. This type of joint shall be provided at all such supports in a concrete frame structure where clay masonry is exposed to the weather.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75; am. (3) (b) 3 and (6) (c) 1, Register, December, 1974, No. 226, eff. 1-1-75; am. (3) (c) 2 and (6) (b) 2, Register, December, 1976, No. 252, eff. 1-1-77.

Ind 53.323 Engineered masonry. (1) **DEFINITION.** Engineered masonry means design of plain or reinforced masonry based on an engineering analysis.

(2) **REQUIREMENTS.** Calculations or other substantiating data to justify a reduction in requirements shall be submitted for all items in conflict with sections Ind 53.322, 53.33 or 53.34.

Notes: It will be the practice of the department to approve designs in conformance with the following: (1) clay and shale units—"Building Code Requirements for Engineered Brick Masonry," Structural Clay Products Institute (now known as Brick Institute of America), 1750 Old Meadow Road, McLean, Virginia, 22101 (August 1969); (2) concrete units—"Specifications for the Design and Construction of Load-Bearing Concrete Masonry," National Concrete Masonry Association, P.O. Box 9186, Rosslyn Station, Arlington, Virginia 22209 (1970); (3) cast stone and architectural precast concrete units—"Design of Precast Concrete Wall Panels," Title No. 68-46, *ACI Journal*, July 1971 (also see section Ind 53.40); and (4) standards of accepted engineering practice, provided proposed materials are in successful similar use or proven by test to be adequate.

(3) **IMPROVEMENTS.** Where design by engineering analysis is based upon material of a higher grade or a superior workmanship than is generally provided in accepted practice, it must be clearly established to the satisfaction of the department by test or other evidence that such

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quality exists and will only be employed under special inspection or field testing.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

Ind 53.33 Construction. (1) **COLD WEATHER WORK.** Adequate cold weather construction and protection provisions shall be taken to prevent masonry from being damaged by freezing.

Note: It will be the practice of the department to accept conformance with "Recommended Practices for Cold Weather Masonry Construction," International Masonry Industry All-Weather Council, 1970. (Available from International Masonry Institute, 823 16th Street NW, Washington, D.C. 20006.)

(2) **WORKMANSHIP FOR LOAD-BEARING MASONRY.** (a) The maximum thickness of a mortar joint shall be $\frac{3}{8}$ inch.

(b) Except for head joints used for weep holes and ventilation, solid masonry units shall be laid so as to achieve full head and bed joints.

(c) Hollow masonry units shall be laid with full head joints and full bed joints under the full bearing areas of the face shells (and under webs where the adjacent cells are to be filled with grout).

(3) **CLEANING.** Chemical cleaning agents shall be prevented from harming the metal reinforcement of structural components.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75; r. (1) and renum., Register, December, 1974, No. 223, eff. 1-1-75.

Ind 53.34 Miscellaneous design-construction details. (1) **SPECIAL USE WALLS.** (a) *Hollow walls.* 1. In exterior hollow walls, suitable flashing shall be installed at the bottom of the cavity so as to drain any water outward.

2. Open vertical joints or weep holes of $\frac{3}{8}$ inch minimum diameter shall be provided in the facing just above the flashing at a horizontal spacing not exceeding 3 feet.

(b) *Parapet walls.* 1. See Ind 51.02 (1.2) for requirements of parapet walls.

2. When roof drains are needed to remove precipitation and are the sole means of water escape, there shall be placed in all parapet walls scuppers or relief openings to prevent overloading of the roof.

(c) *Retaining walls.* The tops of exposed retaining walls shall be coped with noncombustible weatherproof material.

(d) *Reuse of existing walls.* Existing masonry may be used in the alteration or extension of a structure, provided that under the new conditions imposed it meets the requirements of this code or is made so by reasonable repairs.

(2) **CHANGES IN THICKNESS OR PLANE.** (a) *Nonvertical planes.* Details and techniques for all masonry to be installed in a nonvertical plane shall be submitted to the department for approval.

(b) *Thickness change requirements.* Where hollow walls or walls of hollow masonry units change in thickness, a course of solid masonry,

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concrete-filled hollow units or a continuous bearing element shall be interposed between the thicker and thinner sections.

(c) *Increase in thickness, including corbels.* The thickness of masonry shall not be increased (in the upward direction), except for corbels as follows:

1. The maximum horizontal projection of a corbel from the face of the wall from which it projects shall not exceed $\frac{1}{3}$ the thickness of the wall.

2. The maximum projection of a masonry unit shall not exceed $\frac{1}{2}$ the height of the unit nor $\frac{1}{3}$ its bed depth.

(d) *Variation in thickness (chases and recesses).* Walls shall not be less than their required thickness between horizontal lateral supports except where permitted for chases and recesses as follows:

1. Chases or recesses shall not be made in load-bearing walls 8 inches or less in thickness. Pipes, ducts, conduits or similar noncombustible items may be installed in cores of hollow units.

2. Chases or recesses shall not be closer than 2 feet to any pilaster, buttress, cross wall, end wall or other stiffener that provides lateral support.

3. The maximum depth of any chase or recess shall not exceed $\frac{1}{3}$ the thickness of the wall.

4. The length along the wall of any chase or recess shall not exceed 4 feet.

5. The clear distance between chases and recesses or each other shall not be less than 4 times the wall thickness.

6. Any chase or recess in conflict with the previous requirements shall be considered as an opening (see Ind 53.34 (3) (a) 4.).

7. No chase or recess shall reduce the thickness of material below the minimum required for fire walls, fire division, fire partitions or fire protective covering of structural members.

(e) *Protection.* In masonry exposed to the weather, pockets or crevices in which water may accumulate shall be avoided or protected to prevent damage.

(3) *BEARING.* (a) *Weight support of masonry.*

1. *General requirements.* The bearing support for all masonry shall be of noncombustible material and have lateral stability.

2. *Projections.* The projection of a wall beyond the edge of a supporting member other than masonry, such as a shelf angle or edge of a beam, shall not exceed $1\frac{1}{4}$ inches, unless at least $\frac{2}{3}$ the mass of the wythe of masonry involved is located directly over the load-carrying member.

3. *Shelf angles.* See Ind 53.322 (7) (b).

4. *Openings.* The masonry above openings shall be adequately supported. The bearing length of structural elements which support the masonry above the opening shall be not less than 4 inches. The bearing stresses at these locations shall not exceed those allowed in Ind 53.322 (1).

(b) *Bearing on masonry.* Bearing stresses in masonry shall not exceed those specified in Ind 53.322 (1). Flexural members shall have bearing details that allow rotation at their supports without causing local failures.

1. *Concentrated loads.* Beams, girders, trusses, joists and other members causing concentrated loads shall bear a minimum of 8 inches in length in the direction of span upon at least one of the following:

a. *Concrete beam.* The equivalent of a nominally reinforced 2,500 psi concrete beam 8 inches in height.

b. *Solid masonry.* At least 8 inches in height of masonry composed of solid units.

c. *Metal plate.* A metal plate of sufficient thickness and size to safely distribute the load to masonry units. For piers and columns, the bearing plate shall not exceed 60% of the cross-sectional area of the pier or column and the resultant reaction of all vertical and horizontal loads shall fall within the middle third of the member.

d. *Bond beam.* The bond beam shall be the equivalent of not less than 8-inch lintel (bond beam) blocks with 2 No. 4 bars embedded in 2,500 psi concrete fill. The loads shall bear on the concrete fill.

2. *Continuous loads.* Joists, trusses and beams other than wood [for wood, see Ind 53.63 (4)], spaced 4 feet or less on center and 40 feet in span, slabs or other members causing continuous loads shall be transmitted to masonry with a minimum bearing length of 3 inches upon solid masonry at least 2½ inches in height, or as indicated for concentrated loads.

3. *Multi-wythe walls.* Ties required for transverse bond shall be installed in the first horizontal mortar joint below the required beam, solid masonry or metal plate.

4. *Stack bond walls.* Concentrated loads shall be distributed into masonry laid in stack bond by a concrete beam or bond beam (as defined in 1. above). For masonry of solid units, 2 additional rows of a continuous tie assembly [as defined in Ind 53.316 (2)] may be used instead of a concrete beam or bond beam.

5. *Support of wood floor members.*

a. Where a wood structural member is buried in masonry for support, it shall be firecut or a self-releasing device shall be used.

b. Where the end of a wood structural member is built into an exterior wall, a ½-inch air space shall be provided at the sides, top and end of such member.

(4) *JOINTING.* See Ind 53.322 (7) for jointing.

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(5) BOLTS AND ANCHORS. The allowable shear on steel bolts and anchors shall not exceed the values given in Table 53-XIII.

TABLE 53-XIII
ALLOWABLE SHEAR ON BOLTS AND ANCHORS

Bolt or Anchor Diameter (Inches)	Embedment† (Inches)	Allowable Shear (Pounds)
3/8	4	270
1/2	4	410
5/8	4	550
3/4	4	750
7/8	5	1100
1	6	1500
1 1/8	7	1850
1 1/4	8	2250

†Bolts and anchors shall be solidly embedded in mortar or grout.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75; am. (1) (d), Register, December, 1974, No. 228, eff. 1-1-75.

Ind 53.35 Tests. (1) **GENERAL.** All masonry materials shall meet the requirements of section Ind 53.31, and the department may require submittal of test data, at any time, to show conformity.

(2) **SAMPLING AND TESTING.** The selection and construction of all test specimens shall conform to standard test procedures and shall be truly representative of the materials, workmanship and details to be normally applied in practice.

(3) **STANDARDS.** The testing of all masonry shall be in accordance with Table 53-XIV.

(4) **SPECIAL TESTS.** (a) *Fire tests.* See section Ind 51.04.

(b) *Load tests.* Whenever there is reasonable doubt as to the stability or structural safety of a completed structure or part thereof, the department may require a load test on the building or portion of the structure in question.

TABLE 53-XIV
STANDARD METHODS OF SAMPLING AND TESTING

Classification	Spec.	ASTM Test Method Including Ind 51.23 (No.)
Base Materials.....	Portland Cement.....	C 150 (81)
	Masonry Cement.....	C 91 (22)
	Hydrated Lime.....	C 25 (10), C 50 (14), C 110 (25)
	Gypsum.....	C 471 (87), C 472 (38)
	Aggregate.....	C 144 (29)
Mortar.....	Mortar.....	C 270† (34)
Masonry Units.....	Clay and Shale.....	C 87 (20), C 112 (28)
	Concrete.....	C 140†† (23)
	Natural Stone.....	C 97 (23), C 99 (24), C 170 (32), C 898 (42)
	Cast Stone.....	C 42 (13), C 97 (23)
	Arch. Precast Concrete.....	C 39 (12), C 43 (13), C 87 (23), C 487 (36)
	Gypsum.....	C 478 (39)
Assemblies.....		E 72 (46), E 149 (51), E 447 (54)

†Mortar in the field, tested in a laboratory, shall test at least 85% of the minimum compressive strength required, and the field mortar will serve as the final basis for mortar approval. When mortar is not proportioned according to limitations of Table 53-VII, mortar shall be periodically tested by an impartial testing laboratory. Results of such required testing shall be submitted as evidence of conformity, when requested by the department.

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††Typical hollow load-bearing concrete masonry units shall be initially tested for compliance; thereafter periodic testing may be required as directed by the department. Sampling shall be done only by the department or its authorized agents. The time and place of sampling will be at the discretion of the department.

Note: A record of initial test and subsequent spot checks will be kept by the department.

History: Cr. Register, July, 1974, No. 229, eff. 1-1-75.

Ind 53.36 Veneer, furring and trim. (1) **GENERAL.** Veneer, furring and trim as used in this section refers to a facing of weather-resistant noncombustible materials securely attached to a backing, but not so bonded as to exert common action under load.

(a) Veneer shall not be considered as part of the masonry when computing strength or required thickness.

(b) Veneer shall not be assumed as supporting any load other than its own weight.

(2) **MATERIAL REQUIREMENTS.** (a) *General.* See section Ind 53.31 for typical requirements of common masonry materials.

(b) *Tile and terra-cotta.* Such units shall be frost-proof and not more than 288 square inches in area.

(3) **THICKNESS.** No materials used for veneer shall have a thickness less than the values listed in Table 53-XV.

(4) **BEARING AND BACKING SUPPORTS.** (a) *Bearing and backing supports* shall be weather-resistant and shall provide sufficient strength and stability to adequately support the veneer.

**TABLE 53-XV
MINIMUM THICKNESS OF VENEERS**

Material	Minimum Actual thickness (Inches)
Clay Brick or Tile	1 3/8
Concrete Masonry Units	1 3/8
Natural Stone	1 3/8
Cast Stone	1 3/4
Architectural Precast Concrete	3/4
Marble Slabs	3/4
Slate	3/4
Architectural Terra-cotta	1
Ceramic Veneer - Mechanical Anchorage	1
Ceramic Veneer - Adhesion Anchorage	3/16
Asbestos Cement Boards	1/2
Aluminum Clapboard Siding	.024
Metal - Corrosion Resistant	.0149
Stucco and Exterior Plaster	3/4

(b) Masonry veneer 1 3/8 inches or greater in thickness shall be supported by shelf angles or other equivalent weight supports. The spacing between such supports shall not exceed 18 feet vertically when the veneer is more than 30 feet above grade.

(5) **ATTACHMENT.** (a) *General.* All veneers, supports and attachments shall be capable of resisting a horizontal force equal to the wind loads specified in section Ind 53.12. Attachment shall be accomplished by mechanical methods or adhesion.

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(b) *Attachment by mechanical methods.* All anchors shall be corrosion-resistant.

1. Veneer of conventional size masonry units (one square foot or less). Such veneer shall be securely attached to its backing by anchors the equivalent of 22 U.S. gage corrugated sheet steel $\frac{3}{8}$ inch wide with at least one such tie located in every 2 square feet of wall.

2. Veneer of large size masonry units (greater than one square foot). Such veneer shall be securely attached with anchors the equivalent of not less than $\frac{1}{4}$ inch diameter bolts in accordance with either of the following:

a. Each unit individually anchored to the supporting framework with at least 3 anchors.

b. Individual units doweled to each other at all horizontal joints and anchored to the backing at all horizontal and vertical joints so that one anchor is provided for every 6 square feet of wall surface.

3. Veneer of metal. Exterior metal veneer shall be securely attached to its backing or supporting framework with the equivalent of wire of at least No. 9 steel wire gage spaced not more than 24 inches apart both horizontally and vertically. Wider spacing where proved adequate may be used when units exceed 4 square feet in area, provided there are at least 4 proper attachments per unit.

(c) *Attachment by adhesion.* Veneer one inch or less in thickness may be cemented to a masonry or concrete wall or to exterior portland cement plaster on high rib galvanized metal lath with an adhesive, provided that the bond is sufficient to withstand a shearing stress of 50 psi after curing for 28 days. Individual units so attached shall not exceed 30 inches in any one dimension nor have more than 540 square inches of face area.

(6) **JOINTING.** Pressure-relieving joints commensurate with lateral stability requirements shall be provided both horizontally and vertically where needed to compensate for differential movement between veneer and backing or frame. See also Ind 53.322 (7).

(7) **GROUNDING.** Metal veneers fastened to supporting elements which are not a part of the grounded metal framing of a building shall be effectively grounded.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-76.

PART IV CONCRETE

Ind 53.40 Concrete requirements. (1) **GENERAL.** The design and construction of structures in concrete of cast-in-place or precast construction, plain, reinforced or prestressed shall conform to the rules and principles of the following standards:

(a) ACI Std. 318 [Ind 51.26 (1)], Building Code Requirements for Reinforced Concrete.

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(b) ACI Std. 512 [Ind 51.26 (2)], Recommended Practice for Manufactured Reinforced Concrete Floor and Roof Units.

(c) ACI Std. 525 [Ind 51.26 (3)], Minimum Requirements for Thin Section Precast Concrete Construction.

Note: The following standards and recommendations (1) through (13) are recognized by the department as being good engineering practice: (1) "Commentary on Building Code Requirements for Reinforced Concrete," ACI Report 318; (2) "Recommended Practice for Selecting Proportions for Concrete," ACI Std. 211.1; (3) "Recommended Practice for Selecting Proportions for Structural Lightweight Concrete," ACI Std. 211.2; (4) "Recommended Practice for Hot Weather Concreting," ACI Std. 606; (5) "Recommended Practice for Cold Weather Concreting," ACI Std. 306; (6) "Manual of Standard Practice for Detailing Reinforced Concrete Structures," ACI Std. 315; (7) "Recommended Practice for Evaluation of Compression Test Results of Field Concrete," ACI Std. 214; (8) "Recommended Practice for Measuring, Mixing and Placing Concrete," ACI Std. 614; (9) "Recommended Practice for Concrete Formwork," ACI Std. 347; (10) "Specification for the Design and Construction of Reinforced Concrete Chimneys," ACI Std. 505; (11) "Suggested Design of Joints and Connections in Precast Structural Concrete," ACI Report 512; (12) "Guide for Cellular Concretes Above 60 pfc, and for Aggregate Concretes Above 50 pfc with Compressive Strengths Less than 2600 psi," ACI JOURNAL, February 1976 (Copies of above standards and recommendations may be obtained from American Concrete Institute, P.O. Box 19180, Redford Station, Detroit, Michigan 48219); (13) "Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction," AWS Std. 12.1 (American Welding Society, 2501 NW 7th St., Miami, Florida 33126).

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

Ind 53.41 Gypsum concrete requirements. (1) **GENERAL.** The design and construction of gypsum concrete shall be in accordance with the following standards:

(a) ASTM C 317 [Ind 51.25 (35)], Standard Specifications for Gypsum Concrete.

(b) ANSI A 59.1 [Ind 51.27 (5)], Specifications for Reinforced Gypsum Concrete.

(2) **LIMITATIONS.** Gypsum concrete shall not be used where exposed directly to weather or where subject to wetting. Gypsum concrete shall be protected from freezing or coming in contact with moisture during shipment, storage, erection or pouring.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

Ind 53.42 Vermiculite concrete requirements. Vermiculite concrete, when used in roof systems and slabs-on-grade, shall be in accordance with: ANSI A 122.1 [Ind 51.27 (5)], "Specifications for Vermiculite Concrete Roofs and Slabs-on-Grade." Vermiculite concrete shall not be used where it can be subjected to moisture.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

PART V

METALS

Ind 53.50 Structural steel requirements. The design, fabrication and erection of structural steel for buildings and structures shall conform to: AISC [Ind 51.27 (2)], "Specification for Design, Fabrication and Erection of Structural Steel for Buildings," and the provisions of the accompanying commentary for this specification, with the following modifications:

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(1) **FABRICATOR SPLICES.** Any shop or field connection or splice not specifically shown on the designer's drawings shall have been previously approved by the designer and a record shall be kept of this approval. This record shall be submitted to the department when requested.

(2) **LATERAL BRACING MEMBERS.** Individual bracing members providing lateral restraint to columns or to compression flanges of beams and girders or to compression chords of trusses shall be proportioned to resist at least 2 percent of the compression force at the brace location unless a suitable analysis is made to determine the appropriate strength and stiffness of the bracing member.

(3) **CERTIFICATION AND IDENTIFICATION.** (a) *Certification.* All structural steel shall have a mill report or a test report made in accordance with ASTM A-6 [Ind 51.25 (1)] from the steel supplier; the reports shall include the information on the minimum yield strength and chemistry of the steel furnished. Upon request by the department, the supplier or fabricator shall furnish certified mill reports, test reports, affidavits and/or other information about the steel for the specific project.

(h) *Marking of steel.* Steel used for main components in completed members or assemblies shall be marked. This marking shall be accomplished by color coding or other means of identification as to its type or grade prior to shipment from the mill. The marking shall be continued through the fabricator's plant to the construction site. Steel which conforms to ASTM A-36 [Ind 51.25 (2)] designation may be fabricated without marking.

(c) *Acceptable steel types.* Steel of structural quality shall conform to the standards specified in section 1.4.1.1 of the AISC [Ind 51.27 (2)]. Steel types not listed in the above mentioned section of the AISC may be used if approved by the designer. An approval letter indicating conformance with Ind 53.50 (3) (a) and (b) shall be sent to the department.

†Note: The type and grading may be indicated by the ASTM specification designation or a designation correlated to the information included on the certified mill or test report.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

Ind 53.51 Cold formed steel requirements. The design of cold-formed steel for buildings and structures shall conform to the AISI [Ind 51.27 (4)] "Specification for the Design of Cold-Formed Steel Structural Members," and the provisions of the accompanying commentary for this specification, with the following modifications:

- (1) **FABRICATOR SPLICES.** See Ind 53.50 (1)
- (2) **LATERAL BRACING MEMBERS.** See Ind 53.50 (2).
- (3) **CERTIFICATION.** See Ind 53.50 (3) (a).

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

Ind 53.52 Steel joist requirements. The design, fabrication and erection of steel joists shall conform to the "Standard Specifications

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for: Open Web Steel Joists, Longspan Steel Joists and Deep Longspan Steel Joists" adopted by the SJT [Ind 51.27 (9)].

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

Ind 53.53 Structural welding of steel. The requirements of this section shall apply to all welds on or between materials within the scope of Ind 53.50, Ind 53.51 and Ind 53.52.

(1) **BASE METALS.** Steels to be welded under this code are listed in AWS D 1.1, sections 8.2 and 10.2 [Ind 51.27 (6)].

(2) **FILLER METALS.** Filler metal requirements that are acceptable under this code are listed AWS D 1.1 section 4.1 [Ind 51.27 (6)].

(3) **WELDING PROCESSES.** (a) Manual shielded metal arc, submerged arc, gas metal arc and flux cored arc welding processes conforming with the procedures established in AWS D 1.1, sections 2, 3 or 4 [Ind 51.27 (6)] shall be considered as prequalified and are approved for use without performing procedure qualification tests.

(b) Electroslag and electrogas welding processes will not be considered as prequalified. They may be used provided a procedure is developed and provided it conforms to the applicable provisions of AWS D 1.1, sections 2, 3 or 4 [Ind 51.27 (6)].

(4) **WELDING PROCEDURES.** (a) *Procedure specification.* All welding procedures shall be prepared as a written procedure specification. This written procedure specification shall be prepared by the manufacturer, fabricator or contractor and shall be made available or submitted to the department when requested.

Note: Suggested form SB-228A, showing the information required in the procedure specification, may be obtained from the department.

(b) *Procedure qualification.* All joint welding procedures shall be previously qualified by tests as prescribed in AWS D 1.1 section 5.6 [Ind 51.27 (6)], except for the prequalified procedures exempted in Ind 53.53 (3) (a). The test shall be conducted under the supervision of an approved testing laboratory and the test results shall be submitted to the department for approval.

(5) **DESIGN OF WELDED CONNECTIONS AND JOINTS.** The details of all joints shall comply with the requirements of AWS D 1.1, section 2 and section 10, parts III and IV [Ind 51.27 (6)]. A joint form not specified in AWS D 1.1, section 2 and section 10, parts III and IV, shall not be used until it is qualified to the satisfaction of the department.

(a) *Stud welding.* Stud welding shall be done by a procedure qualified in accordance with the requirements of AWS D 1.1, section 4, part VI [Ind 51.27 (6)].

(6) **OPERATOR QUALIFICATIONS.** All structural welding work shall be done by certified [as defined in Ind 53.53 (7)] welders. The required qualification test shall be conducted under the supervision of an approved testing laboratory. The weld test report shall be submitted to the department for evaluation. Test specimens shall be submitted when requested by the department.

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(a) The manual welders shall be tested and qualified in accordance with AWS D 1.1, section 5, part III [Ind 51.27 (6)].

(b) The manual tackers shall be tested and qualified in accordance with AWS D 1.1 section 5, part V [Ind 51.27 (6)].

(c) The welding machine operator shall be tested and qualified in accordance with AWS D 1.1, section 5, part IV [Ind 51.27 (6)].

(7) **OPERATOR CERTIFICATION.** The department will issue to the welder or welding machine operator who has successfully passed the prescribed qualification tests, a certificate bearing his name, social security number, identifying mark, the process, the procedure specification number and other pertinent information from his qualification test. This certificate will remain in effect for 3 years provided the operator is continuously engaged in welding operations without an interruption of more than 3 consecutive months. If the interruption exceeds 3 consecutive months, the certificate shall automatically become void.

(a) Each manual welder and tacker or welding machine operator shall be retested every 3 years in accordance with Ind 53.53 (6).

(b) Each manual welder and tacker or welding machine operator certificate which has become void due to welding operation interruption exceeding 3 consecutive months or having exceeded the 3-year certificate time limit can be renewed only by retesting at an approved testing laboratory.

(8) **WELD IDENTIFICATION.** Each structurally significant member shall have its welding identified by a distinguishing mark stamped on the member by the certified welders involved.

(9) **CRITERION OF FINAL ACCEPTANCE.** All structural welding is subject to examination by approved inspectors and such inspection shall be the final criterion for conformance and acceptability for the intended use.

(10) **STRUCTURAL WELDING DONE OUTSIDE THE STATE OF WISCONSIN.** All welding shall conform with the requirements of section Ind 53.53. In addition, manufacturers and suppliers of structural steel shall, prior to commencing any welded construction, submit evidence of procedure qualification and welder certification that has been approved by an independent testing laboratory which is acceptable to the department.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

Ind 53.54 Aluminum framing requirements. The design, fabrication and erection of aluminum structural framing members shall conform to "Specifications for Aluminum Structures" [Ind 51.27 (1)], published by The Aluminum Association.

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

Ind 53.55 Stainless steel requirements. The design, fabrication and erection of light gage stainless steel framing members shall

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conform to AISI [Ind 51.27 (4)], "Specification for the Design of Light Gage, Cold-Formed Stainless Steel Structural Members."

History: Cr. Register, July, 1974, No. 223, eff. 1-1-75.

Ind 53.56 Other metals. The design, fabrication and erection of other metals or metal alloys not specifically listed in this section shall be in accordance with the provisions of section Ind 50.18.

History: Cr. Register, July, 1974, No. 228, eff. 1-1-75; am. Register, December, 1976, No. 262, eff. 1-1-77.

PART VI

WOOD AND WOOD FIBER PRODUCTS

Ind 53.60 General. (1) **SCOPE.** The requirements of sections Ind 53.60 to 53.63, inclusive, shall apply to the materials, design, and construction procedures used in all wood and wood fiber products construction work under this code.

(2) **DEFINITION.** Wood and wood fiber products include those structural elements derived from solid wood, structural glued-laminated timber, plywood, fiberboard, hardboard and other wood-fiber-based materials.

History: Cr. Register, July 1974, No. 223, eff. 1-1-75.

Ind 53.61 Materials and design of structural elements. (1) **SAWN LUMBER.** The material characteristics and the design provisions of load-bearing structural sawn lumber shall be in accordance with the following adopted standard and listed exceptions:

(a) "National Design Specifications for Stress-Grade Lumber and Its Fastenings" [Ind 51.27 (8)] and its Supplement Table 1, including Tables 1a and 1b.

1. Exceptions:

a. Section 200-R-1. The provisions of this section shall also apply to reused lumber. Reused lumber shall be considered to have a duration of load factor of 0.90.

b. Section 200-G-1. In addition to requiring grading in conformance with ASTM D 246 [Ind 51.25 (43)], lumber (including reused lumber) of species and grades not listed in Table 1 of the supplement to the NDS [Ind 51.27 (8)] shall be identified by the grade mark of, or certificate of inspection issued by, a lumber grading or inspection bureau or agency recognized as being competent.

c. Section 203-A. The cumulative effects of short-time loads, such as snow, shall be considered in determining duration of load. For snow load, no greater duration of load factor than 1.05 shall be used.

d. Section 102-D. Refer to section Ind 53.11. The combination of full snow load with wind load shall be taken into consideration.

e. Part IX is deleted. Refer to section Ind 53.61 (2).

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(2) **STRUCTURAL GLUED-LAMINATED TIMBER.** Structural glued-laminated timber is an engineered, stress-rated product of a timber laminating plant comprising assemblies of specially selected and prepared wood laminations securely bonded together with adhesives. The grain of all laminations is approximately parallel longitudinally. The following standards are adopted as part of this building code for the design and production of structural glued-laminated timber, except that the modification of design stresses for duration of load shall be as specified in Ind 53.61 (1) (a) i.e.

(a) AITC 117 [Ind 51.27 (3)], "Standard Specifications for Structural Glued-Laminated Timber of Douglas Fir, Western Larch, Southern Pine and California Redwood."

(b) AITC 119 [Ind 51.27 (3)], "Standard Specifications for Hardwood Glued-Laminated Timber."

(c) AITC 120 [Ind 51.27 (3)], "Standard Specifications for Structural Glued-Laminated Timber Using 'E' Rated and Visually Graded Lumber of Douglas Fir, Southern Pine, Hem Fir and Lodgepole Pine."

(3) **ROUND POLES.** Allowable unit stresses for nongraded round poles used as structural members other than piling shall be 80 percent of the allowable unit stresses for select structural grade beams and stringers (19 percent moisture content) of the appropriate species as listed in Table 1, supplement to the National Design Specification for Stress Grade Lumber and Its Fastenings [Ind 51.27 (8)]. No obviously unsound load-bearing poles are to be used. Higher allowable stresses will be permitted for round poles graded in accordance with a recognized standard.

Note: ASTM designation D 8200-73 "Standard Specification and Methods for Establishing Recommended Design Stresses for Round Timber Construction Poles" is acceptable for graded round poles. ANSI Standard OS-1-1972 may be used for poles subject to transverse loads only.

(4) **PILING.** See section Ind 53.24.

(5) **PLYWOOD.** (a) *General.* The quality and design of all plywood used in construction of all buildings and structures shall conform to the minimum standards under this section. All plywood when used structurally, including among others, use for siding, roof and wall sheathing, subflooring, diaphragms, and built-up members, shall conform to the performance standards for its type in U.S. Product Standard PS 1 [Ind 51.27 (11)] for softwood plywood/construction and industrial. Each panel or member shall be identified for grade and glue type by the trademarks of an approved testing and grading agency. In addition, all plywood when permanently exposed in outdoor applications shall be of exterior type.

Note: It will be the policy of the department to approve designs in conformance with the following: (1) "Plywood Design Specifications" including Supplement No. 1 "Design of Plywood Curved Panels"; Supplement No. 2 "Design of Plywood Beams"; Supplement No. 3, "Design of Flat Plywood Stressed-Skin Panels"; and Supplement No. 4 "Design of Flat Plywood Sandwich Panels"; (2) "Plywood Diaphragm Construction"; (3) Laboratory Report 121, "Plywood Folded Plate Design and Details"; (4) Laboratory Report 93, "Load-Bearing Plywood Sandwich Panels"; and (5) "Fabrication Specifications Plywood-Lumber Components: CP-8, BB-8, SS-8, SP-81, FF-62, PW-61" (above publications available from the American Plywood Association, 1119 A Street, Tacoma, Washington 98401); (6) Design

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Guide HP-303-71, "Structural Design Guide for Hardwood Plywood" (available from the Hardwood Plywood Manufacturers Association, 2310 South Walter Reed Drive, Arlington, Virginia 22206).

Note 2: The department will accept plywood treated in accordance with the standards of the American Wood Preservers Association.

(b) No part of any of the above referenced standards shall supersede the general live load requirements of section Ind 53.11.

(6) **RECONSTITUTED WOOD BASE-FIBER AND PARTICLE PANEL MATERIALS.** Materials of this type, when used structurally, shall be approved by the department in accordance with the requirements of section Ind 50.12. Evaluation will be based on ASTM D 1037 [Ind 51.25 (44)].

(7) **SOLID WOOD FLOOR AND ROOF SHEATHING.** Minimum thickness of nonstress rated lumber used for floor and roof sheathing shall be in accordance with Table 53-XVI.

TABLE 53-XVI
MINIMUM NET THICKNESS OF LUMBER PLACED (INCHES)

Use	Span (Inches)	Perpendicular to Support		Diagonal to Support	
		Surfaced Dry†	Surfaced Unseasoned	Surfaced Dry†	Surfaced Unseasoned
Floors.....	24	3/4	25/32	3/4	25/32
	16	5/8	11/16	5/8	11/16
Roofs.....	24	5/8	11/16	3/4	25/32

†Maximum 19% moisture content.

(a) The above dimensions shall be the minimum dimensions for lumber with grades as specified in Table 53-XVII.

TABLE 53-XVII
MINIMUM BOARD GRADES†

Grading Agency	Solid Floor or Roof	
	Sheathing	Spaced Roof Sheathing
West Coast Lumber Inspection Bureau	Utility	Standard
Western Wood Products Association.....	4 Common or Utility	3 Common or Standard
Southern Pine Inspection Bureau.....	No. 3	No. 3
Redwood Inspection Service	Merchantable	Construction, common
National Lumber Grades Authority.....	4 Common or Utility	3 Common or Standard
Northern Hardwood and Pine Manufacturers Association	4 Common	3 Common
Northeastern Lumber Manufacturers Association	4 Common	3 Common

†The above grades are taken from grading rules approved by the American Lumber Standards Committee.

(8) **TIMBER FASTENERS.** The design and use of timber fasteners shall be in accordance with the requirements of National Design Specifications for Stress-Grade Lumber and Its Fastenings [Ind 51.27 (8)].

(a) *Fastener identification.* Light gauge perforated metal plate connectors shall be permanently identifiable with regard to their gauge and manufacturer.

History: Cr, Register, July, 1974, No. 223, eff. 1-1-75; am. (2) Register, December, 1974, No. 228, eff. 1-1-75; r. and rec. (2), Register, April, 1976, No. 232, eff. 5-1-75.

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Ind 53.62 Special systems. (1) **WOOD TRUSSES.** Wood trusses shall be constructed in accordance with the following recommended standard and the listed exceptions:

(a) "Design Specifications for Light Metal Plate Connected Trusses" [Ind 51.27 (10)].

1. Exceptions and additions:

a. Section 301.2. Moment coefficients used in design of top or bottom chord members shall be based on the assumption of no fixity at member ends or joints due to plate connectors.

b. Metal plate connectors shall be identifiable as stated in Ind 53.61 (8) (a).

c. The modification of design stresses for duration of load shall be as specified in Ind 53.61 (1) (a) i.e.

(b) For trusses with nail-glued plywood gusset plates, calculations and design reference source shall be submitted to the department.

(c) Mechanically fastened trusses shall conform to Part V, "Timber Connector Joints," of National Design Specifications [Ind 51.27 (8)].

History: Cr. Register, July, 1974, No. 223, eff. 1-1-76; or, (1) (a) i.e., Register, December, 1974, No. 223, eff. 1-1-76.

Ind 53.63 Minimum construction requirements. The requirements of this section shall apply to all wood framing.

Note: Recognized wood framing and construction details indicated in "Wood Construction Data No. 1 and No. 5" of the National Forest Products Association, Technical Services Division (1612 Massachusetts Ave. NW, Washington, D.C. 20036) is recommended as good design and construction practice.

(1) **FIRE STOPS.** Fire stops shall be provided at all intersections of interior and exterior walls with floors, ceilings and roof in such manner as to effectively cut off communication by fire through hollow concealed spaces and prevent both vertical and horizontal drafts.

(a) Furred walls shall have fire stops placed immediately above and below the junction of any floor construction with the walls, or shall be fire-stopped the full depth of the joist.

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

(c) All wood fire stops as required in this section shall be lumber not less than 2 inches in nominal thickness, or 3/4-inch thick plywood with joints backed, and not less in width than the enclosed space within the partition except as provided for chimneys. Fire stops may also be of gypsum board, cement asbestos board, mineral wool or other approved noncombustible materials, securely fastened in place.

(2) **WOOD FRAMING INTO FIRE-RATED MASONRY WALLS.** See Ind 51.045 (1) (m).

(3) **FIRE-CUTTING.** Wood members supported in masonry walls shall have the ends of such members splayed or firecut to allow free end

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rotation in the vertical plane of the member, out of the masonry wall. See also Ind 53.34 (3) (b) 5.b.

(4) **BEARING.** (a) *Joists and trusses.* The ends of each joist or truss shall have not less than 1½-inch length of bearing on wood or metal nor less than 3-inch length on hollow or solid masonry units.

(b) *Beams and girders.* The ends of beams or girders supported on masonry or concrete shall have not less than 4-inch length of bearing. See also Ind 53.34 (3).

(5) **NOTCHING AND DRILLING.** No notching of outer fibers of structural members is permitted unless substantiated by design calculations. Circular holes bored in joists and studs that are within the middle one-third of the depth of joist or studs are permitted without design calculations.

(6) **DECAY PREVENTION.** Where wood is used in parts of a building exposed to moisture that causes the moisture content of wood to exceed 19%, the wood shall be adequately ventilated or treated with preservative.

Note: The department will accept wood products treated in accordance with the standards of the American Wood Preservers Association and the American Wood Preservers Bureau.

(a) All wood columns, posts and frame legs whose base is subject to deterioration due to moisture shall bear on concrete or other inorganic materials which extend at least 3 inches above the adjacent surface unless treated with preservative.

(b) The ends of wood structural members built into exterior masonry walls or into concrete shall be treated with preservative or a moisture-proof barrier shall be installed on the bearing surface.

Note: In areas subject to termites attack, refer to "Design of Wood Structures for Permanence" (published by the National Forest Products Association, 1619 Massachusetts Ave. NW, Washington, D. C. 20036) as suggested by National Design Specifications [Ind 51.27 (8)], Appendix F, section B.2.

(7) **TRUSS BRACING AND ANCHORAGE.** All wood trusses shall be securely fastened to the supports and each truss shall be secured in position in accordance with National Design Specifications [Ind 51.27 (8)], Appendix F, section J.

(8) **ANCHORAGE.** Anchorage shall be in accordance with subsection Ind 53.12 (2).

(9) **CROSS BRIDGING.** Cross bridging shall be furnished in accordance with paragraph 300-J of NDS [Ind 51.27 (8)]. When joists support floor or roof decks other than wood or wood decks which are not adequately attached, cross bridging shall be provided at 8-foot intervals.

(10) **SOLID BLOCKING.** All floor and roof joists shall be supported laterally at the ends and at each support by solid blocking except when the ends of joists are nailed to a header, band or rim joist or to an adjoining stud. Solid blocking shall be provided between floor joists where subjected to concentrated loads. Solid blocking shall be

not less than 2 inches in nominal thickness and the full depth of the joist.

(11) JOIST SUPPORT. Floor or roof joists shall not be toe nailed into the side of beams and girders for support. Such joists shall be supported by joist hangers, ledgers or metal plate connectors of adequate structural capacity.

(12) STUD WALLS. Unless evidence is provided to indicate otherwise, the maximum spacing and height of studs shall be in accordance with Table 53-XVIII. Notching and drilling of studs shall conform to subsection Ind 53.63 (5). Where load-bearing studs are spaced at 24-inch intervals, the roof trusses, rafters, and joists shall be centered over the studs or, in lieu thereof, solid blocking equal in size to the studs shall be installed to reinforce the double plate above.

(13) MINIMUM RECOMMENDED NAILING SCHEDULE. Unless evidence of design for the connection is provided, the connection shall have a minimum nailing in accordance with Table 53-XIX or its equivalent.

TABLE 53-XVIII
MAXIMUM SPACING AND HEIGHT OF STUDS

Size	Grade Referring to Pb and Pc	Height (Feet)	Spacing (Inches)	
			Exterior or Load-Bearing	Interior & Non-Load-Bearing
2 by 4 or larger	Utility	8	16	24
2 by 3	Standard and better	8	16	16
2 by 4—3 by 4	Standard and better	12	16	24
2 by 6 or larger	Standard and better	18	24	24

TABLE 53-XIX
MINIMUM RECOMMENDED NAILING SCHEDULE

Connection	Nailing (using common nails)
Joist to sill or girder, toe nail	3-8d
Bridging to joist, toe nail each end	2-8d
Ledger strip	3-10d at each joist
1" x 6" subfloor or less to each joist, face nail	2-8d
Over 1" x 6" subfloor to each joist, face nail	3-8d
2" subfloor to joist or girder, blind and face nail	2-16d
Sole plate to joist or blocking, face nail	16d at 16" oc
Top plate to stud, end nail	2-16d
Stud to sole plate, toe nail	4-8d
Doubled studs, face nail	16d at 24" oc
Doubled top plates, face nail	16d at 16" oc
Top plates, laps and intersections, face nail	2-16d
Continuous header, two pieces	16d at 16" oc along each edge
Ceiling joists to plate, toe nail	3-8d
Continuous header to stud, toe nail	4-8d
Ceiling joists, laps over partitions, face nail	3-16d
Ceiling joists to parallel rafters, face nail	3-16d
Rafter to plate, toe nail	3-8d
One-inch brace to each stud and plate, face nail	2-8d
1" x 8" sheathing or less to each bearing, face nail	2-6d
Over 1" x 8" sheathing to each bearing, face nail	3-8d
Built-up corner studs	16d at 24" oc
Built-up girders and beams	20d at 32" oc along each edge

History: Cr. Register, July, 1974, No. 223, eff. 1-1-76; am. (6) intro., Register, December, 1976, No. 252, eff. 1-1-77.

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Chapter Ind 54

FACTORIES, OFFICE AND MERCANTILE BUILDINGS

Ind 54.001 Scope	Ind 54.15 Standpipes and fire extinguishers
Ind 54.01 Construction, height and allowable area	Ind 54.16 Automatic sprinklers
Ind 54.02 Number and location of exits	Ind 54.17 Fire alarm
Ind 54.03 Type of exits	Ind 54.18 Floor load signs
Ind 54.04 Required exit width	Ind 54.19 Signs indicating number of persons
Ind 54.05 Capacity of buildings	Ind 54.20 No smoking signs
Ind 54.06 Exit doors	Ind 54.21 Tents
Ind 54.07 Passageways	Ind 54.50 Garages
Ind 54.08 Enclosure of stairways and shafts	Ind 54.51 Filling stations; buildings and structures
Ind 54.10 Trap doors and floor openings	Ind 54.52 Automobile tire or battery shops
Ind 54.11 Lighting	Ind 54.53 Automobile packing decks
Ind 54.12 Sanitary facilities	
Ind 54.13 Change rooms and lunchrooms	
Ind 54.14 Isolation of hazards	

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.

Note: See section Ind 51.03 for standards of classes of construction.

(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.

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TABLE 34.01
ALLOWABLE FLOOR AREAS (Square Feet)
(Maximum gross floor area per floor)

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

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

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(c) Buildings with no area limitations shall have a continuous all-weather, hard-surfaced area 30 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 table 54.01)	(if sprinklered)	(total allowable)
1. One story	10,000 sq. ft.	+ (1.6 X 10,000)	= 26,000 sq. ft.
2. Two or more stories	10,000 sq. ft.	+ (.76 X 10,000)	= 17,600 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 51.047. Such doors may normally remain open if held in that position by fusible links.

History: 1-2-58; 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. 198, eff. 1-1-73; r. and rec. (2) and (3), Register, September, 1973, No. 223, 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.

(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: 1-2-58; cr. (1) (c), Register, September, 1959, No. 46, eff. 10-1-59; am. (1) (1), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (1) (b) eff. 8-1-71 and exp. 1-1-72, and cr. (1) (b) eff. 1-1-72, Register, July, 1971, No. 187; am. (1), Register, September, 1973, No. 212, eff. 10-1-73.

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Ind 54.03 Type of exits. (1) At least one-half of the exits required in accordance with section Ind 54.02 shall be stairways or standard exits to grade as specified in sections Ind 51.15-51.18. The other exits shall be either stairways, standard exits, or horizontal exits as specified in section Ind 51.19, or fire escapes as specified in section Ind 51.20. A fire escape will not be accepted as a required exit for any building level more than 5 stories or 55 feet above grade. An outside wooden stairway may be used as an exit for a 2-story building.

(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 1 foot in 10 feet.

History: 1-2-56; am. (1), Register, December, 1974, No. 228, eff. 1-1-75.

Ind 54.04 Required exit width. (1) The total required exit width from a building level shall be in accordance with the requirements of subsections Ind 51.15 (6) and Ind 51.16 (3).

(2) Standard fire escapes (section Ind 51.20) may be substituted for stairways to the extent of not more than $\frac{1}{2}$ of the required total width, subject to the provision of section Ind 54.02.

(3) Horizontal exits in accordance with the requirements of section Ind 51.19 may provide up to one-half of the required exit widths for any floor, subject to the provisions of section Ind 54.02.

History: 1-2-56; am. (1) (a) and (b) and (3) (a) and (b), Register, June, 1972, No. 198, eff. 1-1-78; r. and rec. (1) and (3), r. (4), Register, December, 1974, No. 228, eff. 1-1-75.

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 sq. ft. per person
- (c) Dining rooms, cafes, taverns, etc.----- 10 sq. ft. per person
- (d) Places of seated assemblage----- 7 sq. ft. per person
- (e) Warehouses ----- 300 sq. ft. per person
- (f) Factories and offices----- 75 sq. ft. per person

(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 56.01.

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(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 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 5 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: 1-2-55; am. (1) (a), (b), (c), (d) and (2), Register, February, 1971, No. 152, 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. 198, eff. 1-1-73.

Ind 54.09 Opening to roof. **History:** 1-2-55; r. Register, December, 1970, No. 240, eff. 1-4-75.

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,

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shall be protected by fire-resistive doors as specified in section Ind 51.047.

History: 1-2-66; am. Register, February, 1971, No. 182, eff. 7-1-71; r. and enac. eff. 8-1-71 and exp. 1-1-72; cr. eff. 1-1-72, Register, July, 1971, No. 187.

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 facilities. (1) **TOILET ROOMS.** The occupancies included under the scope of this chapter shall be provided with toilet rooms as outlined in this section.

(a) *Factories, office and mercantile buildings.* All factories, office and mercantile buildings shall be provided with separate toilet rooms for each sex, except as follows:

1. Where not more than 5 employees or 25 patrons are accommodated, one toilet room, shared in common, may be provided if the door of the toilet room is equipped with a lock to ensure privacy.

2. Separate toilet rooms for the employees and the general public need not be provided if the toilet rooms are accessible to both employees and the general public.

3. Toilet facilities need not be provided in buildings and structures which provide service to people in automobiles, such as drive-in bank teller booths, photography and film service booths, or parking lot attendant booths, but not including drive-in restaurants, provided that a written statement is submitted to the department showing proof that convenient toilet facilities are available during all periods of operation. The requirement for toilet facilities is also waived for mobile crews and for unattended buildings, provided the employees have access to available toilet facilities.

(b) *Shopping centers.* In shopping centers, separate toilet rooms for each sex shall be provided for use by the general public. The toilet rooms may be located in the public mall or in the individual stores. Separate toilet rooms for each sex shall be provided for the employees in each store. In stores which accommodate not more than 5 employees and 25 patrons, one toilet room to accommodate both sexes will be acceptable. A store which has a net area of 750 square feet or less is not required to be provided with toilet rooms for the employees if the employees have access to the public toilet rooms located in the mall.

Note #1: The department recommends that public toilet rooms in the mall be conveniently located for patron use and that the travel distance between sets of public toilet rooms be less than 400 feet.

Note #2: See sections Ind 54.12 (1) (d) and Ind 55.32 for requirements for toilet rooms for other use groups which may also be included in shopping centers.

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(c) *Places of worship.* Places of worship which are included under the scope of this chapter shall be provided with separate toilet rooms for each sex.

(d) *Places for entertainment, recreation and seated dining.* Restaurants, taverns, and places for entertainment and recreation which are included under the scope of this chapter shall be provided with separate toilet rooms for each sex. Separate toilet rooms for employees and the general public are not required.

Note: See chapter 11 RC, rules of the department of health and social services, for supplementary requirements for toilet room facilities in restaurants.

(e) *Garages, parking ramps, service stations and filling stations.* Toilet rooms shall be provided in accordance with the requirements of this subsection.

1. *Garages.* Separate toilet rooms for each sex shall be provided in all service and repair garages, body shops, automobile tire and battery shops, and buildings of similar use, except that a single toilet room, shared in common, may be provided in buildings which accommodate not more than 5 employees or 25 patrons. Separate toilet rooms for employees and patrons need not be provided if toilet rooms are accessible to both employees and patrons.

2. *Service stations and filling stations.* Separate toilet rooms for each sex shall be provided in service stations and filling stations, including self-service stations. Separate toilet rooms for employees and patrons need not be provided if toilet rooms are accessible to both employees and patrons.

3. *Parking ramps.* Toilet rooms need not be provided in unattended parking ramps.

(2) *SANITARY FIXTURES.* The number of fixtures required for the total number of persons of each sex shall be determined in accordance with the ratios established in Table 54.12. The number of fixtures required for the general public shall be added to the number of fixtures required for the employees in all buildings, except in buildings which accommodate not more than 5 employees or 25 patrons or in filling stations and service stations. The total number of persons will be considered equally divided between men and women unless a different ratio is approved by the department. The requirements of this section do not apply to the buildings exempt from toilet rooms under Ind 54.12 (1).

History: 18-58; am. (3) (a) and (b), and (6), Register, September, 1959, No. 45, eff. 10-1-59; r. and rec. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 54.13 Change rooms and lunchrooms. (1) *CHANGE ROOMS.* Change rooms equipped with storage facilities for street clothes shall be provided where employees are required to wear protective clothing due to the nature of the employment and where employees are exposed to toxic materials and industrial poisons. Separate storage facilities for street clothes and work clothes shall be provided for employees who work with industrial poisons.

Note: See also chapter H 96, rules of the department of health and social services, for requirements for dressing rooms and lockers in restaurants.

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TABLE 54.12
NUMBER OF FIXTURES REQUIRED FOR EMPLOYEES AND PATRONS

EMPLOYEES¹

Type of Occupancy	Type of Fixtures				
	Water Closets (WC)		Urinals (U)	Lavatories (L)	Showers (S) ²
	Males (M)	Females (F)	Males (M)		
<u>Places of employment (employees/shift)</u>					
0- 5 employees	1	1	0		
3- 9 employees of each sex	1	1	0		
10- 25 employees of each sex	1	1	0		
16- 35 employees of each sex	1	2	0		
36- 55 employees of each sex	2	3	0		
56- 80 employees of each sex	2	4	2		
81-110 employees of each sex	3	5	2		
111-150 employees of each sex	4	6	2		
Over 150 employees of each sex	One additional fixture for each additional 40 employees of each sex; 2/3 of the additional water closets for males may be urinals.			One (L) for each 2 (WC) and/or (U), or fraction	One (S) for each 10 employees of each sex, or fraction
					One (DF) for each 100 persons, or fraction

GENERAL PUBLIC³

<u>All public buildings, except restaurants and taverns</u>					
0- 25 persons of each sex	1	1	0		
26-100 persons of each sex	1	1	0		
101-200 persons of each sex	1	2	1		
201-300 persons of each sex	1	3	2		
301-400 persons of each sex	2	4	2		
401-500 persons of each sex	2	5	3		
501-600 persons of each sex	2	6	4		
Over 600 persons of each sex	One (WC) for each additional 500 (M), or fraction	One (WC) for each additional 275 (F), or fraction	One (U) for each additional 500 (M), or fraction	One (L) for each 2 (WC) and/or (U), or fraction	One additional (DF) for each additional 5000 persons
<u>Taverns and restaurants</u>	One (WC) for each 75 (M), or fraction	One (WC) for each 30 (F), or fraction	One (U) for each 50 (M), or fraction ³	0	0

EMPLOYEES AND THE GENERAL PUBLIC

<u>Public buildings & places of employment</u>					
0-25 patrons and 0-5 employees/shift	1	0	1	0	1 ¹
<u>Filling stations and service stations with not more than 5 employees/shift</u>	1	1	0	1	1

¹Requirements for the general public must be added to the number of fixtures required for employees.

²Showers shall be provided in public pool facilities and where occupational hazards, such as poisons, infectious or irritating materials are present.

³Urinal may be omitted in restaurants which accommodate less than 25 males and do not serve alcoholic beverages.

Note #1: See also rules of the department of health and social services for sanitary fixtures for public swimming places, mobile home parks, camping grounds, camping resorts, recreational camps and educational camps.

Note #2: See Wis. Adm. Code Ch. Ind 1.000-2000--Wis. Safety and Health Code, for additional washing facilities required in places of employment where environmental hazards are present.

TABLE 54.12
NUMBER OF FIXTURES REQUIRED FOR EMPLOYEES AND PATRONS

EMPLOYEES¹

Type of Occupancy	Type of Fixture					
	Water Closets (WC)		Urinals (U)	Lavatories (L)	Showers (S) ²	Drinking Facilities (DF)
	Males (M)	Females (F)	Males (M)			
<u>Places of employment (employees/shift)</u>						
0- 5 employees	1		0			
3- 9 employees of each sex	1	1	0			
10- 15 employees of each sex	1	1	1			
16- 35 employees of each sex	2	2	1	One (L) for each 2 (WC) and/or (U), or fraction	One (S) for each 10 employees of each sex, or fraction	One (DF) for each 100 persons, or fraction
36- 55 employees of each sex	2	3	1			
56- 80 employees of each sex	2	4	2			
81-110 employees of each sex	3	5	2			
111-150 employees of each sex	4	6	2			
Over 150 employees of each sex	One additional fixture for each additional 40 employees of each sex; 2/3 of the additional water closets for males may be urinals.					

GENERAL PUBLIC¹

<u>All public buildings, except restaurants and taverns</u>						
0- 25 persons of each sex	1	1	0			
26-100 persons of each sex	1	1	0			
101-200 persons of each sex	1	2	1		0	One (DF) for each 150 persons up to 500
201-300 persons of each sex	1	3	2			
301-400 persons of each sex	2	4	2			
401-500 persons of each sex	2	5	3			
501-600 persons of each sex	2	6	4	One (L) for each 2 (WC) and/or (U), or fraction		One additional (DF) for each additional 3000 persons
Over 600 persons of each sex	One (WC) for each additional 600 (M), or fraction	One (WC) for each additional 275 (F), or fraction	One (U) for each additional 500 (M), or fraction			
<u>Taverns and restaurants</u>	One (WC) for each 75 (M), or fraction	One (WC) for each 30 (F), or fraction	One (U) for each 50 (M), or fraction ³		0	0

EMPLOYEES AND THE GENERAL PUBLIC

<u>Public buildings & places of employment</u>						
0-25 patrons and 0-5 employees/shift	1		0	1	0	1
<u>Filling stations and service stations with not more than 5 employees/shift</u>	1	1	0	1	0	1

¹Requirements for the general public must be added to the number of fixtures required for employees.

²Showers shall be provided in public pool facilities and where occupational hazards, such as poisons, infectious or irritating materials are present.

³Urinal may be omitted in restaurants which accommodate less than 25 males and do not serve alcoholic beverages.

Note #1: See also rules of the department of health and social services for sanitary fixtures for public swimming places, mobile home parks, camping grounds, camping resorts, recreational camps and educational camps.

Note #2: See Wis. Adm. Code Ch. Ind 1000-2000--Wis. Safety and Health Code, for additional washing facilities required in places of employment where environmental hazards are present.

(2) **LUNCHROOMS.** A space for eating lunches shall be provided in all places of employment where there is exposure to injurious dusts, toxic material and industrial poisons. Such space shall be physically separate from any location where there is exposure to toxic materials. Toilet rooms shall not be permitted to serve as lunchrooms.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 54.14 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 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: 1-2-66; am. (1) and (2), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (1) and (2) eff. 8-1-71 and exp. 1-1-72; cr. (1) and (2) eff. 1-1-72, Register, July, 1971, No. 187; remove from 54.13, Register, December, 1976, No. 252, eff. 1-1-77.

Ind 54.15 Standpipes. (1) **FIRE DEPARTMENT STANDPIPES.** Fire department standpipes shall be provided in all buildings exceeding 60 feet in height.

(2) **FIRST-AID STANDPIPES.** First-aid standpipes shall be provided in all buildings 3 stories or more in height in which the floor area of each story is more than 3,000 square feet, unless the floor area is divided with noncombustible 0-hour or 3/4-hour rated partitions into 3,000 square foot areas, or unless an approved automatic sprinkler system is installed.

History: 1-2-66; remove from 54.14 and r. and rec. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 54.16 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.

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(d) Buildings of Type No. 1 and No. 2 construction whose contents are not readily combustible.

History: 1-2-56; r. and rect., Register, December, 1970, No. 180, eff. 1-1-71; am. (1) (J), Register, June, 1972, No. 188, eff. 1-1-73; renun. from 54.15, Register, December, 1976, No. 252, eff. 1-1-77.

Ind 54.17 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. 188, eff. 1-1-73; renun. from 54.16, Register, December, 1976, No. 252, eff. 1-1-77.

Ind 54.18 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.

History: 1-2-56; renun. from 54.17, Register, December, 1976, No. 252, eff. 1-1-77.

Ind 54.19 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.

History: 1-2-56; renun. from 54.18, Register, December, 1976, No. 252, eff. 1-1-77.

Ind 54.20 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.

History: 1-2-56; renun. from 54.19, Register, December, 1976, No. 252, eff. 1-1-77.

Ind 54.21 Tents. All tents used for sales or storage purposes shall conform to the requirements specified for tents in sections Ind 55.58-Ind 55.63, inclusive of this code.

History: Cr. Register, September, 1959, No. 45, eff. 10-1-59; renun. from 54.20, Register, December, 1976, No. 252, eff. 1-1-77.

HAZARDOUS OCCUPANCIES

Ind 54.50 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.

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(b) A private garage is one used in connection with a private 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, salerooms 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.

Note: Section 157.19, Wis. Stat., permits retail dealer's buildings for the storage of farm tractors, trucks and motorized farm machinery to be metal covered, pole type or frame construction. Buildings constructed of other than metal or concrete may not be located closer than 30 feet to any other building. Buildings in excess of 50 feet in length require more than one door. The statute requires that motor fuel and storage batteries be removed from the vehicles and prohibits vehicle overhaul or repair in the 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 sections Ind 51.047 and 51.048.

(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

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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.

(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 64.22.

(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: 1-2-66; r. and rec. (2) (c), Register, September, 1969, No. 46, eff. 10-1-69; am. Register, January, 1961, No. 61, 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. 7-1-71; r. and rec. (2) (a) intro. par., (2) (b), (c), (d) and (3) intro. par., eff. 8-1-71, 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. 198, eff. 1-1-73; am. (2) (b) and (3) (a), Register, December, 1976, No. 240, eff. 1-1-76; return. from 67.00 and am. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 54.51 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

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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.

(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 paragraph (a) which are 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 sections Ind 51.047 and 51.048.

(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 fuel 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 51.04.

4. The under floor space is effectively vented by gravity means.

Note: For requirements applying to floor pits, see section Ind 54.50.

History: 1-2-56; am. (2) (a); cr. (2) (a) 1, Register, September, 1959, No. 45, eff. 10-1-59; am. (2) (d) and (2) (f) 8, Register, February, 1974, No. 182, eff. 7-1-74; r. and recr. (2) (d) and (2) (f) 3, eff. 8-1-71, exp. 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. 195, eff. 1-1-73; am. (2) (d), Register, December, 1975, No. 240, eff. 1-1-76; renum. from 57.64, Register, December, 1976, No. 252, eff. 1-1-77.

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Ind 54.52 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 54.50.

(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 54.50.

History: 1-2-66; renun. from 57.52 and am. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 54.53 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 unpierced enclosing walls 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.

History: Cr. Register, June, 1956, No. 6, eff. 7-1-56; cr. (2) (g), Register, August, 1967, 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; r. (2) (g), Register, December, 1975, No. 240, eff. 1-1-76; renun. from 57.53, Register, December, 1976, No. 252, eff. 1-1-77.

Chapter Ind 55

THEATERS AND ASSEMBLY HALLS

Ind 55.001 Theaters	Ind 55.35 Automatic sprinklers
Ind 55.01 Assembly halls	Ind 55.38 Use of "safety-base" film
Ind 55.02 Class of construction	Ind 55.40 Motion picture machine booths, general
Ind 55.03 Height above grade	Ind 55.41 Construction of booth
Ind 55.04 Exposure and courts	Ind 55.42 Doors
Ind 55.06 Separation from other occupancies	Ind 55.43 Openings
Ind 55.06 Capacity	Ind 55.44 Ventilation of booths
Ind 55.07 Number and location of exits	Ind 55.45 Relief outlets
Ind 55.08 Type of exits	Ind 55.46 Electric wiring
Ind 55.09 Stairways	Ind 55.47 Motion picture machine
Ind 55.10 Exit doorways and doors	Ind 55.48 Fire protection in booth; care and use of film
Ind 55.11 Exit lights	Ind 55.49 Portable booths
Ind 55.12 Required exit width	Ind 55.50 Maintenance
Ind 55.13 Sealing	Ind 55.51 Grandstands
Ind 55.14 Width of aisles	Ind 55.52 Exits
Ind 55.15 Lobbies and foyers	Ind 55.53 Aisles and passageways
Ind 55.16 Inclines and stairs	Ind 55.54 Seating
Ind 55.17 Obstruction	Ind 55.55 Guard rails
Ind 55.18 Mirrors and false openings	Ind 55.56 Portable grandstands or bleachers
Ind 55.19 Decorations	Ind 55.57 Inspection
Ind 55.20 Elevator and vent shafts	Ind 55.58 Tents
Ind 55.21 Stage separation	Ind 55.59 Structural requirements
Ind 55.22 Proscenium wall	Ind 55.60 Flame resistance
Ind 55.23 Proscenium curtain	Ind 55.61 Fire hazards
Ind 55.24 Automatic smoke outlet	Ind 55.62 Exits
Ind 55.25 Stage vestibules	Ind 55.63 Electrical installations
Ind 55.26 Footlight trough	Ind 55.64 Fire extinguishing equipment
Ind 55.27 Fireproof paint	Ind 55.65 Illumination: exit lights and signs
Ind 55.28 Stage accessory rooms	Ind 55.66 Boiler and furnace room
Ind 55.29 Boiler and furnace rooms	Ind 55.67 Toilet facilities
Ind 55.30 Lights and lighting	Ind 55.68 Outdoor theaters
Ind 55.32 Sanitary facilities	
Ind 55.33 Standpipes	
Ind 55.34 Fire extinguishers	

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.

Notes: 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: 1-2.58; 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 Stage	Without Stage
Type No. 1 and No. 2.....	No limit	No limit
Type No. 3 and No. 4.....	750	1,000
Type No. 5 and No. 6.....	600	1,000
Type No. 7 and No. 8.....	300	750

(a) Exception. For unlimited capacity, the fire protection of structural steel supporting the roof may be omitted for one-story buildings meeting type No. 1, 2 and 3 construction provided the building has no ground or basement floors. Heavy timber columns and roof framing may be substituted for structural steel framing. The roof decking shall be of noncombustible construction meeting the fire-resistive ratings of Table 51.03-A.

(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 ground floor or 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 30 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: I-2-56; (1); (1) (a); (3); (3) (a); (2) (b); (2) (c); (2) (d); (2) (e); (2) (f); (3); am. Register, June, 1956; No. 6, 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. 132, 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; am. (2) (a), Register, May, 1974, No. 221, eff. 6-1-74; am. (1) (a), Register, July, 1974, No. 223, eff. 8-1-74.

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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 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 55.03†
Type No. 3 thru No. 5	400	2nd story
Type No. 3 thru No. 5	200	3rd and 4th story

†The 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: 1-2-56; r. and rec. Register, September, 1959, No. 45, eff. 10-1-59; am. (2) and (3), Register, June, 1972, No. 198, eff. 1-1-73; am. (2), Register, September, 1973, No. 212, 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: 1-2-56; 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.

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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 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, 1961, No. 61, eff. 7-1-61; 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. (8) eff. 1-1-72, Register, July, 1971, No. 187; am. (2), Register, June, 1972, No. 198, 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	6 sq. ft. per person for seated space. 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. 15 sq. ft. per person for unseated space.
(k) Skating rinks	15 sq. ft. per person.

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(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.

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 1½ inches in height and the number shall be not less than 3 inches in height.

History: 1-2-56; cr. (4) (a), Register, July, 1966, No. 127, eff. 8-1-66; r. (2) (a), amend. (2) (l) (m) (a) to be (k) (l) and (m), Register, September, 1978, No. 213, 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 3 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:

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(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) A room may be placed under a stairway platform landing of 2-hour fire-resistive construction or better provided such room does not have combustible materials or hazardous equipment stored or operated therein. The partitions shall be constructed of noncombustible materials. All openings shall be protected with 20-minute fire door assemblies, or equivalent.

(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 51.16 for general stairway requirements.

History: 1-2-58; am. Register, January, 1961, No. 61, eff. 2-1-61; r. and rec. Register, February, 1966, No. 146, eff. 3-1-66; am. (4), Register, February, 1971, No. 182, eff. 7-1-71; am. (2), Register, December, 1974, No. 228, eff. 1-1-75.

Ind 55.10 Exit doorways and doors. (1) Every required single exit doorway shall contain a standard exit door as specified in section Ind 51.16. 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.

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Ind 55.12 Required exit width. (1) The total required exit width from a building level shall be in accordance with the requirements of subsections Ind 51.15 (6) and Ind 51.16(3).

(2) In theaters, the width of the front entrance shall be not less than $\frac{1}{3}$ of the total required exit width.

History: 1-2-66; am. (1), Register, June, 1972, No. 198, eff. 6-1-72; am. (1), Register, December, 1974, No. 228, eff. 1-1-75.

Ind 55.13 Seating. (1) All seats, chairs and benches shall be placed not less than 32 inches back to back measured horizontally, except 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. Loose chairs or seats shall not be used unless a special permit is secured from the department of industry, labor and human relations.

(3) There shall not be more than 12 seats in a row between aisles, nor more than 6 seats in a row which has an aisle on one side only except that for grandstands or bleachers without back rests and with a railing along the front, these figures may be doubled. No aisles will be required for such grandstands or bleachers where the seats extend to the floor or ground without a railing along the front.

(a) The number of seats in a row may be increased to 100 where self-raising seats are provided which leave an unobstructed passageway between rows of not less than 18 inches in width leading to a side aisle on each side of the auditorium in which exit doorways are located at not more than 20 feet intervals to an exit corridor or exit court.

(4) No seat bench or platform on which seats are placed shall be more than 22 inches in height of riser.

(5) No seat bench, or other platform or floor area on which seats are placed, or the top seat of any bleachers shall be nearer to the ceiling than 8 feet, nor nearer to the bottom of any truss or girder than 6 feet 4 inches.

(6) The requirements of this section do not apply to restaurants, dining or dance halls.

History: 1-2-60; am. Register, January, 1961, No. 61, eff. 2-1-61.

Ind 55.14 Width of aisles. (1) 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 $\frac{1}{4}$ 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.

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(2) 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.

Ind 55.15 Lobbies and foyers. The width of lobbies and foyers shall be determined on the same basis as required for exits in section Ind 55.12, but shall in no case be less than 5 feet wide, and shall be so designed and apportioned as to prevent congestion and confusion. Lobbies and foyers which serve as means of egress shall be at least equal in combined width to the required width of the stairways, passageways, aisles or exit doorways leading to them.

Ind 55.16 Inclines and aisle steps. (1) To overcome any difference in level between courts, corridors, lobbies, passageways or aisles required, or used, in egress from a theater or an assembly hall, approved ramps as specified in section Ind 55.08 shall be employed where the difference in elevation does not exceed 3 feet, except that this requirement need not apply to balconies.

(2) Steps in balcony aisles shall extend the full width of the aisle and shall have a uniform rise and run as specified in section Ind 55.09. No handrails will be required.

Ind 55.17 Obstruction. (1) All lobbies, aisles, passageways and doorways shall be kept free from furniture, drapes, display equipment, merchandise, vending machines and other obstructions, and no person except an employee shall be allowed to stand in or occupy any of the aisles, passageways, corridors or lobbies during any performance or public gathering. Except that patrons may be allowed to wait in a lobby or similar space if such use does not encroach upon the required clear width of the exits. Such waiting shall be restricted to areas separated from the required exit ways by fixed railings not less than 42 inches high. In entrance lobbies only, the exit space may be divided by railings not less than 36 inches high set up in the direction of travel in an approved manner for the regulation of ingress and egress.

(2) A booth or counter for the sale of package merchandise may be placed in the lobby or foyer of a theater where there is sufficient excess space so that the front of the booth or counter can be located not less than 5 feet back of the line marking the width of the lobby or foyer required for exit purposes.

Ind 55.18 Mirrors and false openings. (1) No mirror shall be placed in any part of a theater or assembly hall used by the public for exit purposes, including lobbies, corridors, stairways, ramps or any other exit facility. Where a mirror is used in an auditorium, it shall be placed flush with the wall and with the bottom at least 7 feet above any floor, balcony, gallery or platform.

(2) No false opening or decorative device giving the appearance of a door or window, where none exists, shall be placed in any part of a theater or assembly hall used by the public.

Ind 55.19 Decorations. Fabric decorations used in theaters and assembly halls shall be flame proof.

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Ind 55.20 Elevator and vent shafts. Enclosures for elevator and vent shafts shall be of 2-hour fire-resistive construction as specified in section Ind 51.04 and all openings therein protected by fire-resistive doors or windows as specified in section Ind 51.047.

History: 1-2-58; 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 55.21 Stage separation. (1) In every theater and assembly hall the stage shall be completely separated from the auditorium by a proscenium wall of 4-hour fire-resistive construction as specified in section Ind 51.04, except as follows:

(a) In theaters and assembly halls having a capacity not exceeding 500 persons, the proscenium wall shall be of 2-hour fire-resistive construction as specified in section Ind 51.04, or better.

(b) In theaters and assembly halls an open stage or platform will be permitted without the proscenium wall separation from the auditorium, provided the stage or platform is not more than 6 feet higher or wider than the proscenium opening.

History: 1-2-58; am. (1) intro. par., and (1) (a), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (1) intro. para. and (a), eff. 8-1-71 and exp. 1-1-72, and cr. (1) intro. par. and (a), eff. 1-1-72, Register, July, 1971, No. 187.

Ind 55.22 Proscenium wall. (1) The proscenium wall shall extend from an incombustible foundation, or from the lowest fireproof floor below the stage floor, to the highest adjoining roof, except that where a 4-hour fire-resistive wall is required it shall extend at least 2 feet above the highest adjoining roof.

(2) There shall be not more than 2 openings in the proscenium wall below the level of the auditorium floor, and not more than 2 openings other than the proscenium opening, in the proscenium wall above the level of the auditorium floor, except that in addition to the above openings there may be one opening to provide access through the proscenium wall to the orchestra pit.

(3) Each such opening shall not exceed 21 square feet in area and shall be protected by a fire-resistive door as specified in section Ind 51.047.

History: 1-2-58; am. (3), Register, March, 1972, No. 195, eff. 4-1-72.

Ind 55.23 Proscenium curtain. Where a proscenium wall is required for the separation of a stage from an auditorium, the proscenium opening shall be provided with a curtain as approved by the department.

Note: The department will accept standards for the design and installation of "Proscenium Curtains" as specified in the 1970 edition of the "Uniform Building Code" published by the International Conference of Building Officials.

History: 1-2-58; r. and rec. Register, May, 1971, No. 185, eff. 8-1-71.

Ind 55.24 Automatic smoke outlet. Where a fireproof proscenium curtain is required, or provided, the stage shall be provided with one or more automatic smoke outlets, constructed of metal or other incombustible material, placed near the center and above the highest part of the stage, and having a combined area equal to not less than

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8% of the area of the stage floor. Vertical louver openings shall be placed not less than 3 feet above the roof and shall be not less than twice the area of the shaft. The smoke outlet shall be designed and constructed so as to open by gravity, and so as to effectively overcome the effects of neglect, rust, dirt, frost, snow, heat, twisting, or warping of the frame work. The louvers, or dampers in the openings shall be held closed by cotton or hemp cords running to the stage floor close to each stage door. Fusible links, or other approved heat release devices, shall be inserted in each cord near the outlets.

Ind 55.25 Stage vestibules. All entrances to the stage shall be vestibuled in such manner as to protect the curtain, scenery, and auditorium from drafts of air.

Ind 55.26 Footlight trough. The footlight trough shall be made of, or lined with, incombustible material.

Ind 55.27 Fireproof paint. All stage scenery, properties, curtains, and decorations made of combustible material, and all woodwork in or about the stage, shall be effectively flame-proofed.

Ind 55.28 Stage accessory rooms. (1) All dressing rooms, property rooms, and other storage or workrooms shall be built of incombustible material throughout, and shall be separated from the stage by a special occupancy separation as specified in Wis. Adm. Code section Ind 51.08.

(2) No dressing room or employees' room shall be placed more than one story below the grade line, and no dressing room shall be placed above or below the auditorium unless separated therefrom by a special occupancy separation as specified in section Ind 51.08.

Ind 55.29 Boiler and furnace rooms. (1) Every boiler or furnace room, including the breeching and fuel room, shall be enclosed with a 3-hour fire-resistive enclosure as specified in section Ind 51.04, except that in case of an assembly hall accommodating not more than 300 persons, a 2-hour fire-resistive enclosure as specified in section Ind 51.04 may be used. All openings shall be protected with self-closing fire-resistive doors as specified in section Ind 51.047.

(2) All appliances used for heating water which are fired with solid fuel, liquid fuel or gas shall be located in a boiler or furnace room except that gas fired booster water heaters used exclusively for sanitizing dishes and cooking utensils need not be installed in a fire-resistive enclosure.

History: 1-2-66; r. and rec. (2), Register, August, 1967, No. 20, eff. 9-1-67; am. (1), Register, September, 1969, No. 46, eff. 10-1-69; am. (1), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (1), eff. 8-1-71, and exp. 1-1-72; cr. (1) eff. 1-1-72, Register, July, 1971, No. 187.

Ind 55.30 Lights and lighting. (1) Electric lights shall be used for lighting where electric current is available. No oil lamps or other open lights shall be used in or about any stage containing scenery.

(2) No gas lighting of any kind shall be used on any stage containing scenery, nor in any property room, storage room, scene dock, or fly gallery, except in localities where electricity is not available.

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(3) In all theaters and assembly halls, all stairways, passageways, and exit doors shall be properly lighted and shall remain lighted throughout every performance or entertainment and until the audience has left the building.

55.32 Sanitary facilities. (1) **TOILET ROOMS.** All occupancies included under the scope of this chapter shall be provided with separate toilet rooms for each sex. Separate toilet rooms for the employees and the general public need not be provided if the toilet rooms are accessible to both the employees and the general public.

(a) *Toilet rooms in connection with stage.* In theaters and assembly halls which are equipped for the showing of stage productions, separate toilet rooms for each sex, furnished with at least one water closet and one lavatory, shall be provided in connection with the stage.

(b) *Toilet room in connection with motion picture booth.* In theaters where motion picture machines are run continuously for a period of more than 2 hours without at least 10 minutes intermission for the motion picture machine operator for each 2-hour period, a toilet room, furnished with one water closet and one lavatory, shall be provided in direct connection with the motion picture booth.

(2) **SANITARY FIXTURES.** The number of fixtures required for the total number of patrons of each sex shall be determined in accordance with the ratios established in Table 55.32. The number of fixtures required for the employees in accordance with Table 54.12 shall be added to the number of fixtures required for the general public. The total number of persons will be considered equally divided between men and women unless a different ratio is established.

TABLE 55.32

Type of Occupancy	Type of Fixture				
	Water Closets (WC)		Urinals (U)	Lavatories (L)	Drinking Facilities (DF)
	Males (M)	Females (F)	Males (M)		
Places of assembly					
0-100 persons of each sex	1	1	0		
101-200 persons of each sex	1	2	1		One (DF) for each 150 persons up to 300
201-300 persons of each sex	1	3	2		
301-400 persons of each sex	2	4	3		
401-500 persons of each sex	2	5	3		
501-600 persons of each sex	2	6	4	One (L) for each 2 (WC) and/or (U), or fraction	
Over 600 persons of each sex	One (WC) for each additional 600 (M), or fraction	One (WC) for each additional 275 (F), or fraction	One (U) for each additional 600 (M), or fraction		One additional (DF) for each additional 3000 persons
Taverns and restaurants	One (WC) for each 75 (M), or fraction	One (WC) for each 30 (F), or fraction	One (U) † for each 60 (M), or fraction		0

†Urinal may be omitted in restaurants which accommodate less than 25 males and do not serve alcoholic beverages.

Note: See also rules of the department of health and social services for sanitary fixtures for public swimming places, mobile home parks, camping grounds, camping resorts, recreational camps and educational camps.

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

Ind 55.33 Standpipes. (1) **FIRE DEPARTMENT STANDPIPES.** Fire department standpipes shall be provided in all buildings exceeding 60 feet in height.

(2) **FIRST-AID STANDPIPES.** First-aid standpipes shall be provided in all buildings having theaters and assembly halls with an occupancy load of more than 300 persons, unless an approved automatic sprinkler system is installed. First-aid standpipes shall also be provided on the stage of every theater and assembly hall where a fire curtain is required.

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

Ind 55.34 Fire extinguishers. (1) Standard fire extinguishers of an appropriate type as specified in section Ind 61.22 shall be provided for all theaters and assembly halls as follows:

- Two on stage, if scenery is used.
- One on stage, if no scenery is used.
- One in motion picture booth, or in ticket office if there is no booth.
- One in dressing room section.

(2) Extinguishers shall be properly exposed to view and always accessible.

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Ind 55.35 Automatic sprinklers. In every theater and assembly hall where a proscenium curtain is required, approved automatic sprinklers, as specified in section Ind 51.23, shall be provided under the stage, under the stage roof, and in the dressing rooms, but not in the automatic smoke outlet.

Ind 55.39 Use of "safety-base" film. (1) The requirements of sections Ind 55.40 through 55.49 will not apply in buildings in which movie projectors are used with "safety-base" film provided the conditions of (a) and (b) in this subsection are met.

(a) The owner shall submit an affidavit to the department of industry, labor and human relations stating that "safety-base" film only will be used in all movie projectors.

(b) The affidavit shall be signed by the owner and the signature notarized.

Note: For definition of "owner", see section 101.01 (2) (3), Wis. Stats.

History: Cr. Register, April, 1971, No. 184, eff. 5-1-71.

Ind 55.40 Motion picture machine booths, general. Every motion picture machine using nitro-cellulose film, together with all auxiliary and associated equipment, shall be enclosed in a booth so arranged as to permit the operator to walk freely on either side and in back of the machine. At least 48 square feet in area shall be provided for one machine, and 24 square feet additional for each machine over one. The ceiling height shall be not less than 7 feet.

Ind 55.41 Construction of booth. The floor of each motion picture booth shall be constructed of masonry or reinforced concrete, or shall be covered with not less than 2 inches of fire-resistive material. The walls and ceilings shall be not less than 2-hour fire-resistive construction as specified in section Ind 51.04.

History: 1-2-58; 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 55.42 Doors. (1) The door to the booth shall be not larger than necessary for the safe and proper use and maintenance of the booth and equipment, but in no case shall its dimensions be smaller than 2 feet by 5 feet or larger than 8 feet by 7 feet. The top of the door shall be not less than 12 inches below the ceiling of the booth.

(2) The door shall be a tight-fitting self-closing fire door as specified in section Ind 51.047, shall open outwardly, and shall not be equipped with any latch.

History: 1-2-58; am. (2), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (2) eff. 8-1-71 and exp. 1-1-72; cr. (2) eff. 1-1-72, Register, July, 1971, No. 187.

Ind 55.43 Openings. (1) Two openings for each motion picture machine may be provided. The one for the operator's view shall not be larger than 200 square inches and the one for projection not larger than 120 square inches. Where separate stereopticon, spot, or flood-light machines are installed, not more than one opening shall be provided for each such machine for both the operator's view and the projection of light. All such openings shall be as small as practicable.

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(2) Each opening shall be provided with an approved gravity shutter set into guides not less than one inch at sides and bottom, and overlapping the top of the opening by at least one inch when closed. Shutters shall be not less than No. 10 U.S. Standard gauge iron or equivalent, arranged to move freely in guides of like material and thickness bolted to the wall. Each shutter shall be suspended by a cord and shall be so arranged that closing is by gravity action. A fusible link shall be provided in the cord over each shutter. A link shall also be provided over each magazine, which on operating will close all shutters. A manual release shall be provided near each exit door by which all shutters can be closed simultaneously. Shutters shall not be blocked open nor held open in any manner except by the harness of cords and links as herein described.

Ind 55.44 Ventilation of booths. Every booth or room housing projection, sound or any other equipment which vitiates good air conditions or requires the attention of an attendant shall be ventilated as required by section Ind 54.05. Fresh air intakes in booth walls, except for outside air, shall not exceed 72 square inches in area, nor be more than 3 inches above the floor. They shall be equipped with automatic shutters as described for projection openings.

History: 1-2-56; r. and rec. Register, October, 1967, No. 143, eff. 11-1-67; am. Register, December, 1975, No. 246, eff. 1-1-76.

Ind 55.45 Relief outlets. Every booth or room housing projection, sound or other equipment which constitutes a fire, smoke, explosion or fuming hazard shall be equipped with one or more gravity outlets extending upward from the ceiling through the roof. The net area of such gravity relief outlets shall be equal to one per cent of the room or booth floor area, but not less than 12 inches in diameter. Such outlets shall be constructed as sheet metal ducts having double walls with $\frac{1}{2}$ inch air space between, or better construction. Where a relief outlet passes through, or is within 18 inches of any combustible construction, or passes through any other occupancy, approved masonry flues as specified for chimneys, section Ind 54.46, shall be used. The relief outlets shall be equipped, at the booth or room outlets, with a gravity shutter which will open automatically under excessive heat conditions. The automatic shutter shall normally be tightly closed where mechanical exhaust ventilation is required in the same room.

Ind 55.46 Electric wiring. All lights and electric wiring, also motors, arc lamps, rheostats, and associated electrical equipment shall conform in type and arrangement to the requirements of the Wisconsin state electrical code.

Ind 55.47 Motion picture machine. Every projection machine shall be securely fastened to the floor, and together with sound head and other associated equipment, shall be of safe design. No part of the film shall be outside of a tight metal enclosure during projection, and the feed and take-up reels shall have riveted, flanged, or welded joints. A shutter shall be placed in front of the condenser, arranged so as to be closed except when held open by the operator, or by some mechanical device which will assure immediate closure when operation of the machine is stopped.

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Ind 55.48 Fire protection in booth; care and use of film. (1) All shelves, furniture and fixtures shall be incombustible. No combustible material shall be permitted to be within such booth, except films and film cement not exceeding one pint. Smoking is prohibited. Heating equipment in booths shall be limited to steam, warm air, hot water or electric convection heaters with low surface temperature elements. Radiators shall be protected by $\frac{1}{4}$ inch mesh screen with the top sloped at least 45 degrees to the horizontal.

(2) Films not in process of rewinding, examination or projection shall be kept in metal containers. Up to 40 pounds of film may be kept in the projection booth in interstate commerce commission shipping containers. Excess over 40 pounds shall be kept in an approved film cabinet, but the total quantity of film in any booth shall not exceed 125 pounds.

(3) Rewinding in the projection booth is prohibited unless done in an approved enclosed type rewind machine. An approved can with self-closing hinged cover shall be provided for scrap film.

(4) Up to 125 pounds of film in addition to that permitted in a projection booth, may be kept in containers as specified above, providing this excess is in a rewind room of not less than 80 square feet area, and of the construction specified in sections Ind 55.41 and Ind 55.42. Such room shall have a vent of at least 50 square inches area extending upward to the outside of the building, with a clearance to combustible material conforming to section Ind 55.45. Furniture and heating shall be as for the projection booth, and smoking is prohibited.

Note: In the foregoing section the weight of a 1000 foot roll of 35 millimeter film is assumed as 6 pounds.

Ind 55.49 Portable booths. (1) Every portable booth used to confine the fire hazards of a motion picture machine shall be of approved design conforming to the requirements for permanent booths.

(2) Every booth used for more than 3 consecutive performances in one location will be considered a permanent booth.

Ind 55.50 Maintenance. All theaters and assembly halls, and all parts thereof, shall be kept clean, sanitary and in good repair.

GRANDSTANDS, BLEACHERS, TENTS AND PLACES OF OUTDOOR ASSEMBLY.

Ind 55.51 Grandstands. (1) Grandstands erected of frame construction shall be located at least 20 feet from any other building or adjoining property line unless the exterior walls of such adjacent building are of 2-hour fire-resistive construction or better and all openings therein are protected with fire-resistive doors and windows as specified in section Ind 51.047.

(2) No wood grandstand unit shall exceed 10,000 square feet in ground area or 200 feet in length.

(3) Wood grandstand units shall be placed not less than 20 feet apart or shall be separated by walls of not less than 2-hour fire-resistive construction.

(4) The highest level of seat platforms of any wood grandstands shall not be more than 20 feet. Portable grandstands or bleachers within tents shall not be more than 12 feet above the ground or surface at the front of the grandstand.

(5) All grandstands shall be designed and constructed to conform with the structural requirements of chapter Ind 53 of this code.

(6) Seat boards and foot boards shall be designed to safely support a live load of not less than 120 pounds per lineal foot. The width of foot boards shall not be less than 7½ inches.

(7) The space under a grandstand shall be kept free from extraneous flammable materials and shall not be occupied for other than exit purposes except that such space, if enclosed with one-hour fire-resistive construction or better, may be used for non-hazardous purposes if approved in writing by the department of industry, labor and human relations.

History: 1-2-66; am. (1), Register, February, 1971, No. 182, eff. 7-1-74; r. and rec. (1) eff. 8-1-71 and exp. 1-1-72; cr. (1) eff. 1-1-72; Register, July, 1971, No. 187.

Ind 55.52 Exits. (1) Every grandstand, balcony or tier considered separately shall be provided with at least 2 exits located as remotely from each other as practicable and leading directly to the outside at grade. If the capacity of any such structure, balcony, or tier exceeds 1,000 persons, there shall be at least 3 exits and where the capacity exceeds 4,000 persons, there shall be at least 4 exits.

(2) Exits shall be distributed uniformly to prevent congestion and shall be so located that the line of travel to an exit or to the entrance to an exit passageway is not greater than 150 feet.

(3) The total width of exits from any grandstand, balcony or tier shall not be less than 22 inches per 100 persons, except that for grandstands which are constructed of incombustible material throughout and have a closed incombustible deck under the seats, the total width of exits may be not less than 22 inches for each 500 persons or fraction.

Ind 55.53 Aisles and passageways. (1) All ramps, stairs, doorways and doors used for exit purposes shall conform to the requirements of sections Ind 55.08, 55.09 and 55.10 of this code.

(2) Aisles having seats on both sides shall not be less than 3 feet 6 inches in width and aisles having seats on one side only shall not be less than 24 inches wide. Cross aisles shall not be less than 48 inches in width. No aisles will be required for grandstands or bleachers where the seats extend to the floor or to the ground without a railing along the front.

(3) Trailer seating mounted on incombustible decking not exceeding 300 capacity each shall be provided with aisles or stairways not less than 36 inches in width.

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Ind 55.54 Seating. (1) The seating arrangement shall comply with the requirements of section Ind 55.13 except that for seats without backs the horizontal distance from back to back of seats shall not be less than 22 inches. There shall be a space of not less than 12 inches between the back of each seat and the front of the seat immediately behind it. All measurement is to be taken between plumb lines.

(2) Where the same level is not used for both seat bench and foot rest, independent foot rests shall be provided.

(3) All seat boards and foot boards shall be securely fastened in place in such a manner that they cannot be accidentally displaced.

(4) Where the rise of a seat bench or platform exceeds 11 inches, intermediate steps shall be provided the full width of the aisles. Such steps shall have a rise of not more than 11 inches and a tread of not less than 10 inches *nominal width*. In no case shall the angle of seating exceed 45 degrees.

Ind 55.55 Guard rails. A substantial guard rail not less than 42 inches in height and having 2 intermediate rails shall be provided along the back and ends of all grandstands where the seats are more than 4 feet above the ground. Where the front foot rest of any grandstand is more than 2 feet above the ground, a guard rail extending not less than 36 inches above such front foot rest shall be provided.

Ind 55.56 Portable grandstands or bleachers. (1) Portable grandstands or bleachers shall be self-contained units having all necessary parts to withstand and restrain all forces which may be developed during occupancy. They shall be so designed and constructed that if any structural member essential to the strength and stability of the structure is omitted during erection, the presence of unused connections or fittings will make the omission self-evident.

(2) A portable grandstand shall not be used for public occupancy until it has been securely assembled in accordance with this requirement.

(3) Portable grandstands shall be provided with base plates, sills, floor runners, or sleepers of sufficient area and strength to support safely the total live and dead loads.

(4) Where portable grandstands rest directly on the ground, mud sills of suitable material and having sufficient area to prevent dangerous settlement shall be provided under the base plates or sleepers. All mud sills shall be properly anchored to the ground and all bearing surfaces shall be in contact.

(5) A-frames or other supports and seat stringers for portable grandstands or bleachers shall be secured to prevent accidental displacement during occupancy.

(6) Field connections to wood members shall be by means of rivets, bolts, connectors, lag screws, friction or other approved devices. Lag screws shall not be used for direct tension. The use of nails and wood screws is permissible for holding wood posts together except that they shall not be used for demountable connections.

(7) Wood members in tension shall be connected at each end by not less than 2 bolts or lag screws or by approved connectors or other approved devices. Adequate provision shall be made to prevent the splitting or shearing of wood at such connections.

(8) The following requirements shall apply to folding and movable bleachers used in places of assembly in addition to the other requirements of sections Ind 55.56 and Ind 55.57.

(a) Shop drawings, specifications and calculations or a test report made by a recognized testing agency covering each bleacher model shall be submitted to the department of industry, labor and human relations by an architect or professional engineer registered in Wisconsin, for approval.

(b) No required exit doors or exit passageways shall be obstructed by any bleacher installation. Floor plans, elevations, and typical structural information showing the location of bleachers, exit doors, and exit passageways, for each installation shall be submitted to the department of industry, labor and human relations in triplicate for approval before work on the installation is commenced. The plans shall be made by and bear the seal of an architect or professional engineer registered in Wisconsin.

(c) All bleachers shall be designed to resist a horizontal swaying force applied to the seats in a direction parallel to the length of the seats of at least 24 pounds per lineal foot of seats and in a direction perpendicular to the seats of not less than 10 pounds per lineal foot of seats.

(d) Seat board and foot boards shall be designed to safely support a live load of not less than 120 pounds per lineal foot.

(e) All bleachers shall be equipped with sockets or holders along the back and ends to support guard rails. A guard rail not less than 42 inches in height and having 2 intermediate rails shall be provided along the back of the top row of seats. Guard rails not less than 42 inches in height above foot boards and having an intermediate rail at mid-height shall be provided at the open end of all bleachers where the seats are more than 4 feet above the floor.

(f) The highest level of seat platforms of any forward folding or movable bleachers shall not be more than 12 rows or 11 feet above the floor.

(g) Forward folding bleachers shall be securely anchored to the floor with bolts, lag screws, or other approved devices.

History: 1-2-56; cr. (8), Register, November, 1968, No. 85, eff. 12-1-68.

Ind 55.57 Inspection. Every portable grandstand or bleacher shall be carefully inspected by a building official before each period of public occupancy and any loose connections, defective or broken members or loose supports shall be properly repaired before the structure is used. In cities or towns which do not have a building official, such inspections shall be made by the chief of the fire department or other public official designated by the department of industry, labor and human relations.

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Ind 55.58 Tents. (1) For the purpose of this section a tent is a portable, temporary shelter or a structure, the covering of which is made of pliable material.

(2) No tent shall be erected to cover more than 75% of the premises on which it is located.

(3) Tents used for assembly purposes which cover 1500 square feet or more of ground area shall be located at least 20 feet from any other structure or adjoining property lines.

(4) Stake lines of adjacent tents used for assembly purposes shall be sufficient distance from each other to provide an emergency exit passageway not less than 6 feet in width between stake lines. Proper protection shall be provided along such stake lines to eliminate tripping hazards.

(5) Concession and other tents not used for assembly purposes need not be separated from each other and may be located less than 20 feet from other structures.

(6) This section does not apply to tents or shelters used exclusively for construction purposes.

Ind 55.59 Structural requirements. (1) Poles and other members supporting tents shall be of sufficient size and strength to support the structure safely without exceeding the stresses specified in chapter Ind 53 of this code.

(2) All tents shall be adequately guyed, supported and braced to withstand a wind pressure or suction of not less than 10 pounds per square foot.

(3) The poles, guys, stakes, fastening, etc., shall be of sufficient strength and so attached as to resist a wind pressure of at least 20 pounds per square foot of projected area of the tent.

Ind 55.60 Flame resistance. All tents used for assembly purposes or in which animals are stabled and all other tents used by the public in places of outdoor assembly shall be effectively flame-proofed. The owner shall furnish a certificate or a test report by a recognized testing engineer or laboratory as evidence that such tents have the required flame resistance.

Ind 55.61 Fire hazards. (1) The ground enclosed by any tent used in connection with a place of outdoor assembly and for a distance of not less than 10 feet outside such structure on all sides shall be cleared of all flammable material or vegetation which will transmit fire. The premises shall be kept free from such flammable material during the period the premises are used by the public.

(2) No hay, straw, shavings or similar combustible materials other than that necessary for the current feeding and care of animals shall be permitted within any tents used for public assembly except that sawdust and shavings be used if kept damp.

(3) No smoking or unapproved open flame of any kind shall be permitted in any tent while occupied by the public. "No Smoking" signs shall be conspicuously posted in all tents open to the public.

(4) Tents shall not be used for motion picture performances unless safety film is used.

Ind 55.62 Exits. (1) Every tent occupied by the public shall have at least 2 standard exits located at or near opposite ends of the structure.

(2) In tents used for assembly purposes, exits shall be provided on 3 sides if the capacity exceeds 600 persons and on 4 sides where the capacity exceeds 1,000 persons. Exits shall be uniformly distributed but in no case shall the line of travel to an exit be greater than 150 feet.

(3) The total width of exits from a tent used for assembly purposes shall not be less than 44 inches per 100 persons. Exit openings shall comply in all respects with the requirements of Wis. Adm. Code sections Ind 55.10 and Ind 51.15 of this code.

Ind 55.63 Electrical installations. (1) Electrical systems in all places of outdoor assembly shall be installed in accordance with the requirements of the Wisconsin state electrical code. All such systems shall be maintained and operated in a safe and workmanlike manner.

(2) The electrical system and equipment shall be isolated from the public by proper elevation and guarding. All electrical fuses and switches shall be installed in approved enclosures. Cables laid on the ground or in areas traversed by the public shall be placed in trenches or protected by approved covers.

Ind 55.64 Fire extinguishing equipment. One or more fire extinguishers of approved type and size shall be provided in connection with every wood grandstand and in all tents used for assembly purposes. Such extinguishers shall be maintained in proper working order and shall be located where they are easily accessible, preferably in or near the ticket office. In large installations, additional fire extinguishing equipment shall be provided as directed by the building official.

Ind 55.65 Illumination; exit lights and signs. (1) All exits, aisles and passageways leading to exits in grandstands and other places of outdoor assembly shall be kept adequately lighted at all times when the structure is occupied by the public. Artificial illumination having an intensity of not less than 2.5 foot candles at the floor line shall be provided when natural light is inadequate.

(2) Exit lights and signs complying with the requirements of section Ind 55.11 shall be provided in all places of outdoor assembly where more than 100 persons can be accommodated.

Ind 55.66 Boiler and furnace room. Every boiler or furnace room, including the breeching and fuel room, in places of outdoor assembly, shall be enclosed with a 2-hour fire-resistive enclosure or better and all interior openings in walls forming such enclosures shall be protected by self-closing fire-resistive doors. Gas-fired appliances for

heating water shall be installed in a boiler or furnace room. Chimneys shall be constructed in conformity with the requirements of section Ind 64.45 of this code.

Ind 55.67 Toilet facilities. Separate toilets shall be provided for each sex in connection with all places of outdoor assembly. Toilet rooms and equipment shall comply in all respects with the requirements of sections Ind 52.50-Ind 52.64, inclusive, of this code.

Ind 55.68 Outdoor theaters. (1) **DEFINITION AND SCOPE.** For the purpose of this code, an outdoor theater is a place of outdoor assembly used for the showing of plays, operas, motion pictures and similar forms of entertainment in which the audience views the performance from self-propelled vehicles parked within the theater enclosure. The requirements of this section shall apply to outdoor theaters now in existence and to outdoor theaters hereafter constructed, except as provided in subsection (5).

(2) **ENTRANCES AND EXITS.** All entrances and exits for outdoor theaters shall comply with the regulations of the state highway commission for driveways from property abutting state highways and the following additional requirements:

(a) Not more than one entrance shall be provided for each access road but each such entrance may be divided into 2 roadways and channelized to properly provide for vehicles turning right or left from the highway.

(b) That portion of an entrance or exit lying within the highway right-of-way shall comply with the regulations of the authority in charge of the maintenance of the highway or in the event this authority has no regulation, it shall comply with regulations prescribed by the state highway commission.

(c) Not more than one exit shall be provided for each access highway but such exit may be suitably channelized to provide for right and left turns to the highway, and not more than one traffic lane shall be permitted for each traffic lane on the highway available to vehicles leaving the theater.

(3) **VEHICLE STORAGE.** (a) Sufficient area shall be provided between the highway and the ticket booth to provide storage space for vehicles equal to not less than 10% of the theater capacity. In all cases, sufficient storage space shall be provided so the vehicles will not back up on the traveled way of the highway. Storage area shall be calculated on the basis of 162 square feet per vehicle.

(b) A hold-over storage area having sufficient capacity to accommodate not less than 15% of the theater capacity shall be provided between the ticket booth and the ramp area.

(4) **TOWER CONSTRUCTION.** The tower supporting the motion picture screen shall be designed to resist a horizontal wind pressure of not less than 30 pounds for every square foot of exposed surface.

(5) **LOCATION OF TOWER.** The screen shall be so oriented that the picture is not visible from any major highway. This requirement does not apply to towers erected prior to January 1, 1952.

(6) **CONCESSION AND MOTION PICTURE MACHINE BOOTH.** The motion picture booth and equipment shall comply in all respects with the requirements of sections Ind 55.40-55.49, inclusive, of this code.

(a) Concession buildings in connection with outdoor theaters shall comply with the requirements of chapter Ind 54 of this code.

(7) **SANITARY EQUIPMENT.** Separate toilet rooms shall be provided for males and females in connection with all outdoor theaters as required by section Ind 55.32. Toilet rooms and equipment shall comply in all respects with the requirements of sections Ind 52.50-52.64 of this code.

(a) In determining the number of fixtures required for toilet rooms in connection with outdoor theaters, the capacity of the theater is established by allowing 2½ persons for each vehicle accommodated, exclusive of vehicles parked in the waiting or hold-over area.

(b) Where the public toilet rooms are so located that the patrons must cross the ramp area in order to reach the toilet rooms, a suitable approach or passageway leading thereto shall be maintained. Such passageways shall be properly lighted and they shall be kept free from obstructions.

(8) **RAMPS AND SPEAKER EQUIPMENT.** (a) Ramps shall be spaced not less than 38 feet apart. The ramps shall be so designed that any vehicle can move from its parked position to the exit driveway without being required to back up.

(b) All ramps, parking areas, entrance and exit driveways shall be properly surfaced with a gravel surfacing or better, adequate to withstand the weight of the vehicles accommodated.

(c) Where additional seating space is provided in the theater enclosure for patrons using public transportation facilities, the speaker arrangement shall be such that the sound will be confined to the immediate seating area and not broadcast beyond the theater enclosure.

(d) There shall not be less than 18 feet distance between speaker posts, measured parallel to the ramps, except in seated areas for patrons using public transportation. All electrical wiring and electrical equipment shall be installed in accordance with the provisions of the Wisconsin state electrical code. Each speaker post shall be wired with wire approved for underground use laid in trenches not less than 12 inches in depth.

(9) **LIGHTING.** All entrance and exit driveways shall be adequately lighted and properly marked to avoid congestion and confusion and shall remain lighted throughout the performance and until the audience has left the area.

(10) **SPEED LIMIT.** In every outdoor theater, notices of a permanent character shall be prominently displayed designating the maximum speed limit permitted for cars driven within the area. Parking lights shall be used when cars are moving in the theater enclosure.

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(11) **RUNNING OF ENGINES.** At each performance, an instructive trailer shall be shown on the screen informing the patrons of the danger of carbon monoxide poisoning when the engine is running and stating that when it becomes necessary to run the engine, the windows of the vehicle should be opened at least one inch.

History: 1-2-56; r. and rec. Register, September, 1969, No. 46, eff. 10-1-59.

Chapter Ind 56

SCHOOLS AND OTHER PLACES OF INSTRUCTION

Ind 56.001 Scope	Ind 56.18 Auditoriums, gymnasiums and field houses
Ind 56.01 Maximum height	Ind 56.14 Seats, desks and aisles
Ind 56.02 Classes of construction	Ind 56.15 Heating plants
Ind 56.04 Subdivisions and fire stops	Ind 56.16 Sanitary facilities
Ind 56.05 Exterior wall openings	Ind 56.17 Lighting
Ind 56.06 Exits	Ind 56.18 Fire extinguishers
Ind 56.07 Required exit width	Ind 56.19 Fire alarms
Ind 56.08 Exit doors	Ind 56.20 Standpipes
Ind 56.09 Passageways	

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.

Notes: Also see requirements for classes of construction.

History: 1-2-56; r. Register, May, 1971, No. 185, eff. 6-1-71; cr. 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.

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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

1. Exception. For unlimited capacity, the fire protection of structural steel supporting the roof may be omitted for one-story buildings meeting type No. 1, 2 and 3 construction provided the building has no ground or basement floors. Heavy timber columns and roof framing may be substituted for structural steel framing. The roof decking shall be of noncombustible construction meeting the fire-resistive ratings of Table 51.03-A.

(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. 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.

History: 1-2-56; r. and rec. Register, May, 1971, No. 186, eff. 6-1-71; am. (1) and (2) and r. and rec. (3), Register, June, 1972, No. 198, eff. 1-1-73; cr. (4), Register, September, 1973, No. 218, eff. 10-1-73; r. and rec. (4) (a) 1., Register, May, 1974, No. 221, eff. 8-1-74.

Ind 56.03 History: 1-2-56; am. Register, February, 1971, No. 182, eff. 7-1-71; r. Register, May, 1971, No. 186, 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 rec. eff. 8-1-71 and exp. 1-1-72; 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."

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(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: 1-2-55; am. Register, January, 1961, No. 61, eff. 2-1-61; r. and rec., Register, May, 1971, No. 186, eff. 6-1-71; r. and rec., Register, September, 1973, No. 213, eff. 10-1-73.

Ind 56.06 Exits. (1) **TOTAL NUMBER OF EXITS.** The total number of exits from each floor level and each building shall be determined on the basis of total aggregate exit width and distances to exit. Each building and each floor level shall be provided with at least 2 exits.

(2) **TYPE OF EXITS.** At least 2 exits from all floor levels shall lead directly to grade through standard exit doors, stairs, interior enclosed stairs, smokeproof stair towers, fire-rated exit corridors, passageways, or ramps. One-half of the remaining required exits may be horizontal exits or fire escapes. Fire escapes are prohibited as required exits in pre-school, elementary, middle, and high schools. In no case will fire escapes be permitted above the second story.

(a) **Standard exit doors.** Standard exit doors shall be provided in accordance with the requirements of sections Ind 51.15 and Ind 56.08.

(b) **Exit stairs.** Stairs shall conform to the requirements of section Ind 51.16, except that the stairs shall have a uniform rise of not more than 7½ inches, measured from tread to tread, and a uniform tread of not less than 10 inches, measured from nosing to nosing of tread. Handrails shall be provided on both sides. All stairs serving basements shall be in accordance with the requirements of subsection Ind 51.02 (11). No closets or rooms may be placed under a stairway or landing.

(c) **Interior enclosed stairs and smokeproof stair towers.** Interior stairs and smokeproof stair towers shall be constructed in accordance with the requirements of sections Ind 51.17 and Ind 51.18.

(d) **Fire-rated exit corridors.** All rated exit corridors required to satisfy limitations on exit distance shall be of not less than one-hour fire-resistive construction, unless the fire-resistive ratings indicated in Table 51.03-A for required exit corridor enclosures are more restrictive.

(e) **Exit ramps.** The minimum width of exit ramps shall be determined in accordance with the requirements of section Ind 56.07. The minimum width shall be not less than 3 feet 8 inches. Exit ramps, other than those required for the physically disabled, shall have a slope not exceeding 1:8. Ramp slopes exceeding 1:12 shall be provided with handrails. Ramps shall be provided with a slip-resistant finish. Ramps shall be provided from areas noted under subsection Ind 56.06 (3) (c) involving a change of elevation between floor levels or platforms not exceeding 3 feet.

(f) *Fire escapes.* Fire escapes shall be constructed in accordance with the requirements of section Ind 51.20.

(g) *Horizontal exits.* Horizontal exits shall be constructed in accordance with the requirements of section Ind 51.19 and shall be of at least 4-hour rated construction.

(3) **LOCATION OF EXITS.** (a) *Exit distance.* Travel distance to an exterior exit door, a required fire-resistive rated exit corridor, interior enclosed stairs, smokeproof stair tower, horizontal exit, or fire escape, from any point in a building accessible to the public, shall not exceed 150 feet. Building service areas, including pipe chases and tunnels, catwalks, ducts or similar spaces not accessible to the public, shall not exceed 300 feet from an exit.

(b) *Distribution of exits.* All exits shall be distributed to provide the best possible means of egress. The exits shall be located so that in case any exit is blocked at any point some other exit is accessible through public passageways at all times. Locked security gates and doors shall not be placed so as to block required exit passageways or create dead-end corridors.

(c) *Auditorium, gymnasium and field house exits.* This rule shall apply only to auditoriums, gymnasiums and field houses which have a capacity exceeding 600 persons. One-half of the required exits shall discharge directly to a street(s), alley(s) or open court(s) connected with a street(s), unless a 2-hour rated exit corridor(s) is provided, wide enough to accommodate one-half of the occupants, which extends from the interior wall of the auditorium, gymnasium or field house to an exterior exit. The remaining required exits shall discharge directly to the exterior or to a public passageway which permits 2 directions of travel to the exits at the exterior of the building. The exiting shall be direct and unobstructed.

(4) **CLASSROOM EXITS.** (a) *Exits serving 50 persons or less.* At least one exit shall be provided from all rooms serving a capacity of 50 persons or less. The exit shall discharge directly to the exterior of the building or to a public passageway which permits 2 directions of travel to the exterior.

(b) *Exits serving 51-100 persons.* At least 2 exits shall be provided from all rooms serving a capacity of 51-100 persons. One exit shall discharge directly to the exterior of the building or to a public passageway which permits 2 directions of travel to the exterior. One exit may discharge through an adjacent room provided a clear passageway is maintained from the connecting door to a required exit(s) serving the adjacent room.

(c) *Exits serving more than 100 persons.* At least 2 exits shall be provided from all rooms serving a capacity of more than 100 persons. The exits shall discharge directly to grade or to a public passageway which permits 2 directions of travel to the exterior.

(5) **WIDTH OF EXITS.** The total required exit width shall be provided in accordance with the requirements of section Ind 56.07.

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(6) **EXIT LIGHTS.** All required exits indicated in section Ind 56.06 (2), and exits from areas serving a capacity of more than 100 persons, shall be identified by an approved exit light. Directional exit lights shall be provided to direct occupants to an exit. Exit lights and directional exit lights shall be in accordance with the requirements of section Ind 51.15 (5).

History: 1-2-56; am. (1), cr. (1) (a), Register, September, 1959, No. 46, eff. 10-1-59; am. Register, January, 1961, No. 61, eff. 2-1-61; r. and rec. (1) (a), renam. (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; am. (1) (a) 2., Register, December, 1974, No. 233, eff. 1-1-75, r. and rec., Register, December, 1976, No. 240, eff. 1-1-76; and (2), intro. and cr. (2) (c), Register, December, 1976, No. 240, eff. 1-1-77.

Ind 56.07 Required exit width. (1) The total required exit width from a building level shall be in accordance with the requirements of sections Ind 51.15 (6) and Ind 51.16 (3).

(2) 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 paragraph (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.

	Minimum Square Feet Per Occupant
1. Academic classrooms - Regular	20
2. Administrative and office space	70
3. Arts, crafts, drafting	30
4. Bleachers (one seat per 18 inches of bench length)	
5. Gymnasiums, field houses, auditoriums, theatres, lecture rooms (fixed seating)	6
6. Gymnasiums, field houses, multipurpose rooms, cafeterias, study halls, commons and other level floor areas with nonfixed individual seating	10
7. Home economics, business education	30
8. Individual arts-vocational shop	50
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	50
13. Special education	
a. Mentally retarded, physically handicapped, etc.	26

History: 1-2-56; r. and rec. (8), Register, May, 1971, No. 185, eff. 6-1-71; am. (1), Register, June, 1972, No. 188, eff. 1-1-73; r. and rec., Register, September, 1973, No. 213, eff. 10-1-73; r. and rec. (1), r. (2), (3) and (4), renam. (5) to be (2), Register, December, 1974, No. 233, eff. 1-1-75.

Ind 56.08 Exit doors. (1) **STANDARD EXIT DOORS.** Exit doors shall comply with the requirements of 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.

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(2) **CLASSROOM EXIT DOORS.** (a) *Doors serving 50 persons or less.* Classroom doors serving a capacity of 50 persons or less shall be not less than 3 feet 0 inches in width. The doors may swing into the classroom.

(b) *Doors serving a capacity of 51-100 persons.* Classroom doors serving a capacity of 51 to 100 persons shall be not less than 3 feet 0 inches in width and shall swing outward toward the means of egress.

(c) *Doors serving more than 100 persons.* Classroom doors serving a capacity of more than 100 persons shall be standard exit doors and shall swing outward toward the means of egress.

History: 1-2-56; r. and rec. Register, December, 1975, No. 240, eff. 1-1-76.

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 renam. (2) to be (1), 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 movable scenery, it shall comply with sections Ind 55.21 to 55.24 inclusive.

Note: 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 farthest projection of the back of one seat and the front of seat immediately behind.

Note: 1. Above measurements are relative to the furthest projection when seat is in its normal unseated position such as self-riking seat. 2. See allowable occupant space capacity under section Ind 56.07 (2) (b). 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 farthest projection of the back of one seat and the front of seat immediately behind.

Note: For measurements see "Note No. 1" under Ind 56.13 (2) (a).

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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 $\frac{1}{4}$ 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: 1-2-56; r. and rec., Register, May, 1971, No. 186, 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 instructional 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) **TOILET ROOMS.** Separate toilet rooms for each sex shall be provided for all occupancies included under the scope of this chapter. The toilet rooms shall be completely enclosed and arranged to ensure privacy, except that in elementary schools (kindergarten through grade 8) the doors to the toilet rooms

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may be eliminated if the entrance to the toilet room is located in the wall of a public corridor.

(2) **SANITARY FIXTURES.** 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-6	7-12	Post High School	Large Group Occupancy Areas	Administrative Areas
Water Closets (W)	35	50	100	200	10
Water Closets (M)	75	100	200	300	15
Urinals	85	60	100	150	40
Lavatories	75	100	100	150	15
Drinking Fountains	1 per 6,000 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: 1-2-58; am. (2), (3), (4) and (4) (a), Register, September, 1958, 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. 185, eff. 6-1-71; am. (1) (Intro.), r. and rec. (1) (a), cr. (1) (b), Register, September, 1973, No. 213, eff. 10-1-73; resub. (1) to be (2) and cr. (1), Register, December, 1976, No. 252, eff. 1-1-77.

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. All electrical work shall be installed to conform to the requirements of the Wisconsin State Electrical Code.

History: 1-2-56; am. Register, January, 1961, No. 61, eff. 2-1-61; cr. (9), Register, November, 1967, No. 25, eff. 12-1-67; am. (3) (a), Register, February, 1972, No. 183, eff. 7-1-71; r. and rec. Register, May, 1971, No. 186, 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 one 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; am. Register, December, 1976, No. 252, eff. 1-1-77.

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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: 1-2-66; am. Register, May, 1971, No. 186, eff. 6-1-71.

Ind 56.20 Standpipes. (1) **FIRE DEPARTMENT STANDPIPES.** Fire department standpipes shall be provided in all buildings exceeding 60 feet in height.

(2) **FIRST-AID STANDPIPES.** First-aid standpipes shall be provided in all buildings 3 stories or more in height, unless an approved automatic sprinkler system is installed.

History: Cr. Register, December, 1976, No. 262, eff. 1-1-77.

Chapter Ind 57

APARTMENT BUILDINGS, HOTELS AND PLACES OF DETENTION

Ind 57.001 Scope	Ind 57.12 Enclosure of stairways and shafts
Ind 57.01 Class of construction	Ind 57.13 Sanitary facilities
Ind 57.02 First floor fire-resistive	Ind 57.15 Repairs
Ind 57.03 Garage and business separation	Ind 57.16 Cleanliness
Ind 57.04 Corridor and dividing partitions, 3 story places of abode	Ind 57.17 Size of rooms
Ind 57.05 Court walls	Ind 57.18 Habitable rooms-floors below grade
Ind 57.06 Yards	Ind 57.19 Windows
Ind 57.07 Number, location and type of exits	Ind 57.20 Isolation of fire hazards
Ind 57.08 Required exit width	Ind 57.21 Standpipes
Ind 57.09 Exit doors	Ind 57.22 Fire alarms
Ind 57.10 Passageways	Ind 57.24 Directions for escape
Ind 57.11 Lighting of exits	Ind 57.25 Row house

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 57.01 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 as in section Ind 51.03.

(2) All 3-story places of abode, other than hospitals and places of detention, shall be at least type No. 3 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, 1969, No. 45, eff. 10-1-59; am. (1), (2) and (3), Register, June, 1972, No. 196, 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. 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 51.043. All stairways and shafts 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 51.043, 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 67 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; am. (1), Register, December, 1975, No. 240, eff. 1-1-76.

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 buildings having more than 8 habitable rooms on each floor shall be divided into groups of not more than 8 habitable rooms each, with

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partitions of not less than one-hour fire-resistive construction as specified in section Ind 51.04.

(3) Corridor and specified dividing partitions shall be provided with 20-minute fire door assemblies, or equivalent.

Note: See Ind 51.047 for standards of 20-minute door assemblies or equivalent.

History: 1-2-66; am. (1), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (1) eff. 8-1-71 and exp. 1-1-72; cr. (1) eff. 1-1-72; Register, July, 1971, No. 187; r. and rec. Register, September, 1973, No. 213, eff. 10-1-78; am. (3), Register, December, 1974, No. 228, eff. 1-1-76.

Ind 57.05 Court walls. For walls of courts and similar interior shafts for light and air, see table 51.03-A.

History: 1-2-66; 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; 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 50 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 40 feet above grade if they are placed against blank walls. Every building

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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 doors opening into it from the office or court house section of the building.

History: 1-2-58; r. and rec. (1), Register, December, 1970, No. 180, eff. 1-1-71; am. (4), Register, February, 1971, No. 182, eff. 7-1-71; r. and rec. (4) eff. 8-1-71 and exp. 1-1-72; am. (4) eff. 1-1-72; Register, July, 1971, No. 187; am. (1) and (2), Register, June, 1972, No. 198, eff. 1-1-73; am. (1) (intro.), (2) and (4), Register, September, 1973, No. 213, eff. 10-1-73.

Ind 57.08 Required exit width. The total required exit width from a building level shall be in accordance with the requirements of sections Ind 51.15 (6) and Ind 51.16 (3).

History: 1-2-58; am. Register, December, 1974, No. 228, eff. 1-1-75.

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 shaft, dumbwaiter shaft, clothes chute, waste-paper chute, pipe shafts and other similar vertical shafts in buildings more than 2 stories in height shall be enclosed with at least 2-hour fire-resistive partitions, as described in section Ind 51.043.

Note: See section Ind 57.03 for stairs and shafts leading to garage areas.

History: 1-2-56; am. Register, February, 1971, No. 189, eff. 7-1-71; r. and rec. off. 8-1-71 and exp. 1-1-72; cr. off. 1-1-72, Register, July, 1971, No. 187; r. and rec. (1), Register, June, 1972, No. 198, eff. 1-1-78; am. (4), Register, December, 1976, No. 240, eff. 1-1-76.

Ind 57.13 Sanitary facilities. (1) **TOILET ROOMS.** Every building included under the scope of this chapter shall be provided with separate toilet rooms for each sex, except that a common toilet room may be provided in individual living or sleeping units.

(2) **SANITARY FIXTURES.** The number of sanitary fixtures required for each sex shall be determined in accordance with the ratios established in Table 57.13.

(3) **EMPLOYEES.** Sanitary facilities for employees who do not sleep in the building shall be provided in accordance with the requirements of Table 54.12, unless the employees have access to the facilities provided for the residents.

(4) **GENERAL PUBLIC.** Sanitary facilities for the general public shall be provided in accordance with the requirements of Table 54.12, unless the general public has access to the facilities provided for the residents.

(5) **KITCHEN SINK.** One kitchen sink, equipped with hot and cold running water, shall be provided in living units equipped for food preparation.

Note: See chapter JJ 24 — general and special hospitals, and chapter JJ 22 — nursing homes, rules of the department of health and social services, for special requirements and locations for water closets, lavatories and bathing facilities.

History: 1-2-56; am. (1), (2) and (3), Register, June, 1946, No. 6, eff. 7-1-46; cr. (4), Register, July, 1967, No. 139, eff. 8-1-67; r. and rec., Register, December, 1970, No. 180, eff. 1-1-71; r. and rec. Register, December, 1976, No. 262, eff. 1-1-77.

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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TABLE 57.13

Type of Occupancy	Type of Fixture				
	Water Closets (WC)		Urinals (U)	Lavatories (L)	Bathrooms or Showers
	Males (M)	Females (F)	Males (M)		
Occupancies having individual unit toilet rooms, such as hotels, motels, apartments, row houses, town houses, condominiums	One (WC) for each living unit		0	One (L) for each living unit	One for each living unit
Occupancies requiring communal use of sanitary facilities, such as dormitories, camps, rooming houses, jails, hospitals, nursing homes, foster care homes	One (WC) for each 10 (M), or fraction	One (WC) for each 10 (F), or fraction	Urinals may be substituted for up to 2/3 of the required no. of (WC)	One (L) for each 10 persons	One for each 20 persons
					One (DP) for each 100 persons

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: 1-2-56; r. and rec. Register, June, 1967, No. 168, eff. 7-1-67; r. and rec. (2), Register, July, 1967, No. 132, eff. 8-1-67; r. (2), Register, December, 1970, No. 180, eff. 1-1-71; am. Register, September, 1973, No. 213, eff. 10-1-78.

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 arway.

(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 arway.

*See Appendix A for further explanatory material.

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(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 64.07.

(b) Have, when used as a required means of egress, exits complying with sections Ind 51.16 and 52.21.

(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 areaway) 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 #1: Surface and subsoil draining systems for areaways and foundation walls are regulated under the requirements of the Wis. Adm. Plumbing Code Chapter 11.82, administered by the department of health and social services.

Note #2: See Ind 50.07 (2) "Note #3" for reference to flood plain 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 #1: The inside design conditions for cooling or dehumidification will be accepted on the basis of a dry bulb temperature of 76° F and a relative humidity not greater than 55%.

Note #2: See Ind 50.12 (1) (c) 2 "Note" for the acceptance of nationally recognized association methods and standards as a basis for calculations and design data.

*See Appendix A for further explanatory material.

Note #3: The standards for winter heating are found in chapter Ind 64 of this code.

History: 1-2-56; r. and recr., 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 64.07.

History: 1-2-56; r. and recr. Register, September, 1950, No. 46, eff. 10-1-50; r. and recr. Register, June, 1967, No. 138, eff. 7-1-67; r. and recr. (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 breeching, 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 61.04. All openings shall be protected by self-closing fire-resistive doors as specified in section Ind 61.047.

(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 61.04, or better, except as otherwise provided in this section.

(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 61.04, 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 61.04, 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 61.04, 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.

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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, 1959, No. 45, eff. 10-1-59; am. Register, February, 1971, eff. 7-1-71; r. and rec. eff. 8-1-71 and sup. 1-1-72; ex. eff. 1-1-72. Register, July, 1971, No. 187; am. (5), Register, September, 1973, No. 213, eff. 10-1-73.

Ind 57.21 Standpipes. (1) **FIRE DEPARTMENT STANDPIPES.** Fire department standpipes shall be provided in all buildings exceeding 60 feet in height.

(2) **FIRST-AID STANDPIPES.** (a) *Institutional occupancies.* First-aid standpipes shall be provided in all buildings used as hospitals, homes for the aged, nursing homes, asylums, places of detention, and buildings with similar uses, unless an approved automatic sprinkler system is installed.

(b) *Residential occupancies.* First-aid standpipes shall be provided in all apartment buildings, rooming houses, hotels, motels, and buildings with similar uses, 3 stories or more in height which accommodate more than 20 occupants, unless an approved automatic sprinkler system is installed.

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

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 chimes or other approved sounding devices shall be used when within hearing distance of the patients. Visual attention compelling 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.

(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 Bells. History: 1-2-56; r. Register, December, 1975, No. 240, eff. 1-1-76.

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. 218, eff. 10-1-73.

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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 attic access as specified in section Ind 51.02 (18) (a). The other provisions of Ind 51.02 (18) (b) need not be complied with.

History: 1-2-50; am. (1) and (2) (a), Register, September, 1973, No. 213, eff. 10-1-73; am. (2) (d), Register, December, 1976, No. 240, eff. 1-1-76.

Chapter Ind 60

CHILD DAY CARE FACILITIES

Ind 60.001 Scope	Ind 60.21 Exiting
Ind 60.01 Definitions	Ind 60.22 Passageways
Part I	Ind 60.23 Stair and shaft enclosure
General Requirements	Ind 60.24 Fire extinguishers
Ind 60.10 Occupancy separation	Ind 60.25 Hazardous areas
Ind 60.11 Capacity of buildings	Part III
Ind 60.12 Doors	Day Care Centers Serving 9 or More Children
Ind 60.13 Windows and outside openings	Ind 60.30 Class of construction
Ind 60.14 Access to attic and roof	Ind 60.31 Exiting
Ind 60.15 Sanitary facilities	Ind 60.32 Required exit width
Ind 60.16 Electrical work	Ind 60.33 Passageways
Ind 60.17 Illumination	Ind 60.34 Stair and shaft enclosure
Ind 60.18 Heating and ventilating	Ind 60.35 Fire extinguishers
Ind 60.19 Opening features	Ind 60.36 Fire alarm systems
Part II	Ind 60.37 Hazardous areas
Day Care Centers Serving 4 to 8 Children	Ind 60.38 Exit and emergency lighting
Ind 60.20 Class of construction	

Ind 60.001 Scope. The requirements of this chapter shall apply to all public and private day care centers accommodating children, including all buildings, or parts of buildings, used as child day care facilities. Chapter Ind 60 shall not apply to public schools defined in section 115.01 (1), Wis. Stats., or private schools defined in section 121.51 (3), Wis. Stats., or to short-time programs (i.e., Boy Scouts, Girl Scouts, Sunday schools, etc.).

(1) Part I of this chapter is general requirements applicable to all child day care facilities within the scope of chapter Ind 60.

(2) Part II of this chapter is applicable to day care centers serving 4 to 8 children.

(3) Part III of this chapter is applicable to day care centers serving 9 or more children.

(4) Chapters Ind 50 through Ind 58 are applicable for general and structural design requirements.

Note: All references to code chapters and sections prefixed by the letters Ind refer to rules of the department of industry, labor and human relations published in the Wisconsin Administrative Code; i.e., Chapters Ind 50 and Ind 58 are a part of Wisconsin Administrative Code Chapters Ind 60-64-Building and Heating, Ventilating and Air Conditioning Code.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.01 Definitions. (1) **DAY CARE CENTER.** Any place which receives at any one time for compensation 4 or more children under the age of 7 years, for care and supervision, for less than 24 hours a day for more than 10 days a month, without the attendance of a parent, relative or legal guardian.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

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Part I GENERAL REQUIREMENTS

Ind 60.10 Occupancy separation. (1) Where centers are located in conjunction with an assembly hall or a hazardous occupancy, the requirements of sections Ind 54.50 (2) and Ind 55.05, respectively, shall be applicable. If there is no requirement, a one-hour fire-resistive separation shall be provided.

(a) Day care facilities in a church or school building need not comply with the requirements of this section provided all other occupancy requirements are complied with; i.e., the fire wall requirement may be waived if more stringent requirements of chapter Ind 55 or chapter Ind 56 are complied with.

(b) Private garages attached to day care centers serving 4-8 children shall be separated by a one-hour fire-resistive wall.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.11 Capacity of buildings. (1) The occupant load shall be the maximum number of children intended to occupy that floor, but not more than one child per 35 square feet of net floor area. Licensing limitations of the department of health and social services may supersede this requirement.

Note: The minimum staff-to-child ratio shall meet the requirements of ISWS-CV 40.12 of the department of health and social services, which is as follows:

Age	Minimum number of staff to children
0-1 years	1 to 3 children
1-2 years	1 to 4 children
2-2½ years	1 to 6 children
2½-3 years	1 to 8 children
3-4 years	1 to 10 children
4-5 years	1 to 12 children
5 years or over	1 to 16 children

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.12 Doors. (1) All exit doors, and all doors along the path of travel to an exit, shall meet the requirements of section Ind 51.15 with the following exceptions:

(a) The width of all required exit doors may be reduced to 3 feet.

(b) The width of all required exit doors may be reduced to 2 feet 8 inches in existing buildings not accommodating more than 8 children.

(c) All such doors used by not more than 25 persons need not swing outward.

(2) Every closet door latch shall be such that children can open the door from inside the closet.

(3) Every toilet room door lock shall be designed to permit opening of the locked door from the outside in an emergency, and the opening device shall be readily accessible to the staff.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

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Ind 60.13 Windows and outside openings. (1) All classrooms and areas used for instruction, study or sleeping purposes shall be provided with vision panels or windows facing directly upon a street, alley, or open court. The vision panels or windows shall be glazed with glass or other approved material.

(2) The windows or vision panels shall have an aggregate minimum glass area of 10% of the floor area. The minimum openable area of the doors and windows shall be equal to 5% of the floor area of the room served.

(3) See section Ind 60.18 (2) for exception.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.14 Access to attic and roof. (1) Every 2-story building shall have a permanent means of access to the attic space from inside the building. Every building more than 2 stories in height shall have a permanent means of access to the roof. Where a scuttle opening is provided, the opening shall be not less than 20 x 30 inches.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.15 Sanitary facilities. (1) *Toilet rooms.* Separate toilet rooms for each sex shall be provided in day care centers serving 9 or more children. One toilet room, shared in common by both sexes, may be provided in day care centers serving not more than 8 children. The staff and the children may use the same toilet rooms. If separate toilet rooms are provided for the staff, the toilet rooms for the children need not be provided with water closet compartments and the doors to the toilet rooms may be eliminated.

(2) *Sanitary fixtures.* One water closet and one lavatory for the first 10 children and one water closet and one lavatory for every 15 children in excess of 10 shall be provided. Urinals may be substituted for water closets provided the water closets are not reduced to less than two-thirds of the required number of water closets. Separate fixtures for the staff need not be provided.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74; r. and rec. Register, December, 1976, No. 262, eff. 1-1-77.

Ind 60.16 Electrical work. (1) The electrical systems in existing buildings proposed to be used as day care centers shall conform to the Wisconsin state electrical code.

(2) Special protective receptacle covers shall be installed in all areas occupied by children.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.17 Illumination. (1) The illumination for occupied areas, other than sleeping areas, shall have a minimum intensity of 20 foot-candles at a horizontal plane 24 inches above the floor. All other spaces shall meet the requirements of section Ind 19.04, Wis. Adm. Code chapter Ind 19, Illumination Code.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

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Ind 60.18 Heating and ventilating. (1) The heating system shall be capable of maintaining an inside temperature of not less than 67° F.

(2) Fresh air at the rate of 5 cubic feet per minute per occupant shall be provided for centers that do not comply with the requirements of Ind 60.13 (2).

History: Cr. Register, October, 1974, No. 228, eff. 11-1-74.

Ind 60.19 Operating features. (1) Fire prevention inspections shall be conducted monthly. A copy of the latest completed inspection form shall be posted in a conspicuous place in the day care facility.

(2) A fire evacuation plan shall be practiced not less than once per month. Fire alarm and/or smoke detection systems shall be tested at weekly intervals. It is recommended that fire safety be a part of the educational program of the center.

(3) Furnishings, decorations, or other objects shall not be so placed as to obstruct exits, access thereto, egress therefrom, or visibility thereof.

(4)* Flammable and combustible liquids shall be stored in areas accessible only to designated individuals and as recommended in NFPA standard No. 30, Flammable and Combustible Liquids Code.

Note: NFPA standard No. 30 is not a mandatory standard.

History: Cr. Register, October, 1974, No. 228, eff. 11-1-74.

Part II

DAY CARE CENTERS SERVING 4 TO 8 CHILDREN

Ind 60.20 Class of construction. (1) Buildings which are 2 stories or less in height shall be constructed of wood frame unprotected type No. 3 construction, or better, as specified in section Ind 51.03.

(2) Buildings which are 3 stories in height shall be constructed of metal frame unprotected type No. 6 construction, or better, as specified in section Ind 51.03.

(3) Buildings which are more than 3 stories in height shall be constructed of fire-resistive type No. 1 or No. 2 construction, as specified in section Ind 51.03.

History: Cr. Register, October, 1974, No. 228, eff. 11-1-74.

Ind 60.21 Exiting. (1) Children under the age of 2½ years shall be restricted to the first floor, as determined in section Ind 51.02 (14), or to ground floors provided with 2 means of egress directly to grade.

(2) Each floor occupied by children shall have not less than 2 exits.

(3) The exits shall be located to provide the best possible means of egress.

*See Appendix A for further explanatory material.

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(4) Where the floor above exit discharge grade is used by children for sleeping purposes, one exit shall lead directly from the floor to the exterior.

(5) Travel distance from any point to an outside exit door or stair enclosure leading to the outside shall not exceed 75 feet. Travel distance may be increased to 125 feet when the building is provided with a sprinkler system in accordance with the requirements of section Ind 51.23.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.22 Passageways. (1) The minimum unobstructed passageway width shall not be less than 3 feet.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.23 Stair and shaft enclosure. (1) A self-closing door shall be provided at the stair between the basement or ground floor and the first floor.

(2) A self-closing door or smoke detector shall be provided at the stair between the first floor and the second floor when the second floor is used by the children for sleeping purposes. (This requirement does not apply to buildings which are provided with a fire alarm system as described in section Ind 51.24.)

(3) Stairs and shafts serving 3 or more floor levels shall comply with the requirements of section Ind 61.02 (11) and Table 51.03-A.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.24* Fire extinguishers. (1) A portable fire extinguisher suitable for Class B fires shall be provided for the kitchen and cooking area.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.25 Hazardous areas. (1) A boiler, furnace, or any area containing gas- or oil-fired units other than laundry or kitchen equipment shall be protected by one of the following methods:

(a) One-hour fire-resistive enclosure. The door in the enclosure shall be a 1½-inch thick, solid wood core door. Combustion air shall be provided in accordance with section Ind 64.09.

(b) Protected by a smoke detection system.

(2) Hazardous equipment in areas occupied by children shall be separated by one-hour fire-resistive partitions.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74; am. (1) (a), Register, December, 1975, No. 240, eff. 1-1-76.

*See Appendix A for further explanatory material

Part III
DAY CARE CENTERS SERVING 9 OR MORE CHILDREN

Ind 60.30 Class of construction. (1) Class of construction for day care centers shall comply with Table 60.30. Day care centers located in buildings of more than 4 stories shall be provided with one independent stairway serving the day care center only and restricted to the height indicated in Table 60.30.

TABLE 60.30

Type of Construction	Maximum Allowable Height (feet)	Maximum Allowable Number of Stories			
		1	2	3	4
Fire-resistant Type A No. 1 and Type B No. 2	85	X	X	X	X
Metal Frame Protected No. 3 and Heavy Timber No. 4	75	X	X	X	
Exterior Masonry No. 5	60	X	(c)	(a) & (b) or (c) & (d)	
Metal Frame Unprotected No. 6	50	X	(c)	(a)	
Wood Frame Protected No. 7	40	X	X		
Wood Frame Unprotected No. 8	35	X	(c)		

X = permitted.

(a) All floors and supporting members shall have a one-hour fire-resistant rating.

(b) The entire building shall be equipped with an automatic sprinkler system in accordance with section Ind 51.23.

(c) All ceilings shall be covered with ½-inch gypsum wallboard or equivalent.

(d) All floor systems shall be of noncombustible construction.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.31 Exiting. (1) Each floor shall have not less than 2 exits. All required exits shall lead directly, or through an enclosed stairway, to the outside.

(2) The exits shall be located to provide the best possible means of egress.

(3) Travel distance measured along safe passageways between:

(a) Any point in a sleeping room or suite and an exit access door of that room or suite shall not exceed 50 feet;

(b) Any room door intended as an exit access and an exit shall not exceed 50 feet;

(c) Any point in a room or suite and an exit shall not exceed 100 feet.

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(4) The travel distances for children under 2½ years of age in (3) above shall be reduced by 50%.

(6) The travel distances in (3) above may be increased by 50 feet in buildings completely equipped with an automatic sprinkler system. No increase in travel distance is permitted for children under the age of 2½ years.

(6) Children under the age of 2½ years shall be restricted to the first floor, as determined in section Ind 51.02 (14), or to ground floors provided with 2 means of egress directly to grade.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.32 Required exit width. The total required exit width from a building level shall be in accordance with the requirements of sections Ind 51.15 (6) and Ind 51.16 (3).

(2) 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.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74; r. and rec. Register, December, 1974, No. 228, eff. 1-1-75.

Ind 60.33 Passageways. (1) The minimum unobstructed width of corridors and passageways shall be determined in the same manner as specified for stairways and exits in section Ind 60.32. The minimum width shall be not less than 3 feet 8 inches.

(2) The minimum passageway width shall not be less than 3 feet in existing buildings proposed to be used as day care centers, provided the capacity of the day care center does not exceed 40 persons.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.34 Stair and shaft enclosure. (1) All stairs and vertical shafts serving 3 or more floor levels shall comply with section Ind 51.02 (11) and Table 51.03-A. All required stair enclosures must lead to the outside without interruptions.

(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. The door to such room shall be a self-closing, solid, flush type wood door, 1¼ inches in thickness, or better.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.35* Fire extinguishers. (1) Portable fire extinguishers suitable for Class B fires shall be installed in kitchens and cooking areas, and extinguishers suitable for Class A fires shall be installed throughout the remainder of the center.

*See Appendix A for further explanatory material.

TABLE 60.35

Basic Minimum Extinguisher Rating for Area Specified	Maximum Travel Distance to Extinguishers (feet)	Area to be Protected per Extinguisher (square feet)
1A	75	3,000 ^a
2A	75	6,000
3A	75	9,000
4A	75	11,250
6A	75	11,250

History: Cr. Register, October, 1974, No. 228, eff. 11-1-74.

Ind 60.36 Fire alarm systems. (1) Every building accommodating more than 20 children shall be provided with a fire alarm system complying with the requirements of section Ind 51.24.

(a)* Exception. Buildings used for other purposes prior to occupancy as a day care center shall be provided with an approved fire alarm system. The department will accept fire alarm systems complying with the requirements of NFPA standard No. 72A, Local Protective Signaling Systems, or portable alarms approved by the department.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.37 Hazardous areas. (1) Hazardous areas, including boiler or furnace rooms, fuel storage, maintenance shops, woodworking shops, painting areas, and laundries having gas- or oil-fired units with a maximum aggregate input of 37,000 Btu or more, shall be separated from other parts of the building by construction having not less than a one-hour fire-resistive rating. All openings shall be protected by ¾-hour self-closing doors in buildings of 3 stories or less in height. Enclosures shall have a 2-hour fire-resistive rating with 1½-hour "B" label doors in buildings more than 3 stories in height. If the hazard is severe, automatic sprinklers shall be provided in addition to the fire-resistive enclosure when deemed necessary by the department.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

Ind 60.38 Exit and emergency lighting. (1) All required exit doors and exit stairways in day care centers 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 high.

(2) All illuminated exit signs shall be supplied from an emergency source recognized by Wis. Adm. Code chapter E 700, Vol. 2, Wisconsin State Electrical Code.

History: Cr. Register, October, 1974, No. 226, eff. 11-1-74.

*See Appendix A for further explanatory material.

Chapter Ind 64

HEATING, VENTILATING AND AIR CONDITIONING

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Note: Chapter Ind 58 as it existed on December 31, 1975 was repealed and a new chapter Ind 64 was created effective January 1, 1976.

PART I—SCOPE

Ind 64.01 Scope. All heating, ventilating and air conditioning systems shall be designed, installed, maintained and operated so as to provide the service and results required within the provisions of this chapter. The minimum requirements established in each part of this chapter shall be complied with as they apply to that specific public

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building or place of employment. The administrative rules pertaining to energy conservation may be applied retroactively to existing buildings.

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.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76; am. Register, December, 1976, No. 262, eff. 1-1-77.

Ind 64.02 Approval of drawings and specifications. All drawings and specifications shall be submitted to the department in accordance with the provisions of sections Ind 50.07 and Ind 50.12.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76; am. Register, December, 1976, No. 252, eff. 1-1-77.

PART II—DESIGN REQUIREMENTS

Ind 64.03 Design. (1) **BUILDING HEAT LOSS.** The total building heat loss shall be equal to the sum of the building transmission losses and infiltration and/or ventilation losses, whichever are greater.

(2) **HEATING SYSTEM DESIGN.** The heating system shall be designed on the basis of the losses determined by (a) or (b) below, whichever is greater. Credit will be given for internal heat gains against the total design loss of the heating system, provided the heat gains are demonstrated by the designer.

(a) *Occupied periods.* The heating system shall be designed to equal building transmission losses and infiltration and/or ventilation losses during occupied periods; or

(b) *Unoccupied periods.* The heating system shall be designed to equal building transmission losses and infiltration losses during unoccupied periods.

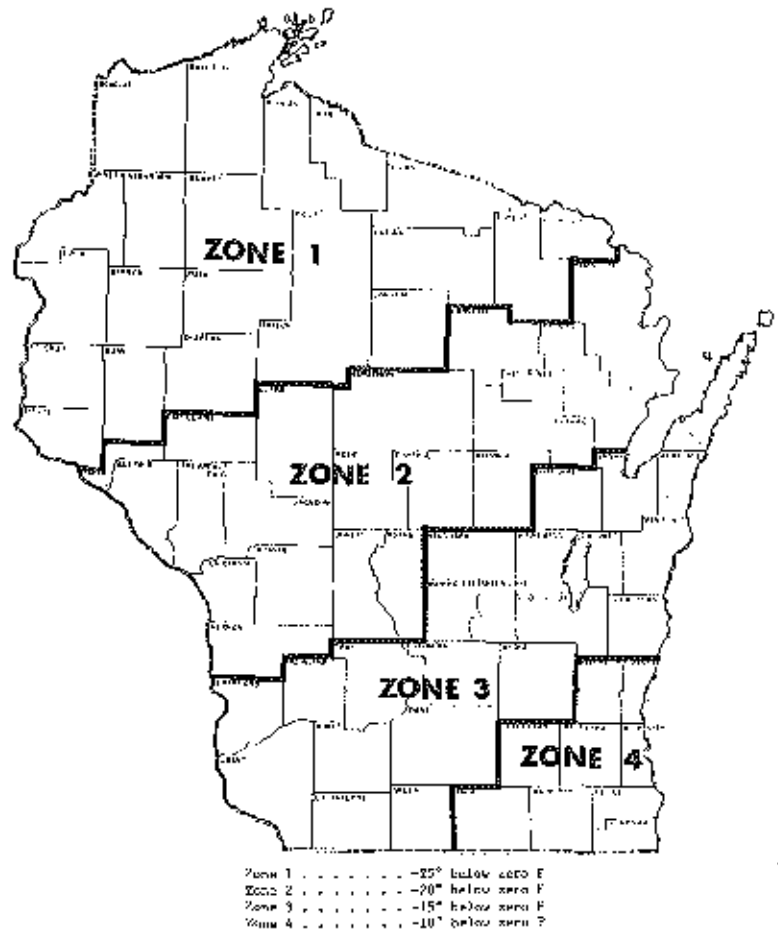
(3) **CAPACITY AND ARRANGEMENT.** The calculated capacity and the arrangement of all installations for required heating and ventilating shall be based upon simultaneous service to all parts of the building unless otherwise exempted by this code.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76.

Ind 64.04 Outside temperature design conditions. In the accompanying map, the state of Wisconsin has been divided into 4 zones. The maximum heat losses for a heating system shall be calculated on the basis of the outdoor temperatures indicated on the map with reference to location of the project.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76.

MAP OF WISCONSIN SHOWING DESIGN TEMPERATURE ZONES



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Ind 64.05 Inside design temperatures and ventilation requirements. (1) **INSIDE DESIGN TEMPERATURES.** The heating system shall be designed to maintain a temperature of not less than that shown in Table 1 and must be operated at not less than that temperature during occupied periods.

(a) *Spot heating.* Spot heating may be used to heat individual fixed work stations in large industrial buildings where it is impractical to provide heat to the entire space as described in (1) above, provided the inside design temperature at the fixed work station is at least 60° F.

(2) **VENTILATION REQUIREMENTS.** The ventilating system shall be designed, maintained and operated to accomplish the required ventilation indicated in Table 1.

(a) *Outdoor air requirement waived.* If a mechanical air supply system is provided and the requirement for outdoor air determined in accordance with Table 1 is less than 5% of the code required air movement of 6 air changes per hour, the requirement for outdoor air may be eliminated.

(b) *Outdoor air requirement and percent of openings waived.* The requirement for outdoor air or percent of openings may be omitted in large volume spaces if 5,000 cubic feet of air per occupant is provided.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76; cr. (1) (a), (2) (a) and (b), Register, December, 1976, No. 262, eff. 1-1-77.

Ind 64.06 Mechanical ventilation systems. (1) **DEFINITION.** Mechanical ventilation is the process of supplying a mixture of tempered outside air and/or simultaneously removing contaminated air to the outside by power-driven fans or blowers.

(2) **DESIGN.** Mechanical ventilation systems shall be designed to supply a continuous source of outside air to all occupied areas during occupancy. Exhaust ventilation in equal volume shall be maintained simultaneously.

(3) **AIR MOVEMENT.** The air movement may be based on actual room height or up to 10 feet from the floor level of the room in question. The volume above 10 feet, in rooms which are more than 10 feet in height, need not be considered in the air change requirement if the required air change is designed to occur in the lower 10 feet of the occupied space.

(a) *Six air changes per hour.* The total air movement for all occupancies shall be at least 6 air changes per hour unless otherwise specified in this code.

(b) *Less than 6 air changes per hour.* An air movement of less than 6 air changes per hour will be permitted where mechanical cooling (air conditioning) is provided and the heat gain requirement for the space has been satisfied.

(c) *Air movement requirement waived.* The air movement requirement for 6 air changes per hour may be omitted in spot heating applications. The air movement requirement may also be omitted in

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buildings containing large volume spaces of at least 5,000 cubic feet of air per occupant and where the requirement for outside air is waived in accordance with section Ind 64.05.

(4) **AIR DISTRIBUTION.** An adequate number of air supply, return and exhaust outlets or grilles shall be provided to insure a uniform distribution of air.

(5) **RECIRCULATION AND TRANSFER OF AIR.** (a) *Recirculation.* No air contaminated by any source other than human occupancy shall be recirculated, except within the same ventilation classification.

(b) *Transfer.* Air in a volume equal to the outside air required for a room may be transferred through a corridor and exhausted through a locker room, toilet room, kitchen, janitor closet or a similar area. Air shall not be transferred through elevator shafts and stairwells where doors are required at any floor level.

(6) **DIVERSIFIED MECHANICAL SYSTEMS.** If the mechanical ventilation system is able to deliver required quantities of outside air to each area when needed, the department will recognize diversity and the system may be designed on the actual occupancy.

Note #1: This rule permits the opening of outside air intakes in schools, offices and retail establishments to be delayed one hour after initial occupancy and permits the closing of outside air openings one hour prior to the termination of the occupancy.

Note #2: See Ch. Ind 1000-2000, Wis. Safety & Health Code, for requirements for dust, fumes, vapors and gases.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76; renum. (2) to be (8), renum. 64.15 (2) to be (3), 64.15 (3) to be (4), cr. (3) (c) and (5), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.07 Natural ventilation system. (1) **OUTDOOR OPENINGS.** Outdoor openings used for natural ventilation shall be within 100 feet, or 5 times the least dimensional width of the occupied area, whichever is the least.

(a) *Outdoor openings located below grade.* Outdoor openings below grade will not be accepted unless there is a clear space outside of the opening having a width not less than 1½ 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 located from a property line.* 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 S1.03-B and section Ind 64.19.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76.

TABLE 1

Use or Occupancy	Minimum Inside Temp. (Deg. F)	Ventilation Classification ²	Ventilation Requirements ¹			Applicable Occupancy Code Section (and No.)
			Determination of No. of Persons ³ per Term ⁴	% of Openings ⁵	CFM/net sq. ft. Floor Area	
Factories, office and mercantile buildings						
Barber and beauty salons (where hair spray is used)	67	(b)	20	1	--	64.54
	67	(d)	20	--	--	64.18
Canning factories	68	(b)	75	1	--	64.54, 64.68
Conference rooms	67	(b)	3	3	--	64.54
Court rooms	67	(b)	6	3	--	64.54
Factories and machine shops	68	(b)	75	3	--	64.54
First aid rooms	67	(b)	6	3	--	64.54
Flammable liquids storage	NHR	(d)	--	--	--	64.18
Furniture and boiler shops	50	(b)	75	3	--	64.11, 64.54
General houses:						
Chapel	67	(b)	6	5	--	64.54
Fitting room	67	(d)	--	--	2	64.54
Office	67	(b)	75	3	--	64.54
Places of worship, entertainment and recreation which accommodate less than 100 persons	4	(b)	1	1	--	64.54
Printing establishments	60	(b)	--	1	--	64.18, 64.54
Retail establishments (basement) (other floors)	65	(b)	40	1	--	64.54
(shopping malls)	65	(b)	40	1	--	64.54
Security vaults (occupied)	65	(d)	360	--	--	64.54
Warehouses	NHR	--	--	--	--	64.11, 64.54
Theaters and places of assembly (which accommodate more than 100 persons)						
Arenas and field houses (use seated areas)	60	(a)	6	1	--	64.55
Astories (drill halls)	55	(a)	30	--	--	64.55
Assembly halls (other than church)	67	(a)	6	--	--	64.55
Bowling alleys	67	(a)	25	--	--	Based on occupied areas
Cafeterias, dining areas, restaurants, billiard rooms	67	(a)	15	--	--	64.55
Churches and places of worship:						
Chapels	67	(b)	6	1	--	64.55 (3)
Dining and social rooms	67	(b)	15	1	--	64.55 (3)
Rear or auditorium	67	(b)	6	1	--	64.55 (3)
Sunday school rooms	67	(b)	20	1	--	64.55 (3)
Club rooms (seated) (unseated)	67	(a)	6	--	--	64.55
	67	(a)	15	--	--	64.55
Dance halls	67	(a)	15	--	--	64.55
Lodge halls	65	(a)	15	--	--	64.55
Roller and ice skating rinks (indoor) (ice skating)	50	(a)	15	--	--	64.55
	NHR	(d)	--	--	--	64.18
Taverns	67	(a)	20	--	--	64.55
Tennis courts (indoor)	55	(a)	--	--	--	64.55
Theaters	67	(a)	6	--	--	64.55
Lobbies	65	(a)	15	--	--	64.55
Lounge rooms	67	(a)	15	--	--	64.55
Motion picture booths	60	(a) or (c)	--	--	2	64.55 (3)
Hospitals and nursing homes						
Autopsy rooms	60	(d)	--	--	2	64.57
Bathrooms, toilet rooms	75	(d)	--	--	2 or 60 CFM/TF	64.57, 64.65
Day rooms (living, dining and recreational areas)	75	(b)	15	5	--	64.57
Delivery rooms	70	(b)	--	5	--	64.57
Laboratories (general)	67	(b)	--	--	--	64.18
Laundries	50	(c)	--	--	2	64.65
Nurses stations	75	(b)	--	5	--	64.57
Operating rooms	70	(a)	--	--	--	64.57
Patient rooms	75	(b)	--	5	--	64.57
Recovery, isolation rooms, procedure	75	(b)	--	5	--	64.57
Storage rooms for flammable anesthetics	60	(c)	--	--	2	64.18, 64.57
Storage rooms for bedpans, soiled linens, soiled utility, and sterilizing equipment rooms	60	(d)	--	--	2	64.57
Therapy (physical and hydrotherapy)	75	(b)	--	5	--	64.57

CA = Cuckling appliances.

LF = Linoleum floor.

NHR = No minimum requirements.

TF = Toilet facilities (water closets and urinals).

¹See Theaters and places of assembly for inside design temperature and net square feet per person.²Ventilation requirements. See sections 64.06, 64.07 and 64.08 for mechanical, natural and exhaust ventilation systems; and sections 64.11 through 64.18 for ventilation and air standards.³Ventilation classification.

(a) Requires a supply of outside air and an equal amount of exhaust ventilation be provided at the rate of 5 CFM per person.

(b) Requires a supply of outside air and an equal amount of exhaust ventilation at the rate of 5 CFM per person, or a percentage of openings.

(c) Requires a supply of outside air and exhaust determined on the basis of CFM per square foot of floor area.

(d) Requires exhaust ventilation determined on the basis of CFM per square foot of floor area. The area shall be provided with negative pressure relative to adjacent areas. A supply of outside air is required when the total building exhaust exceeds one air change per hour, unless otherwise accepted. In multiple-use occupancies, the area of each occupancy shall be considered separately.

(e) Requires a supply of outside air and exhaust determined on the basis of CFM per square foot of floor area. The area shall be provided with a negative pressure relationship with respect to the adjacent areas.

(f) Requires a percentage of openings.

⁴Determination of number of persons. In determining the number of occupants in a given space, the department will accept the net square feet per person as listed in table 1 or the actual number of persons, provided the expected occupancy is indicated on the plans and is reasonable. Where no value is indicated for net square feet per person, use the actual number of occupants to determine the required amount of outside air.⁵Percent of openings. See section 64.07 for special considerations on natural ventilation.

TABLE 1 (CONTINUED)

Use or Occupancy	Minimum Inside Temp. (Deg. F)	Ventilation Classification	Ventilation Requirements ¹		CFM/Person sq. ft. Floor Area	Applicable Occupancy Code Section (Imp No.)
			Determination of No. of Persons ² Net sq. ft. per Person	% of Openings ³		
<u>Schools and other places of instruction</u>						
Administrative office space	57	(b)	75	2	—	64.56
Arts, crafts, drafting rooms	57	(a)	30	—	—	64.56 (3)
Classrooms	57	(a)	20	—	—	64.56
Gymnasiums, field houses, auditoriums, theaters (fixed seats)	55-67	(a)	6	—	—	64.56
Blanchers	—	(a)	2.75 or 1 st /1.7	—	—	64.56
Locker and shower rooms	70	(c) or (d)	—	—	2	64.65
Kitchens	70	(c)	—	—	1 or 2/psol sf	64.65
Chlorine storage rooms	70R	(d)	—	—	1	64.65
Home economics (cooking)	67	(a)	30	—	—	64.55
Kitchens	67	(d)	—	—	200/CA	64.67
Laboratories (science)	65	(c) or (d)	—	—	2	64.67
Lecture halls	67	(a)	20	—	—	64.56
Libraries and reading rooms	67	(a)	6	—	—	64.56
Reading rooms	67	(a)	20	—	—	64.56
Stack rooms	67	(a)	20	—	—	64.56
Lecture halls	67	(a) or (d)	100	—	1/4	64.56
Musicals and art galleries	65	(a)	10	—	—	64.56
Musical rooms (instrumental)	67	(a)	40	—	—	64.56
(small)	67	(a)	70	—	—	64.56
Special education	67	(a)	35	—	—	64.56
Study halls, common areas with nonfixed seating	67	(a)	20	—	—	64.56
Toilet rooms	65	(d)	—	—	2 or 60/1P	64.56
Vocational shops:						
With vehicle service and repair	60	(c) or (d)	—	—	3/4	64.58
Without vehicle service and repair	60	(a)	30	—	—	64.58
Workshops	60R	(d)	—	—	2	64.65
<u>Prison institutions and places of detention</u>						
Cells	67	(a)	—	—	—	64.58
<u>Residential occupancies</u>						
Living and sleeping areas	67	(f)	—	5	—	64.59
Day care facilities	67	(b)	35	5	—	64.60
<u>Garages and service stations</u>						
Automobile showrooms	60	(a)	—	3	—	64.55, 64.64
Garages: 6 or more vehicles	60R	(c) or (d)	—	—	1/2	64.61
Repair areas	60	(c) or (d)	—	—	3/4	64.61
Vehicle service buildings	60	(c) or (d)	—	—	1/2	64.62
<u>General sanitation and service areas</u>						
Chlorine storage rooms	70R	(d)	—	—	1	64.65
Clock rooms	70R	(d)	—	—	2	64.65
Janitor closets	70R	(d)	—	—	2	64.65
Locker rooms and shower rooms	70	(c) or (d)	—	—	2	64.65
Toilet rooms	65	(d)	—	—	2 or 60/1P	64.65
Restrooms	70	(c)	—	—	2 or 2/psol sf	64.66
Kitchens	50	(c) or (d)	—	—	2	64.67
<u>Seasonal occupancies</u>						
Camps and lodges:						
Dining and recreational areas	70R	(b)	15	3	—	64.58
Living and sleeping areas	70R	(f)	—	3	—	64.58
Club houses	70R	(b)	15	3	—	64.58
Drive-ins	70R	(b)	15	1	—	64.58
Kitchens	70R	(c) or (d)	—	—	2	64.67
Casualty collection	70R	(d)	—	—	2	64.67

CA - Cooking appliance.

LP - Linear foot.

70R - No minimum requirements.

1P - Toilet facilities (water closets and urinals).

¹See Theaters and places of assembly for inside design temperature and net square foot per person.²Ventilation requirements. See sections 64.59, 64.60 and 64.61 for mechanical, natural and exhaust ventilation systems; and sections 64.11 through 64.18 for ventilation and air standards.³Ventilation classifications.

(a) Requires a supply of outside air and an equal amount of exhaust ventilation to be provided at the rate of 5 CFM per person.

(b) Requires a supply of outside air and an equal amount of exhaust ventilation at the rate of 5 CFM per person, or a percentage of openings.

(c) Requires a supply of outside air and exhaust determined on the basis of CFM per square foot of floor area.

(d) Requires exhaust ventilation determined on the basis of CFM per square foot of floor area. The room shall be provided with negative pressure relative to adjacent areas. A supply of outside air is required when the total building exhaust exceeds one air change per hour, unless otherwise exempted. In multiple-use occupancies, the area of each occupancy shall be considered separately.

(e) Requires a supply of outside air and exhaust determined on the basis of CFM per square foot of floor area. The room shall be provided with a negative pressure relationship with respect to adjacent areas.

(f) Requires a percentage of openings.

⁴Determination of number of persons. In determining the number of occupants in a given space, the department will accept the net square foot per person as listed in Table 1 or the actual number of persons, provided the expected occupancy is indicated on the plans and is reasonable. Where no value is indicated for net square foot per person, use the actual number of occupants to determine the required amount of outside air.⁵Percent of openings. See section 64.67 for special considerations on natural ventilation.

Ind 64.08 Exhaust ventilation system. (1) **DEFINITIONS.** (a) *Exhaust ventilating system.* 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.

(b) *Gravity exhaust ventilation.* 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.

(2) **DESIGN.** Exhaust ventilating systems shall be designed to reasonably prevent contaminated air from reentering the building.

(3) **OPERATION.** The required building exhaust ventilating systems shall operate continuously during periods of occupancy.

(4) **EXHAUST VENTS.** All exhaust vents shall be ducted to the exterior of the building.

Note: Heat reclaim equipment for exhaust systems having more than 10,000 CFM capacity should be considered for energy savings.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; cr. (4), Register, December, 1976, No. 262, eff. 1-1-77.

Ind 64.09 Combustion air intakes. Any room in which burners are located shall be supplied with combustion air for proper burner operation.

(1) **COMBUSTION AIR FOR BURNERS.** All burners shall be provided with combustion air by one of the following methods:

(a) *Combustion air by gravitational means.* Where combustion air is introduced by gravitational means, the minimum free area for combustion air intakes shall be calculated in square inches as indicated in Table 64.09. The values are based on the fuel input of the heating equipment.

TABLE 64.09

Atmospheric burners	Combustion Air Intakes Ducted from the Outside to an Interior Room	Combustion Air Intakes Located at the Outside Wall of an Exterior Room
Gas-fired, all occupancies except industrial	1 sq.in./1000 Btu/hr.	1 sq.in./2000 Btu/hr.
Gas-fired, industrial occupancies	1 sq.in./1000 Btu/hr.	1 sq.in./6000 Btu/hr.
Oil-fired, all occupancies	1 sq.in./1000 Btu/hr.	1 sq.in./2000 Btu/hr.

(b) *Combustion air by mechanical means.* Combustion air furnished by mechanical systems, such as makeup air units, may be used when complete design data is submitted and approved by the department.

(c) *Combustion air by infiltration.* If the heating equipment is not required to be located in a fire-resistive room, combustion air may be provided by means of infiltration where the total area of the outdoor

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openings (doors and windows) is greater than 3% of the floor area in which the burner is located.

Note: See section Ind 64.22 for special conditions.

(2) **DAMPERS.** (a) Manually operated dampers are prohibited.

(b) Motorized dampers are acceptable when interlocked with the burner. Dampers shall be open when the burner is in operation. A safety interlock switch shall be installed to insure that the damper is in an open position before the burner is permitted to operate.

DAMPERS
FURNACE
SWITCH

(3) **DUCTWORK.** Where ductwork is required to bring combustion air into the building, the duct shall have the same cross-sectional area as the free area of the combustion air openings.

(4) **SEGREGATION OF COMBUSTION AIR.** The combustion air path shall be completely segregated from the outside air ventilation ductwork.

(5) **BURNERS IN NEGATIVE PRESSURE LOCATIONS.** An atmospheric burner shall not be installed where the space in which the burner is located under negative pressure due to an exhaust system.

(6) **MOUNTING HEIGHT.** Mounting height of the combustion air intakes shall be as required in section Ind 64.19 (1) (c).

(7) **AIR-HANDLING EQUIPMENT LOCATED IN A BOILER OR FURNANCE ROOM.** If the fuel input to the burner exceeds 400,000 Btu/hr, the air-handling equipment and the burner shall be interlocked to shut off the burner and the blower when any service door to the air-handling equipment is opened, unless a barrier physically separates the burner from the air handling equipment.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76; r. and recr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.10 Refrigerants. The rules covering the use of refrigerants for air conditioning systems shall conform with Wis. Adm. Code chapter Ind 45, Mechanical Refrigeration.

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

PART III-VENTILATION AND AIR STANDARDS

Ind 64.11 Ventilation and air standards. The quantity of air used to ventilate a given space during periods of occupancy shall always be sufficient to maintain the standards of air distribution, air movement, recirculation, air quality and air temperature as required by the following sections: Ind 64.12 through Ind 64.19.

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

Ind 64.12 Definitions. (1) "Air conditioning." The process of treating air to control temperature, humidity, cleanliness and distribution to meet the requirements of the conditioned space.

(2) "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.

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(3) "Recirculated air." The transfer of air from a space through the air-handling equipment and back to the space.

(4) "Tempered air." Air transferred from a heated or cooled area of a building.

(5) "Tempered outside air." Outside air heated or cooled before distribution.

(6) "Ventilation." The process of supplying or removing air by natural or mechanical means, to or from any space.

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

Ind 64.13 Tempered air requirements. (1) **SUPPLY AIR.** The design conditions of the supply air temperature to the occupied space shall be between 50° F and 140° F.

(2) **TEMPERED AIR SUPPLY DEPENDING ON NEGATIVE PRESSURE.** A supply of tempered air, depending on a negative pressure within the space, will be permitted in foundries, steel fabricating shops and similar areas.

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

Ind 64.14 Tempered outside air requirements. (1) **MAKEUP AIR.** A supply of tempered outside air shall be provided when the total volume of building exhaust from an area exceeds one air change per hour.

Note: See Ch. Ind 1000-2000, Wis. Safety & Health Code, for further requirements for makeup air for industrial exhaust systems.

(2) **PROCESS HEAT.** Process heat may be used to temper required outside air.

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

Ind 64.15 Air movement and distribution. (1) **AIR DELIVERY CAPACITY.** 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° F and 29.92 inches (Hg) barometric pressure.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; renum. (2) and (3) to be 64.06 (3) and (4), r. (4), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.16 Air-cleansing devices. (1) **AIR-CLEANSING ACCESS.** Air-cleansing devices shall be designed and installed to permit access to the equipment for maintenance and to insure proper operation of the heating and ventilating system.

(2) **AIR-CLEANSING FILTERS.** Approved air-cleansing filters shall be designed and 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.

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(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 recognizes as approved, filters listed in the Building Materials List published by Underwriters' Laboratories, Inc., and test data of any other recognized testing agency for the purpose for which it is used.

(3) **AIR-CLEANSING MATERIALS.** Contaminated water shall not be used or recirculated through sprays affecting air used for ventilating purposes.

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

Ind 64.17 Automatic controls. Automatic controls shall be provided to maintain design temperature, control ventilation to provide a continuous air movement of not less than the minimum required by this code, and to provide a continuous supply of outside air and exhaust as determined by the provisions of section Ind 64.05, Table 1, during periods of occupancy.

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

Ind 64.18 Contamination of air. (1) **CONTAMINATION.** Air contaminated from odors, fumes, noxious gases, smoke, steam, dust, spray, or other contamination shall be diluted with uncontaminated air or exhausted to prevent the contaminated air from spreading to other parts of the building occupied by people.

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 injurious to the health, safety or welfare of the employee or frequenters, see Wis. Adm. Code Ch. Ind 1000-2000—Wis. Safety and Health Code.

(a) **Chlorinated hydrocarbons.** 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 Freon F-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 lotions, 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 chapters Ind 1000-2000—Wisconsin Safety and Health Code.

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. The surface temperatures of any type 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 Ch. Ind 1000-2000, Wisconsin Safety and Health Code.

(b) *Transfer of contaminated air.* Air shall not be transferred from an area of greater contamination.

Note: The department will accept air transferred from: corridor to toilet room; corridor to cloak room or janitor closet; dining room to kitchen; locker room to toilet room; gymnasium to locker room; showroom to garage; and corridor to school vocational shops.

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

Ind 64.19 Location of outside ventilating air intakes or exhausts for mechanical ventilation systems. (1) **LOCATION AND DISTANCE.** (a) *Location to prevent contamination.* Outside air intake openings shall be located so as to minimize contamination of outdoor air, but in no case shall the distance be less than 10 feet (measured in any direction) from outlets emitting products of combustion, exhaust vents and plumbing vents.

Note: This requirement also applies to roof-top heating and ventilating equipment.

(b) *Distance to adjacent properties.* 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.* The lowest side of outside air intake openings shall be located at least 12 inches above outside grade, above adjoining roof surfaces, or above the bottom of an areaway.

Note: The department will accept outside air intakes in areaways provided the minimum horizontal cross section of the areaway is equal to the free area of the opening, a grating is provided over the areaway with a free area equal to the required air intake, and the grating is designed for a minimum of 100 PSF live load.

(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.

(3) **WEATHER PROTECTION.** All outside air intake openings shall be protected against weather and water with a weatherproof hood or louvers.

(4) **ACCESSIBILITY AND CLEANLINESS.** All outside air intakes shall be easily accessible for cleaning and shall be kept clean and sanitary.

(5) **DAMPERS.** (a) *Intake.* All required outside air intakes shall be equipped with a damper with automatic controls which will close the damper and prevent the intake of outside air into the building when the ventilating unit is not in operation.

(b) *Exhaust.* All exhaust openings shall be provided with automatic or self-activating back-draft dampers to prevent the intake of outside air into the building when the exhaust units are not in operation.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (5) (a), Register, December, 1976, No. 252, eff. 1-1-77.

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PART IV-HEATING EQUIPMENT REQUIREMENTS

Ind 64.20 Equipment ratings and safety controls. (1)* **TEST AND INSTALLATION STANDARDS.** Oil and gas-fired heating equipment, electric heating equipment, and accessory equipment or devices shall be tested and installed in accordance with standards recognized by the department.

Note: For a list of standards acceptable to the department, refer to Appendix A.

(2) **SAFETY CONTROLS.** (a) *General.* The complete safety control package for the heating and ventilating equipment shall comply with standards accepted by the department.

(b) *Limits and controls.* Oil and gas-fired heating equipment and electric heating equipment shall be equipped with primary (flame safeguard) safety controls, safety limit switches, and burners or electric elements that comply with standards accepted by the department.

Note: The department recognizes UL 296—Oil Burners, and UL 795—Commercial-Industrial Gas-Heating Equipment, as acceptable standards that satisfy the requirements of Ind 64.20 (1) and (2).

(3) **LISTED EQUIPMENT.** Complete factory assembled heating units shall be labeled by listing agencies approved by the department.

Note: The department accepts heating equipment listed by American Gas Association and Underwriters' Laboratories.

(4) **UNLISTED EQUIPMENT.** If the heating equipment is unlisted, the following provisions shall be taken:

(a) *Manufacturer's statement.* A statement from the equipment manufacturer shall be provided indicating the national standard with which the equipment complies.

(b) *Tests.* A test by a Wisconsin registered engineer shall be conducted on the output and safety controls, in accordance with the national standard used by the manufacturer. A statement regarding the test of the rating and safety controls shall be furnished for each installation unless an approval for the equipment is obtained from the department in accordance with (5) below.

(5) *Equipment approval.* Equipment approval may be obtained from the department upon submission of a technical report, based on the test required in (4) (b) above, together with \$100 approval review fee.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-75; r. and recr. Register, December, 1976, No. 252, eff. 1-1-77.

*See Appendix A for further explanatory material.

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TABLE 64.21--LOCATION OF EQUIPMENT¹

Location and type of occupancy	VENTED UNITS				UNVENTED UNITS		ELECTRIC	WATER-LOW PRESS. STEAM
	Gas or Oil Furnace Boilers	Gas or Oil Unit Heater	Gas or Oil Infrared	Gas or Oil Space Heater	Gas Dir. Fired Makeup Air	Gas Infrared	Electric, Unit Heaters, Heat Pumps, Radiant Heaters, etc.	Unit Ventilators, Heaters, Makeup Air Units, Radiant Heaters, etc.
Location	Rated Enclos- ure	7' above Floor	7' above Floor	7' above Floor	7' above Floor	7' above Floor		
Type of occupancy								
Factories, office & mercantile bldgs.	Yes	Yes	Yes	Yes	N.P.	Yes		
Factories	Yes	Yes	Yes	N.P.	N.P. ²	Yes		
Warehouses	Yes	Yes	Yes	N.P.	Yes	N.P.		
Offices	Yes	Yes	Yes	N.P.	Yes	N.P.		
Places of assembly, entertainment, recreation and dining (less than 100 persons)	Yes	Yes	Yes	Yes	N.P.	Yes		
Tennis courts	Yes	Yes	Yes	Yes	N.P.	N.P.		
Theaters and places of assembly, entertainment, and worship (100 persons or more)	Yes	N.P.	N.P.	N.P.	N.P.	N.P.		
Restaurants	Yes	N.P.	N.P.	N.P.	N.P.	N.P.		
Tennis courts	Yes	N.P.	N.P.	N.P.	N.P.	N.P.		
Schools & other places of instruction	Yes	N.P. ³	N.P. ³	N.P.	N.P.	N.P.		
Hospitals, nursing homes and penal institutions	Yes	N.P.	N.P.	N.P.	N.P.	N.P.		
Residential occupancies (apartments, hotels, motels, etc.)	Yes	N.P.	N.P.	N.P.	N.P.	N.P.		
Hazardous occupancies	Yes	N.P.	N.P.	N.P.	N.P.	N.P.		
Garages	Yes	Yes ⁴	Yes ⁴	Yes ⁴	N.P.	Yes ⁴		
Aircraft hangars	Yes	Yes ⁴	Yes ⁴	Yes ⁴	N.P.	Yes ⁴		
Day care centers	Yes	N.P.	N.P.	N.P.	N.P.	N.P.		

N.P. = Not permitted.

¹Direct-fired makeup air units shall be mechanically exhausted in the range of 90% to 110% of the air supplied.²Permitted in retail stores less than 1500 square feet gross area with combustion air ducted to unit.³Permitted in kitchens to provide makeup air for kitchen exhaust systems if located outside building or in a rated enclosure.⁴Permitted only in shops with a 4-hour separation from other parts of the building.⁵Non-fired, direct-vent wall furnaces are permitted in apartments and hotels.⁶Suspend heating units in garages at least 8 feet off the floor.⁷Suspend unit 10 feet above the upper surface of the wings or engine enclosure of the aircraft.⁸Installed occupancies - Use the above occupancy that is most similar to the listed occupancy.⁹Clearances - Equipment shall be installed in accordance with the clearances from combustibles indicated on the name plate of the unit.

Ind 64.21 Location of equipment. The various types of heating equipment and the corresponding types of occupancies in which the equipment may be located are shown in Table 64.21. The footnotes below the table designate special requirements for the listed equipment.

Note: 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, December, 1976, No. 240, eff. 1-1-76; r. and recr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.22 Special requirements. (1) **BOILERS AND PRESSURE VESSELS.** (a) *Construction standards.* Boilers and pressure vessels shall be constructed and installed in compliance with the standards of the American Society of Mechanical Engineers, as adopted under the Wis. Adm. Code chapters Ind 41-42—Boiler and Pressure Vessel Code.

(b) *Installation registration.* Installation registration form SB-257 shall be filed with the department, in accordance with the requirements of section Ind 41.05, before the boiler or pressure vessel is put into operation.

(2) **FURNACES.** Forced-air heating systems shall be designed to prevent a negative pressure on the heat exchanger.

(3) **SUSPENDED EQUIPMENT.** Suspended gas or oil-fired heating and ventilating equipment shall be visible to persons within the room where it is suspended and in no way hidden and shall comply with the following:

(a) If the entering air to the heat exchanger of all gas-fired equipment is 30° F or lower, the heat exchanger and burners shall be constructed of corrosion-resistive materials.

(4) **GAS OR OIL-FIRED RADIANT HEATERS.** Gas or oil-fired radiant heaters are subject to the following provisions:

(a) The heaters shall be equipped with an automatic pilot of the complete shutoff type or with a 100% shutoff electric ignition.

(b) If unvented radiant heaters are used, gravity or mechanical means shall be provided to exhaust at least 4 CFM per 1000 Btu per hour input of installed heaters. Provisions shall be made for an equal supply of outside air.

(c) Exhaust openings for removing products of combustion shall be provided above the level of the radiant heaters.

(d) Oil-fired radiant heaters shall not be suspended over combustible materials.

(e) Oil-fired radiant heaters shall be equipped with mechanical pressure-atomizing burners.

(5) **SPACE HEATERS.** Space heaters shall comply with the following provisions:

(a) 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. Oil-fired space heaters shall be equipped with a mechanical pressure atomizing burner.

(b) Space heaters shall not be equipped with duct extensions beyond the vertical and horizontal limits of the metal enclosure.

(6) **EQUIPMENT IN HAZARDOUS LOCATIONS.** The types of heating and ventilating equipment that may be installed in hazardous locations (as defined in Article 500 of the National Electrical Code) are as follows:

(a) Listed low-pressure steam or hot water unit heaters and makeup air units;

(b) Listed electric units.

Note: The department will accept equipment listed by Underwriters' Laboratories, Inc.

History: Cr. Register, December, 1975, No. 240, off. 1-1-76; r. and recr. Register, December, 1976, No. 262, off. 1-1-77.

Ind 64.23 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 to accomplish the calculated services in practical operation, without undue noise, stress or other detriment.

(2) **EXPANSION AND CONTRACTION.** The piping for the 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 shall be covered with insulating material where the pipes pass through occupied areas and the surface temperature exceeds 180° F, unless guarded.

(4) **STEAM AND HOT WATER PIPES.** No pipe carrying hot water or steam at a surface temperature exceeding 250° F shall be placed within one inch of any woodwork, pass through a combustible floor, ceiling or partition unless the pipe is protected by a metal tube one inch larger in diameter than the pipe or with approved pipe covering.

(5) **GAS OR OIL INSTALLATIONS.** (a) *Piping installations.* All gas piping and oil piping shall comply with the standards accepted by the department.

Note: The department will accept gas piping installations which conform to NFPA No. 54 (ANSI Z223.1), National Fuel Gas Code; and oil piping installations which conform to NFPA No. 31, Oil-Burning Equipment.

(b) *Oil tank installations.* All oil-burning equipment shall be supplied with oil from a supply tank having a capacity of not less than 250 gallons. The fuel oil tank shall be equipped with a fill pipe, vent

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pipe and oil gauge. The vent pipe and fill pipe shall terminate outside of the building.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76; r. and corr. Register, December, 1976, No. 252, eff. 1-1-77.

PART V—AIR DELIVERY SYSTEMS

Ind 64.31 Duct design. All ducts shall be designed to promote the unrestricted flow of air.

Note: The department will accept air duct velocities designed in accordance with the standards of the ASHRAE Handbook of Fundamentals, published by the American Society of Heating, Refrigerating and Air Conditioning Engineers.

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

Ind 64.32 Duct use. No duct designed for the transmission of air shall be used for any other purpose.

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

Ind 64.33 Underground duct construction and installation. (1) **MATERIALS.** (a) *Tile ducts.* All underground duct systems using cement tile, glazed clay tile and other tile having a composition of cement and mineral shall be waterproof and shall have sufficient strength to prevent failure of duct at the 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) *Plastic and metal ducts.* Metal, plastic-coated metal ducts, and other approved materials may be used for underground systems if encased in not less than 2 inches of concrete. The ducts shall be waterproof, noncombustible, smooth and of sufficient strength to prevent collapse.

Note: The department will accept polyvinyl ducts installed underground without concrete.

(2) **DUCT INSULATION.** Supply air ducts installed parallel and adjacent to an outside wall shall be insulated with a moistureproof 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 the underside of the floor to 2 feet below the finished grade.

(3) **DUCT DRAINAGE.** 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.

(4) **DUCT INLETS AND OUTLETS.** A water-tight connection shall be provided where the inlet and outlet risers are connected to underground ducts.

(5) **PIPING.** Nonhazardous piping may be installed in underground ducts if it does not restrict the air flow.

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

Ind 64.34 Duct construction. (1) **METAL DUCTS.** All sheet metal ducts and fittings shall be constructed in compliance with standards approved by the department.

(2) **COMBUSTIBLE DUCTS.** All ducts or airways of wood or other combustible material shall be lined with sheet metal or other approved noncombustible material unless specifically exempted by this code.

Note: The department will accept the standards for ducts in the ASHRAE Handbook of Fundamentals, published by the American Society of Heating, Refrigerating and Air Conditioning Engineers, or as illustrated in the Low Velocity or High Velocity Duct Construction Standards published by the Sheet Metal and Air Conditioning Contractors National Association, Inc.

(3) **NONMETALLIC DUCTS.** Ducts constructed of other than metal shall conform to the following:

(a) The method for fabricating, installing and supporting ducts shall be approved by the department.

Note: The department accepts Class 1 air ducts tested (Standards for Safety, UL 181) and listed by Underwriters' Laboratories, Inc., and constructed in accordance with fibrous glass duct construction standards published by the Sheet Metal and Air Conditioning Contractors National Association, Inc.

(b) The ducts shall resist puncture, deformation or collapse.

(c) The ducts shall not be used where the air temperature exceeds 250° F, for kitchen or fume exhaust ducts, or to convey solids or corrosive gases.

(d) The ducts shall not pass through required fire-resistive construction.

(e) The ducts shall not be 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.

(4) **SPIRALLY WOUND METAL DUCTS.** 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.

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

Ind 64.35 Duct connectors. (1) **FLEXIBLE DUCT CONNECTORS.** Flexible duct connectors between duct systems and air outlets or air outlet units shall conform to the following:

(a) The duct material shall be approved for such use.

Note: Flame-retarded fabric or metal or mineral listed in the Building Materials List, published by Underwriters' Laboratories, Inc., are acceptable.

(b) The construction shall be approved by the department.

(c) The connector shall not be subject to deterioration from mildew or moisture.

(d) The connector shall not pass through required fire-resistive construction.

(2) **VIBRATION CONTROL.** Vibration isolation connectors at the joint between the duct and fan or heat-producing equipment shall conform to the following:

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(a) Connectors shall be a type approved for such use.

Note: Flame-retarded fabric or metal or mineral listed in the Building Materials List, published by Underwriters' Laboratories, Inc., are acceptable.

(b) Connectors shall be not more than 10 inches wide.

(c) Connectors shall not be used where the air temperature is in excess of 250° F.

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

Ind 64.36 Vertical shafts. Every vertical shaft shall be enclosed with noncombustible material which is fire-resistive rated in accordance with Table 51.03-A.

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

Ind 64.37 Insulation. Heating supply ducts shall be covered with insulation unless an allowance is made for temperature drop in the system.

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

Ind 64.38 Gravity ventilation ducts. (1) **DESIGN.** Horizontal runs in gravity ventilation 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 mechanical supply of air or the ventilation duct is connected to an exhaust fan.

(2) **SEPARATE DUCTS.** Separate gravity ventilation ducts, from each area of similar occupancy, shall extend to a plenum at the base of a siphon ventilator.

(3) **PLENUMS.** Gravity ventilation ducts, used with mechanical ventilation supply systems, shall not terminate in an attic plenum unless the plenum is airtight, of noncombustible construction, and the attic floor is smooth. All collecting plenums shall be connected to an approved siphon-type roof ventilator or to an exhaust fan discharging outside the building.

(4) **DAMPERS.** Dampers are prohibited in gravity ventilation ducts, except atmospheric back-draft dampers are permitted.

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

Ind 64.39 Ventilation discharge. All gravity and mechanical ventilation ducts shall be protected from the weather and shall be so located and constructed as to prevent contamination of an outside air supply. Gravity ventilation ducts shall extend not less than 2 feet above the highest portion of the roof or parapet wall and shall be surmounted with an approved type of siphon roof ventilator.

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

Ind 64.40 Relief vents. (1) **BAROMETRIC RELIEF VENTS PERMITTED.** The use of barometric relief vents is permitted for type (a) and (b) ventilation classifications designated in Table 1. Where barometric

relief vents are installed on the roof, the discharge openings shall be not less than 2 feet above the roof.

(2) **BAROMETRIC RELIEF VENTS PROHIBITED.** The use of barometric relief vents is prohibited for type (c), (d) and (e) ventilation classifications designated in Table 1.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.41 Suspended ceiling plenum. Plenums above ceilings used for the supply, return and transfer of air shall be of noncombustible construction, as defined in section Ind 51.01 (86) (a). The installation of hazardous piping and cables is prohibited. Openings into the plenum that would affect the fire-resistive rating of the roof and ceiling are prohibited.

Note: This section permits the use of steel, painted steel bar joists and metal decking, concrete, plaster, control tubing and other inorganic materials and prohibits the use of plastic wire sheathing, plastic thermal insulation, plastic pipe, intumescent paint and organic materials which will not pass ASTM test procedure E-136 (Ind 51.25 (50)).

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.42 Fire dampers and fire curtain doors. (1) **REQUIRED FIRE DAMPERS AND FIRE CURTAIN DOORS.** All heating and ventilating ducts which terminate at or pierce code-required, hourly rated wall, floor or floor-ceiling assemblies (Table 51.03-A) and rated enclosures shall be protected as follows:

(a) Two-hour rated assemblies and enclosures shall be protected with 1½-hour rated fire dampers.

(b) Three-hour and 4-hour rated assemblies and enclosures shall be protected with 3-hour "A" label fire curtain doors.

(2) **EXCEPTIONS.** Exceptions to Ind 64.42 (1) are:

(a) Any assembly, such as a floor-ceiling assembly, that has been certified for use without fire dampers and approved by a nationally recognized testing laboratory.

(b) Metal ducts which do not exceed a maximum area of 20 square inches.

(c) Combustion air ducts which extend from the exterior of the building and terminate at one-hour rated enclosures and which do not pierce any other fire-rated assembly in other areas of the building.

(3) **SERVICING FIRE DAMPERS.** Access panels shall be provided next to fire dampers and fire curtain doors to permit viewing and servicing.

Note #1: The department will accept fire dampers and fire curtain doors listed by Underwriters' Laboratories, Inc. or an approved nationally recognized testing laboratory. The dampers must be installed in the vertical or horizontal position that the dampers were designed and tested for. The department will also accept fire damper and fire curtain door installations recommended in publications of the Sheet Metal, Air Conditioning Contractors National Association, Inc., and the National Fire Protection Association bulletins No. 80 and 90A.

Note #2: Fire dampers classified by Underwriters' Laboratories as 1-½ hour rated assemblies are of single blade, multi-blade and curtain types. Fire curtain doors classified by Register, December, 1976, No. 262 Building and heating, ventilating and air conditioning code

Underwriters' Laboratories as time rated (3 hour) and labeled (A) are of the curtain-blade type.

Note #3: See section Ind 64.36 for fire damper requirements in kitchen exhaust systems.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; r. (1) (a), renums. (1) (b) and (c) to be (1) (a) and (b), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.43 Dampers and damper controls. (1) **VOLUME DAMPERS AND DEFLECTORS.** 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.

(2) **AIR GRILLES.** All air supply outlets and returns shall be equipped with grilles or devices which will provide a uniform distribution of air.

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

Ind 64.44 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 accepts certified ratings listed by the Air Moving and Conditioning Association, Inc.

(2) **QUIET OPERATION.** The sound generated by various fans and blowers shall not be objectionable.

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

PART VI—CHIMNEYS, GAS VENTS, MECHANICAL DRAFT AND VENTING DEVICES

Ind 64.45 Chimneys, smoke stacks, gas vents, mechanical draft and venting devices. (1) **GENERAL REQUIREMENTS.** Heating equipment 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) **NONCOMBUSTIBLE SUPPORTS.** All chimneys or gas vents shall be supported from noncombustible construction unless otherwise approved.

(3) **TERMINATION.** (a) *Gravity type.* All chimneys or vents depending on a gravity principle for the removal of the products of combustion shall extend at least 3 feet above the highest point where the chimneys and vents 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.

(b) *Mechanical type.* The height and cross-sectional area may be reduced for chimneys employing a mechanical draft system of either forced or induced draft when approved by the department.

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

Ind 64.46 Masonry chimneys. The design and construction of the chimney shall conform to the provisions of this section.

(1) **MATERIALS.** The walls shall be built of brick or other approved fire-resistive material. No chimney shall rest upon a flooring of wood nor shall any wood be built into or in contact with any chimney. Combustible headers, beams, joists and studs shall be located at least 2 inches from the outside face of a chimney. The foundation 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.

(2) **FLUE SIZE.** 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. Flue linings 7 inches by 7 inches inside, or 8 inches in diameter inside, may be used.

(3) **FLUE LININGS.** All flue linings shall be capable of withstanding reasonably high temperatures and flue gases and shall have a softening point not lower than 1800° F. Flue linings shall be not less than 3/8 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 8 inches below the bottom of the smoke pipe intake and shall be continuous to a point not less than 4 inches above the enclosing walls.

(4) **SMOKE PIPE CONNECTION.** If there is more than one smoke pipe connected to a flue, the connections shall be at different levels. Two or more heating units, or appliances, may be connected to a common smoke pipe, 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.

(5) **CLEAN-OUT OPENING.** Every chimney shall be provided with a clean-out opening at the base. Such openings shall be equipped with metal doors and frames arranged to remain closed when not in use.

(6) **WIND PRESSURE.** Every chimney shall be designed to withstand wind pressures in accordance with the requirements of section Ind 53.12.

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

Ind 64.47 Metal smokestacks. (1) **SMOKESTACKS IN EXCESS OF 30 FEET.** The thickness of the metal walls shall be at least 3/16 inch for smokestack heights up to 40 feet and 1/4 inch for greater heights. Stacks used for manufacturing, high-pressure boilers, furnaces or other similar heating or manufacturing appliances shall be lined with firebrick 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 if the height of the stack exceeds 15 times its least diameter.

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(a) *Exception.* 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.

(2) **SMOKESTACKS LESS THAN 30 FEET.** Smokestacks less than 30 feet high 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 foundations 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 combustible material within 12 inches of such smokestack shall be protected by $\frac{1}{4}$ inch of asbestos covered by sheet metal.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76.

Ind 64.48 Factory-built chimneys. (1) **GENERAL.** Factory-built chimneys or gas vents shall be of an approved type.

(2) **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° F continuously, and does not exceed 1400° F for infrequent brief periods of forced firing.

(3) **TYPE "B".** An approved type "B" gas vent may be used with gas-fired appliances where the flue gas temperature does not exceed 550° F at the outlet of the draft hood.

(4) **TYPE "BW".** An approved type "BW" gas vent may be used with a vented recessed heater.

(5) **TYPE "C".** A type "C" gas vent may be used with gas-fired, low-heat appliances (low-pressure boilers, 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 section Ind 64.49.

Note: The department recognizes as approved, chimneys designed as types "A", "B", "BW" and "C" and listed by American Gas Association and Underwriters' Laboratories, Inc.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76.

Ind 64.49 Smoke pipes. (1) **CONSTRUCTION AND INSTALLATION.** The construction and installation of smoke pipes shall conform with the following requirements:

(a) *Concealed spaces.* No smoke pipe or breeching serving heating appliances shall pass through any outside window, door, or combustible outside wall, nor be concealed in any closet, attic or similar space.

(b) *Smoke pipes which pass through combustible partitions.* Every smoke pipe which passes through combustible partitions shall be encased with noncombustible 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.

(c) *Distance from materials.* 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 1-½ times the diameter. The above distances may be reduced by one-half if the wall or ceiling is covered with not less than ¼-inch asbestos board covered with sheet metal or with equivalent protection.

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

Ind 64.50 Gas vents. All gas ranges (except those for domestic use), water heaters and other gas-fired equipment shall be provided with vent pipes conforming to the requirements for smoke pipes as specified in section Ind 64.49.

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

PART VII—EQUIPMENT LOCATION, PROTECTION, MAINTENANCE AND OPERATION

Ind 64.51 Guarding and fire protection. (1) **GUARDING OF EQUIPMENT.** Heating and ventilating equipment in gymnasiums, playrooms and similarly 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.

(2) **GUARDING OF SURFACES.** Equipment located in occupied areas and installed less than 7 feet above the floor shall be guarded to prevent contact with:

(a) Any surface temperatures that exceed 180° F;

Note: For electrical equipment, the department will accept the surface temperature defined in UL 1042—Standard for Safety, Electric Baseboard Heating Equipment, published by Underwriters' Laboratories, Inc.

(b) Surfaces that are likely to cause lacerations.

(3) **GUARDING OF MECHANICAL APPARATUS.** All mechanical apparatus shall be guarded to comply with the requirements of Wis. Adm. Code Ch. Ind 1000-2000—Wis. Safety and Health Code.

(4) **FIRE PROTECTION.** All installations under this chapter shall comply with the precautionary requirements of the department to reduce fire hazards.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (2), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.52 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 chapter during periods the building is occupied.

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(3) **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, December, 1975, No. 240, eff. 1-1-76.

Ind 64.53 Final test required. The designer, installer or recognized balancing agency shall be responsible for the testing and balancing of every heating, ventilating and air conditioning system.

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

PART VIII—OCCUPANCY REQUIREMENTS

Ind 64.54 Factories, office and mercantile buildings. (1) **SCOPE.** This classification shall include all places of employment, mercantile buildings, retail establishments where goods and commodities are bought and sold, and places where not more than 100 persons assemble for worship, recreation, entertainment or dining purposes.

(2) **VENTILATION.** The air movement, supply and distribution for all occupancies in this class shall conform to the requirements of section Ind 64.05, Table 1, except that natural ventilation or mechanical ventilation need not be provided in warehouses and cold storage buildings.

(3) **INDUSTRIAL EXHAUST SYSTEM.** (a) *Contaminants.* Industrial exhaust systems shall be installed and operated to remove harmful contaminants in conformance with Wis. Adm. Code Ch. Ind 1000-2000—Wisconsin Safety and Health Code.

(b) *Makeup air.* A volume of outside air shall be supplied to replace the air exhausted if the total volume of air exhausted exceeds one air change per hour. The quantity of makeup air shall equal at least 90% of the air exhausted.

(c) *Connections.* Connections between industrial exhaust systems that convey different materials, the combination of which may produce explosive, heat-generating, corrosive, toxic, or otherwise dangerous mixtures, shall be prohibited.

(4) **LOCKER ROOMS.** Locker rooms used in places of industrial employment shall be provided with outside air. See section Ind 64.05, Table 1.

Note: Exhaust air from locker rooms may be directed through the adjoining toilet room 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 section Ind 64.05, Table 1.

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

Ind 64.55 Theaters and places of assembly. (1) **SCOPE.** This classification shall include auditoriums, 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, Sunday schools and places of worship, funeral home chapels, parochial schools, convents,

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indoor skating rinks, and theaters which accommodate more than 100 persons for entertainment, recreation, worship, or dining purposes.

Note: For areas that will accommodate less than 100 persons, see Ind 64.54.

(2) **VENTILATION.** The air movement, supply and distribution for all occupancies under this classification shall conform to the requirements of section Ind 64.05, Table 1.

(3) **ALTERNATE SERVICE AND CAPACITY.** Heating and ventilating systems installed in places of worship, Sunday schools, 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.

(4) **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.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76.

Ind 64.56 Schools and other places of instruction. (1) **SCOPE.** This classification shall apply to all public and private schools, colleges, universities, academies, seminaries, libraries, museums, art galleries, all places used for vocational instruction and research such as laboratories, shops, science rooms, and all parts of buildings used for instructional purposes.

(2) **VENTILATION.** The air movement, supply and distribution for all occupancies under this classification shall conform to the requirements of section Ind 64.05, Table 1. For corridors provided with lockers, the air movement shall be not less than 10 cubic feet per minute per lineal foot of corridor. This air supply shall be accomplished by means of air inlets admitting air from adjacent classrooms or by a direct tempered air supply.

Note: This rule does not apply to corridors furnished with coat hooks.

(3) **SCHOOL SHOP EQUIPMENT AND LABORATORY EXHAUST.** An exhaust system, in accordance with the requirements of section Ind 64.54 (3), shall be provided for all equipment and processes that create dust, fumes, vapors and gases injurious to health. Makeup air may be transferred from other areas of the building to replace the air exhausted from the equipment or process.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76; am. (3), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.57 Hospitals and nursing homes. (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 "bedfast patients."

Note #1: A "bedfast patient" is a person who is normally confined to a bed or chair.

Note #2: For additional requirements, refer to Wis. administrative codes of the state department of health and social services.

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(2) VENTILATION. The air movement, supply and distribution shall conform to the requirements of section Ind 64.05, Table 1, and the following:

Note: The department of health and social services requires a positive pressure relationship, with respect to adjacent areas, in corridors, operating rooms, delivery rooms, nurseries, day room areas, laboratories with media transfer, and nurses stations which are located in corridors.

(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) 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. 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.
4. Recirculation of air shall only be permitted within the system serving an individual room.
5. Mechanical exhaust shall be provided.
6. The relative humidity in rooms where anesthetic gases are used shall be maintained at not less than 50%.

(c) Private rooms, semi-private wards, day rooms, and nurses stations shall be ventilated in accordance with the requirements of section Ind 64.05, Table 1, unless an openable sash area has been provided and the content of the space is in excess of 400 cubic feet per occupant.

Note: See sections Ind 57.17 and 57.19.

(d) The air movement in corridors and halls shall be not less than 10 cubic feet per minute per lineal foot of corridor or hall.

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

Ind 64.58 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. 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 section Ind 64.05, Table 1. 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 8 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, December, 1975, No. 240, eff. 1-1-76.

Ind 64.59 Residential occupancies. (1) **SCOPE.** This classification shall include all apartments, row houses, rooming houses, hotels, motels, dormitories, and all other places of abode.

Note: See section Ind 67.001 (2) for definition of "place of abode."

(2) **VENTILATION.** The air movement, supply and distribution for all areas of this class shall conform to the requirements of section Ind 64.05, Table 1.

(3) **RETURN AIR DUCTS.** Unlined wood joints and stud spaces will be permitted to be used as return air ducts in individual living units provided with individual heating and ventilating systems. *see 64.34(3)(e)*

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (3), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.60 Day care facilities. (1) **SCOPE.** This classification shall include all public and private day care centers accommodating more than 4 children, including all buildings or parts of buildings used as child day care facilities.

(2) **VENTILATION.** The air movement, supply and distribution for all areas of this class shall conform to the requirements of section Ind 64.05, Table 1.

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

Ind 64.61 Repair areas. (1) **SCOPE.** This classification includes all areas where motor-driven vehicles are repaired.

(2) **VENTILATION.** The air movement, supply and distribution shall be provided in accordance with the requirements of section Ind 64.05, Table 1. The exhaust air shall be drawn from not more than 18 inches above the floor.

(3) **TAIL PIPE EXHAUST.** (a) *Mechanical exhaust system.* A mechanical exhaust system shall be provided 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. A flexible hose, equipped with a device for connecting it to the exhaust pipe of the vehicle and to the exhaust system, shall be provided. 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.

(b) *Nonmechanical exhaust.* 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 the requirements stated in (a) above.

Note: The requirements stated in (2) need not be increased when satisfying requirements of either (3) (a) or (b). Also see Wis. Adm. Code Ch. Ind 1000-2000—Wis. Safety and Health Code.

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(4) **MISCELLANEOUS REPAIR AREAS.** Areas involved in the servicing of small internal combustion engines such as lawnmowers, snowmobiles, chainsaws, cycles, boat engines, battery charging areas, etc. shall be provided with at least 3/4 cubic foot of outside air per square foot of enclosed service floor area and an equivalent exhaust. Exhaust from battery charging or battery storage areas shall be from the top of the area.

(5) **CONTAMINANTS.** If the provisions of this section do not provide sufficient ventilation to meet the standards for threshold limit values covered in Wis. Adm. Code Ch. Ind 1000-2000—Wis. Safety and Health Code, the additional exhaust requirements with an equivalent volume of outside air shall be provided to satisfy the requirements found in Ch. Ind 1000-2000.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76.

Ind 64.62 Vehicle service buildings. (1) **SCOPE.** 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, body repair, and similar operations.

(2) **VENTILATION.** The air movement, supply and distribution shall be provided in accordance with the requirements of section Ind 64.05, Table 1. The exhaust air shall be drawn from not more than 18 inches above the floor.

(a) *Repair area ventilation.* 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 the requirements of section Ind 64.61 above.

(b) *Vehicle washing facilities.* 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 outside air equal to 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 the floor located between the termination of the conveyor system and the vehicle exit door.

(3) **CONTAMINANTS.** If the provisions of this section do not provide sufficient ventilation to meet the standards for threshold limit values covered in Wis. Adm. Code Ch. Ind 1000-2000—Wis. Safety and Health Code, the additional exhaust requirements with an equivalent volume of outside air shall be provided to satisfy the requirements found in Ch. Ind 1000-2000.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76.

Ind 64.63 Garages. (1) **SCOPE.** This classification includes all buildings, or parts of buildings, where motor-driven vehicles are stored.

(2) **VENTILATION.** The air movement, supply and distribution shall be provided in accordance with the requirements of section Ind 64.05, Table 1. Live storage areas shall be provided with exhaust air drawn from a height not more than 18 inches above the floor unless the following requirements are satisfied:

(a) The floor is located at or above grade.

(b) A permanent open-wall area of at least 30% of the total wall area is provided. The openings shall be distributed to permit circulation of air throughout the storage area.

Note # 1: A live storage area is any area used for storage of fire trucks, tractors, automobiles, trucks, and similar self-propelled vehicles which are driven in and out of the storage area under their own power; it does not include areas where vehicles and equipment are stored for seasonal periods, or areas where vehicles are displayed without batteries and where the gasoline tanks of the vehicles are empty and free of fumes.

Note #2: The department will permit the use of a mechanical exhaust system in conjunction with openings in the exterior walls to provide the ventilation required by Table 1.

(3) **CONTAMINANTS.** If the provisions of this section do not provide sufficient ventilation to meet the standards for threshold limit values covered in Wis. Adm. Code Ch. Ind 1000-2000—Wis. Safety and Health Code, the additional exhaust requirements with an equivalent volume of outside air shall be provided to satisfy the requirements found in Ch. Ind 1000-2000.

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

Ind 64.64 Automobile showrooms. (1) **SCORES.** This classification includes all showrooms with offices and occupancies adjacent to repair or live storage areas.

Note: A live storage area is any area used for storage of fire trucks, tractors, automobiles, trucks, and similar self-propelled vehicles which are driven in and out of the storage area under their own power; it does not include areas where vehicles and equipment are stored for seasonal periods, or areas where vehicles are displayed without batteries and where the gasoline tanks of the vehicles are empty and free of fumes.

(2) **VENTILATION.** The air movement, supply and distribution shall be provided in accordance with the requirements of section Ind 64.05, Table 1.

(a) *Separate ventilating system.* A separate ventilating system shall be provided for showrooms or offices where such occupancies are adjacent to repair or live storage areas.

Note: Ventilation is not required if an openable area is provided to conform with the requirements of section Ind 64.07.

(b) *Recirculation.* 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) *Contaminants.* If the provisions of this section do not provide sufficient ventilation to meet the standards for threshold limit values covered in Wis. Adm. Code Ch. Ind 1000-2000—Wis. Safety and Health Code, the additional exhaust requirements with an equivalent

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volume of outside air shall be provided to satisfy the requirements found in Ch. Ind 1000-2000.

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

Ind 64.65 General sanitation and service areas. (1) **SCOPE.** This classification shall include toilet rooms, locker rooms, shower rooms and janitor closets.

Note #1: A janitor closet is a service closet with one or more plumbing fixtures.

Note #2: For exhaust ventilation requirements in hospital service areas, see section Ind 64.57.

Note #3: For exhaust ventilation requirements in places of employment, see section Ind 64.54.

(2) **EXHAUST VENTILATING SYSTEMS.** Exhaust ventilating systems serving this class of occupancy shall not be used for any other service.

(3) **VENTILATION.** The air movement, supply and distribution shall be provided in accordance with the requirements of section Ind 64.05, Table 1.

(a) *Exhaust ventilation.* Exhaust ventilation shall be provided for all areas of this class unless otherwise exempted. The volume of air exhausted shall be provided at a rate of not less than 2 cubic feet per minute per square foot of floor area, or 60 cubic feet per minute per fixture (water closets and urinals). Mechanical exhaust ventilation shall be installed in toilet rooms having more than one fixture (water closets and urinals). The effectiveness of the exhaust shall be greater than the supply.

(b) *Natural ventilation.* Mechanical 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, provided the room has an outside window of at least 4 square feet with at least 2 square feet that is openable.

(c) *Locker, shower and toilet room ventilation.* Adjoining locker, shower and toilet rooms shall be exhausted at the rate of 2 cubic feet per minute per square foot of area, based on the floor area of the largest space. The rooms shall be provided with tempered makeup air supplied directly from the outside or transferred from other areas of the building in accordance with the requirements of section Ind 64.18. A negative pressure relationship shall be maintained in the shower and toilet rooms with respect to the locker room.

6' opening
max
Between
rooms

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (1), cr. (2) (c) and r. (4), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.66 Natatoriums. (1) **POOL VENTILATION.** In natatoriums, a volume of tempered outside air supply and exhaust shall be provided at the rate of at least 2 cubic feet per minute per square foot of pool surface. The volume of tempered outside air and exhaust may be reduced to a minimum of one cubic foot per minute per square foot of pool surface provided humidity controls are used to limit the relative humidity to 60%.

(2) **AIR MOVEMENT.** The air movement in a natatorium shall be not less than 6 air changes per hour unless mechanical cooling is provided to satisfy the heat gain requirement for the space.

History: Cr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.67 Kitchens (1) SCOPE. This classification includes all areas where food is prepared (except in domestic science educational facilities from grades kindergarten through 12, and single unit apartments in hotels, motels and apartment buildings).

(2) **EXHAUST VENTILATION SYSTEMS.** Exhaust ventilation systems serving this occupancy shall not be used for any other service.

(a) *Required exhaust ventilation.* Mechanical exhaust ventilation shall be provided at a rate not less than 2 cubic feet per minute per square foot of floor area for every occupied area within the scope of this section.

(b) *Required exhaust hood.* Exhaust hoods shall be required where frying and/or broiling is done (includes deep-fat frying and surface frying), and where cooking is a regular commercial operation (includes ranges, griddles, fryers, broilers and similar grease-producing equipment).

(3) **REPLACEMENT AIR.** Adequate replacement air shall be provided to equal the air being exhausted by all exhaust systems.

(4) **RECIRCULATION OF AIR.** Recirculation of air as described under subsection Ind 64.15 (4) is prohibited during occupied periods.

(5) **EXHAUST HOOD REQUIREMENTS.** (a) *Size of hood.* The horizontal inside dimensions for canopy hoods 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. The horizontal inside dimensions for noncanopy, pre-fabricated backshelf hoods may be less than the overall horizontal dimensions of the grease-producing equipment.

(b) *Exhaust rates.* The kitchen exhaust hood shall be provided with a capture velocity to effectively capture the grease vapors and may be designed through engineering analysis or the empirical design formulas stated below:

1. *Canopy hood.* Hood open on all 4 sides: $Q = 150 A$ (area).

2. *Wall hood.* Hood open on 3 sides or less: $Q = 100 A$ (area).

3. *Slotted-type hood.* $V = 350$ feet per minute through the slot opening. The slot shall be at least 3 inches in width.

4. *Noncanopy hood.* The minimum volume of exhaust air for noncanopy type hoods (prefabricated backshelf) shall be not less than $Q = 300 L$ (length).

Note: Q equals the exhaust air in cubic feet per minute; A equals the area of the hood over the grease-producing equipment in square feet; V equals the velocity in feet per minute; and L equals the total length in feet of the cooking appliance(s) being ventilated, and measured parallel to the front edge of the appliance(s).

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(c) *Materials.* Hoods shall be constructed and supported by steel not less than .0478 inch U.S. standard gage (No. 18 manufacturers standard gage) or stainless steel not less than .0359 inch U.S. standard gage (No. 20 manufacturers standard gage) or other materials of equivalent strength, fire and corrosion resistance.

Note: The department will permit hoods constructed of aluminum, the thickness of which is not less than .050 inch.

(d) *Seams.* All seams and joints shall be liquid-tight.

(e) *Grease-removal devices.* Approved grease extractors, grease filters or other grease-removal devices shall be provided.

(f) *Exposed hood surfaces.* Hood surfaces and exposed exhaust ducts within 18 inches of combustible material shall be protected in accordance with the requirements of subsection Ind 64-66 (6) (f).

(g) *Concealed hood surfaces.* Hood surfaces that are concealed by or recessed into adjoining construction shall be protected in accordance with the requirements of subsection Ind 64-66 (6) (f).

(h) *Double-wall hoods utilizing outdoor air.* When hoods are connected to ducts supplying outside air, performance data shall be submitted.

Note: Double-wall hoods provided with a supply of outdoor air conserve energy.

(6) **EXHAUST DUCTS FROM HOODS.** (a) *Design.* All ducts shall lead, as directly as possible, to the exterior of the building without forming dips or traps which collect residues. Ducts exposed to the exterior shall be protected with a suitable weatherproof coating.

Note: Temperatures in excess of 2000° F may be experienced within ducts in the event of fire. A means of expansion of long ducts should be considered.

(b) *Materials.* Ducts shall be constructed of and supported by steel not lighter than .0598 inch U.S. standard gage (No. 16 manufacturers standard gage) or stainless steel not lighter than .0478 inch U.S. standard gage (No. 18 manufacturers standard gage) or other materials of equivalent strength, fire and corrosion resistance.

(c) *Seams and joints.* All seams and joints shall be liquid-tight.

(d) *Clean-out openings.* Accessible clean-out openings at the sides of ducts shall be provided at each change of direction of the duct for inspection and servicing.

(e) *Interior ducts.* Ducts shall not pass through required fire walls or partitions.

(f) *Concealed exhaust ducts.* 1. Horizontal ducts. Horizontal concealed ducts connected to hoods that pass through any other area of the building, including suspended ceilings, shall be protected with insulating material to withstand a flue temperature of not less than 1000° F. The temperature of the exposed surface of the insulating material shall not exceed 250° F.

Note: The department will accept the use of masonry chimneys or manufactured chimneys which are tested and approved for use at a flue gas temperature of not less than 1000° F, or

insulating materials for fire endurance systems listed in the Fire Resistance Index published by Underwriters' Laboratories, Inc.

2. Vertical ducts. Vertical concealed ducts that pass through any other area of the building, including suspended ceilings, in one- and 2-story buildings, shall be protected with insulating material as specified in 1. above, or shall be located in 2-hour noncombustible fire-resistive enclosures. In buildings of 3 or more stories, vertical ducts shall be located in 2-hour noncombustible fire-resistive enclosures.

(g) *Exposed exhaust ducts.* Exposed exhaust ducts connected to hoods or canopies shall be located not less than 18 inches from combustible material unless the duct is protected in accordance with the requirements of (f) above.

(h) *Air discharge.* The air discharge shall be directed away from the roof or combustible materials.

(i) *Dampers.* Fire dampers shall not be installed in kitchen exhaust duct systems unless the assembly includes an approved extinguishing system designed to operate with a fire damper in the closed position.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; renum. from 84.66, r. and recr. (5) (a) to (d), renum. (5) (e) to (l) to be (6) (d) to (h), am. (8) (l). Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.68 Seasonal occupancies. When approved in writing by the department, heating requirements may be waived (but not ventilation required by section Ind 64.05, Table 1) during the period of June 1 through September 15 for the following or similar occupancies: drive-in eating places, club houses, outdoor toilets, camp lodge buildings, canning factories, and migrant labor camps (also see chapter Ind 49—Migrant Labor Camps).

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; renum. from 84.67, Register, December, 1976, No. 252, eff. 1-1-77.

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APPENDIX A

The material contained in this appendix is for clarification purposes only. The notes, illustrations, etc. are numbered to correspond to the number of the rule as it appears in the text of the code.

A-50.10-50.25 Forms. The following forms (SH2, 8, 8A, 118, 198, 224B and SBD-4927) are referred to in sections Ind 50.10, 50.12, 50.14, 50.18, 50.20 and 50.25. Copies of these forms are available from the Division of Safety and Buildings, P.O. Box 7946, Madison, Wisconsin 53707.

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Appendix

SB-8(7/78)
PETITION FOR MODIFICATION
OF A RULE IN THE
WISCONSIN ADMINISTRATIVE CODE

WISCONSIN DEPARTMENT OF
INDUSTRY, LABOR AND HUMAN RELATIONS
DIVISION OF SAFETY & BUILDINGS
P. O. BOX 7946, MADISON, WI 53707

PETITION REVIEW FEE - \$50.00

Name of Owner	Building Occupancy or Use	Agent, Architect or Engineering Firm
Company	Tenant Name, if any	Street & No.
Street & No.	Building Location, Street & No.	City State & Zip
City State & Zip	City County	Phone

1. Rule Ind. _____ of the Wisconsin Administrative code cannot be entirely satisfied because:

2. In lieu of complying exactly with the rule, the following alternative is proposed as a means of providing an equivalent degree of safety:

3. Supporting arguments are:

Verification by owner

_____, being duly sworn, says he is the petitioner herein, thus he has read the foregoing petition and that the same is true, as he verily believes.

signature of owner

subscribed and sworn to me this _____ day of _____, 19____, in _____ County, Wisconsin.

Notary Public

My commission expires: _____

Commission Expires	
Secretary	Date

-PETITION IS VALID ONLY IF NOTARIZED

POSITION STATEMENT:
To be compiled by
Chief of Fire Department
SB 8-118-751

WISCONSIN DEPARTMENT OF
INDUSTRY, LABOR AND HUMAN RELATIONS
DIVISION OF SAFETY & BUILDINGS
P.O. BOX 7944, MADISON WI 53707

Name of Owner		Building Occupancy or Use		Agent, Architect or Engineering Firm	
Company		Tenant Name, if any		Street & No.	
Street & No.		Building Location, Street & No.		City	
City		City		County	
State & Zip		City		Phone	
1. I have read the petition for modification of rules: Ind		Denial		Approval	
2. I recommend (Check appropriate box)		Denial		Approval	
3. Explanation for Recommendation:		Conditional Approval		No Comment	
* If desired, Fire Departments may indicate "No Comment" on non-fire safety issues such as sanitary, energy conservation, structural, barrier free environments, etc. 4. ☐ I find no conflict with local rules and regulations. ☐ I find that the petition is in conflict with local rules and regulations. Explanation:					
Signature of Fire Chief				Date	

PLEASE COMPLETE AND SUBMIT PROMPTLY TO DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS AT THE ADDRESS SHOWN ABOVE.

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PLANS APPROVAL
APPLICATION
AS-118 (Rev. 5/76)

Department of
INDUSTRY, LABOR AND HUMAN RELATIONS

Safety & Building Division
Box 7546
201 E. Washington Avenue
Madison, Wisconsin 53707

INSTRUCTIONS: Fill in all applicable data. Submittal of Plan Approval Application form is required with each plan submittal. Examination and inspection fees, as determined on back of form, are required to be submitted with a minimum of three sets of plans. Data required on plans is described in code section Ind 50.10. Codes can be purchased from the Department of Administration, Document Sales, 202 S. Thomson Ave., Madison, 53703.

1. THIS APPLICATION IS FOR: ☐ Building Plan Approval ☐ Heating Plan Approval ☐ Other _____

2. PLANS FOR: ☐ New Building ☐ Addition ☐ Alteration ☐ Structural ☐ Fining & Foundation
☐ Return to previously approved plans ☐ Other _____

3. PROJECT INFORMATION

Name of Owner	Building Occupancy or Use	Designer or Design Firm
Company	Tenant Name, if any	Street & No.
Street & No.	Building Location, Street & No.	City
City	State & Zip	County
Previous Owner, if any	Return Plans to: ☐ Owner ☐ Designer	Phone

4. DETERMINATION OF FEES SEE CHAP. IND. 69 FOR FULL FEE SCHEDULE

SEE BACK OF PAGE FOR FEE CALCULATION AND ABBREVIATED FEE SCHEDULE

Total Volume	4a. Building Plan Fee	\$	
	4b. Heating-Ventilation Fee	\$	
	4c. Other	\$	
	4d. Inspection	\$	
	4e. TOTAL	\$	

FOR OFFICE USE ONLY

Amount Rec'd _____
Date Rec'd _____
Receipt No. _____

5. OTHER INFORMATION

5a. Type of Construction
☐ Fire Resistive Type A ☐ Metal Frame Protected ☐ Exterior Masonry ☐ Wood Frame Protected
☐ Fire Resistive Type B ☐ Heavy Timber ☐ Metal Frame Unprotected ☐ Wood Frame Unprotected
5b. Mechanical Information: Type of Heating _____ Not Rating of Heating Units

5c. SOIL BEARING CAPACITY (See Ind. 53.21)

Method used to determine capacity:

Check One: Verified ☐ Presumptive (11)
Check Value Used: PSF 2000 ☐ 3000 ☐ 4000 ☐
6000 ☐ 12000 ☐ Other _____

Yes	No
☐	☐ Sprinkler System Provided?
☐	☐ Fire Alarm Provided?
☐	☐ Other Detection System Provided?
☐	☐ Emergency Power Provided?

6. DESIGN AND SUPERVISION (IND 50.12)

The design, plans, computations and specifications for this project have been prepared under my supervision. I am registered as an
☐ Architect ☐ Engineer ☐ Designer in Wisconsin as provided in Section 443.01 of the Wisconsin Statutes. ☐ I am not registered. If this building, existing and additions, contains over 50,000 cu. ft. total volume, it must be designed by a registered person.

Signature of Designer	Registration Number	Date
-----------------------	---------------------	------

If this building, existing and additions, contains over 50,000 cu. ft. total volume, the construction of this project shall be under the supervision of a Wisconsin registered architect, engineer or in the case of heating and ventilation, designer.

Plans for buildings over 50,000 cu. ft. will not be approved until the name of the supervising professional is known.

Name of Supervising Professional	Registration Number
----------------------------------	---------------------

NOTE: The supervising professional shall file a written report with the Department upon completion of construction. (Ind 50.13 (3)(c))

4. DETERMINATION OF FEES

INSTRUCTIONS:

1. Refer to fee schedule shown below.
2. Enter area of each floor in appropriate space.
3. Enter height of each floor (Height includes attic and space between floors).
4. Compute volume of each floor/attic space and total volume for building.*
5. Compute building and/or heating fee per building.
6. Enter other fee (if any) in space per building.
7. Compute inspection fees per building.
8. Total fees and transfer information to front page.

*The "total volume" is determined by the overall outside dimensions of length, width and height.

EXAMINATION FEES PER BUILDING:

Building Plan Fee: Fee: .35 per 1000 cu. ft.
Minimum Fee \$20.00
Heating & Ventilating Plan Fee: Fee: .25 per
1000 cu. ft. Minimum Fee \$12.00
Alterations in Bldgs.: Fee \$1.50 per \$1,000
est. cost. Minimum Fee \$10.00
*Structural Plans \$20.00
Revision to Approved Plan \$10.00
*Exhaust Systems \$25.00 per plan
*Spray Booths \$15.00 per plan
Permit to Start Construction (SB-198) \$26.00
*Footing & Foundations Plans \$10.00 per Bldg.
*Stadium, Grandstand, Bleachers \$8.00/1000
Seats. Minimum Fee \$8.00
*Fire Escapes \$20.00 per fire escape

INSPECTION FEES PER BUILDING:

Building Volume/Alt. cost
Up to 25,000 cu. ft./dollars \$15.00
25,001 - 100,000 cu. ft./dollars \$30.00
100,001 - 500,000 cu. ft./dollars \$45.00
500,001 - 1,000,000 cu. ft./dollars \$60.00
In excess of 1,000,000 cu. ft./dollars \$75.00

NOTE:

- (1) Heating & Ventilating plans submitted separately require an inspection fee of \$25.00
(2) Plans other than building or heating require an inspection fee of \$15.00.

No. of Floors	Area	Height	Total each Floor	Total Vol./1000	Exam Fee	Building Plan Fee
Basement/Garage	X		sq. ft.	X	.35	\$
1st Floor	X		sq. ft.	Total Vol./1000	X	Heating Ventilating Fee
2nd	X		sq. ft.	X	.25	\$
3rd	X		sq. ft.			Other
4th & 5th and etc.	X		sq. ft.			\$
Total Volume or						Inspection Fee
Total Cost of Alteration						\$
						Total
						\$

TRANSFER ALL DOLLAR AMOUNTS AND VOLUME TO FRONT PAGE

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SD-198
Rev. 6-72



DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS
INDUSTRIAL SAFETY & BUILDINGS DIVISION
P.O. BOX 7966
MILWAUKEE, WISCONSIN 53207

PERMIT TO START CONSTRUCTION
FEE \$26.00 IN ADDITION TO EXAMINATION/INSPECTION FEES

Location of Project:

Owner: _____ E: _____
Street: _____ Plan File Number: _____
City: _____ Date Plans Rec'd: _____
County: _____
Occupancy: _____

We, the undersigned, request to begin footing and foundation work prior to approval of the plans.

Complete plans have been submitted to the Department of Industry, Labor and Human Relations, Division of Industrial Safety and Buildings, and all information requested by Code Ind 50.10 has been included with the submittal.

We have reviewed the specific code requirements for the building or structure, including Ind 54.01 (construction, height, and allowable area), Ind 50.12, Ind 51.03, Ind 53, Ind 55.02, and Ind 57.60 when applicable and have shown compliance on the drawings.

We agree to make any changes required after the plans have been reviewed and to remove or replace noncode complying parts of the foundation and or footings.

We agree to proceed with the footings and foundation only and will not continue with the remainder of the building or structure until approval has been received.

Owner's Signature: _____ Date: _____ Accepted By: _____ Date: _____
Name: _____ Dept. of Ind., Labor & Human Relations
Address: _____ Div. of Industrial Safety & Buildings
Not Accepted Because: _____

Designer's Signature: _____ Date: _____ Plans will be examined within the next _____ days.
Name: _____
Address: _____ NOTE: Footing and foundation plans submitted prior to final building plans will not be accepted for this permit.

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DILHR-SBD-4927

CERTIFICATE OF COMPLETION

Date _____

TO: Department of Industry, Labor and Human Relations
Safety and Buildings Division
P. O. Box 7946
201 E. Washington Avenue
Madison, WI 53707

Gentlemen:

RE: File Number: _____

Plan Number: _____

Owner: _____

Occupancy: _____

Building Street Address: _____

City: _____ County: _____

This is to certify that construction of the referenced project was under my supervision, in accordance with Ind 50.10, and that to the best of my knowledge and belief it has been completed in substantial compliance with the approved plans and specifications with the following exceptions: (IF NONE, STATE NONE)

This certificate covers: Building ☐
Heating & Ventilation ☐
Structural ☐
Other ☐ (Specify) _____

Name: _____

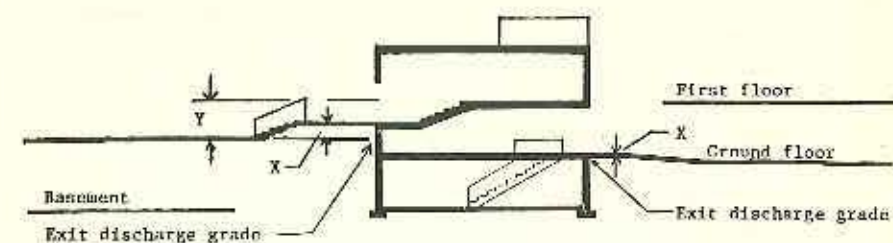
Registration Number: _____

Address: _____

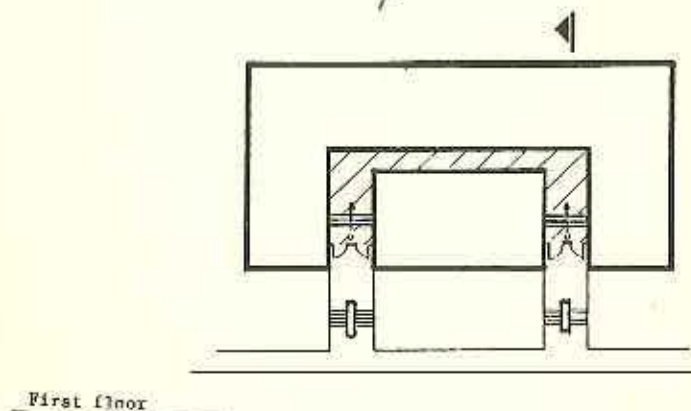
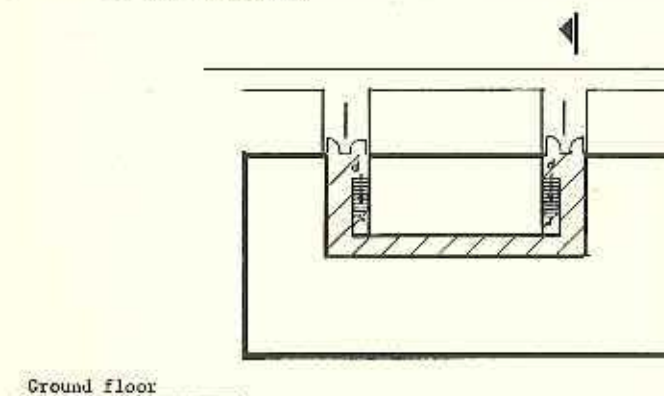
- A-51.01 (12) **BUILDING.** The intent was to consider permanent awnings as part of a building.
- A-51.01 (42) **FAMILY.** The intent of this definition is to clarify the use of the word "family" in reference to subsection Ind 57.001 (2) (a); it is not intended as a variance to requirements stated under Ind 57.001 (2) (b).
- A-51.01 (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 (116) **SEMI-ACC.** 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 50.07, 50.10 and 50.12. Also see chapter A-E 2 of Wis. Adm. Code—Architects, Professional Engineers, Designers and Land Surveyors Examining Board.
 - (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 hazards sections of this code.
- A-51.01 (151) **WALL (PARTY).** It is intended that a property consisting of joining platted subdivisions owned by one individual, that can be owned by separate individuals, is included in the definition of party wall.

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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.



Note: X = 3'-0" (maximum)
Y = 6'-0" (maximum)



A-51.042 (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. Enameling or japanning 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 (16 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 celluloid products, kerosene, oils, etc.
11. Woodworking establishments.

A-51.15 (6) EXAMPLE TO DETERMINE TOTAL AGGREGATE EXIT WIDTH.

5	300	Type No. 1 sprinklered construction.
4	400	Aggregate exit width required from a floor into the stairwell is 30 inches per 100 people on that floor; i.e.,
3	500	5th floor to stairwell = 5 x 30 = 90"
2	200	4th floor to stairwell = 4 x 30 = 120"
1	600	3rd floor to stairwell = 3 x 30 = 150"
B ₁	100	
B ₂	300	
B ₃	400	

Stair width required:

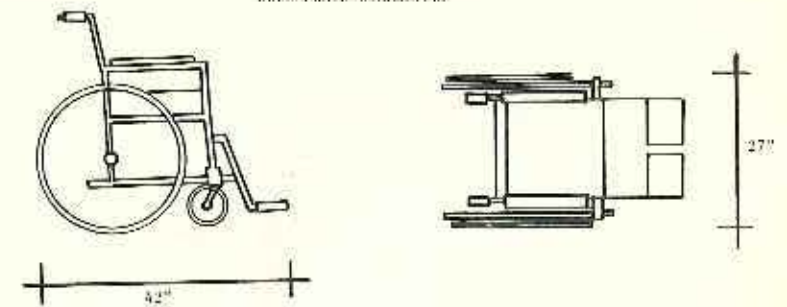
- 5th to 4th - 300 persons (100%) x 30"/100 persons = 90"
- 4th to 3rd - [400 persons (100%) + 300 persons (50%)] 30"/100 persons = 165"
- 3rd to 2nd - [500 persons (100%) + 400 persons (50%) + 300 persons (25%)] 30"/100 persons = 232.5"
- 2nd to 1st - [200 persons (100%) + 300 persons (50%) + 400 persons (25%)] 30"/100 persons = 165" (Use 232.5")
- 1st to exterior - [600 persons (100%) + (200 persons + 100 persons) (50%) + (500 persons + 300 persons) (25%)] 30"/100 persons = 285"
- B₁ to 1st - [100 persons (100%) + 300 persons (50%) + 400 persons (25%)] 30"/100 persons = 195" (Use 150")
- B₂ to B₁ - [300 persons (100%) + 400 persons (50%)] 30"/100 persons = 150"
- B₃ to B₂ - 400 persons (100%) x 30"/100 persons = 120"

Stair width required from B₁ to 1 is 150" as stair cannot decrease in width along path to exit [and 51.16 (2) (c)].

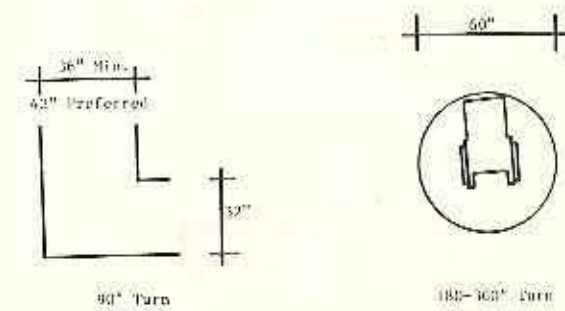
Appendix

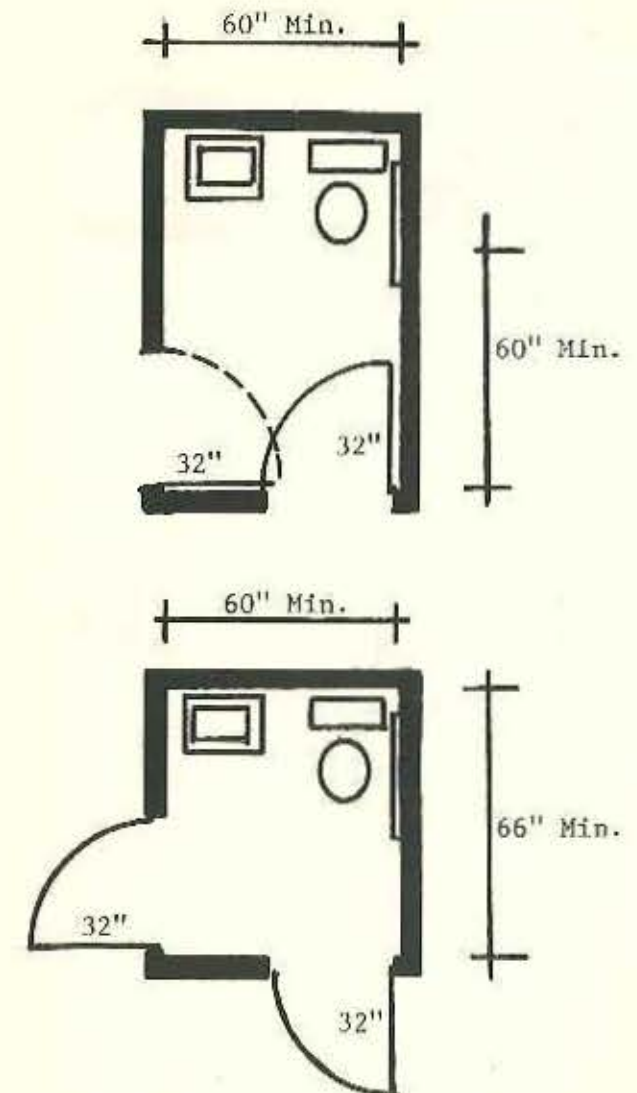
A-52.04 REQUIREMENTS FOR BARRIER-FREE ENVIRONMENTS. The following illustrations are provided to give the designer visual aids for making facilities accessible.

WHEELCHAIR DIMENSIONS

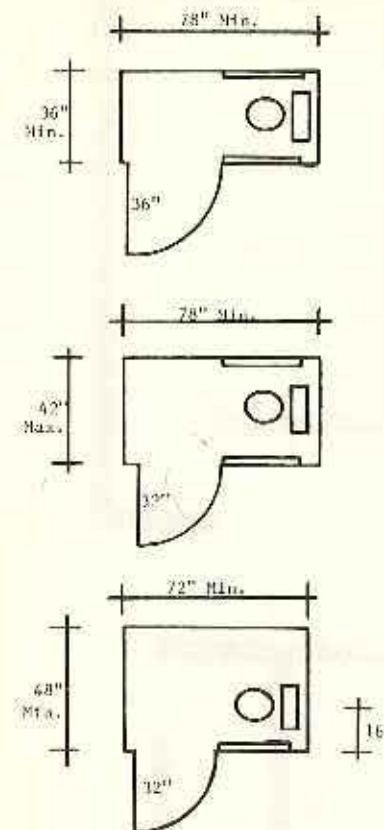


TURNING SPACE



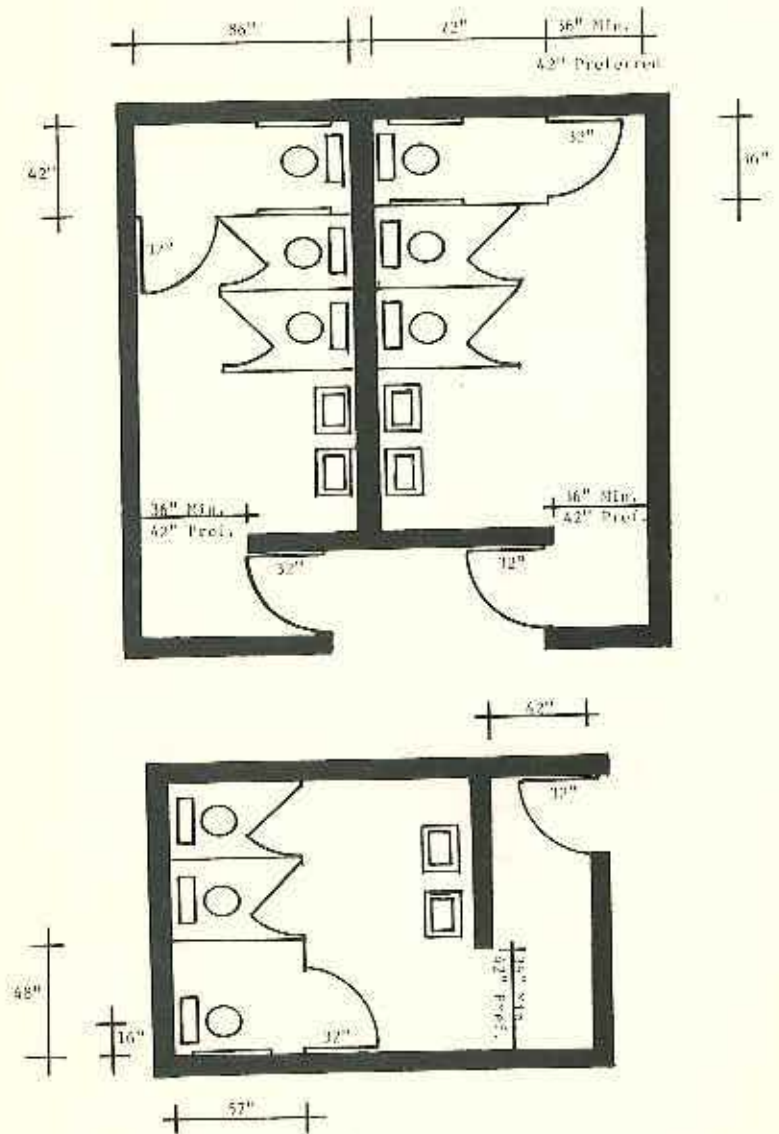
EXAMPLES OF ACCESSIBLE TOILET ROOMS
CONTAINING ONE LAVATORY AND ONE WATER CLOSET

EXAMPLES OF WATER CLOSET COMPARTMENTS
WITH A SIDE ENTRANCE APPROACH



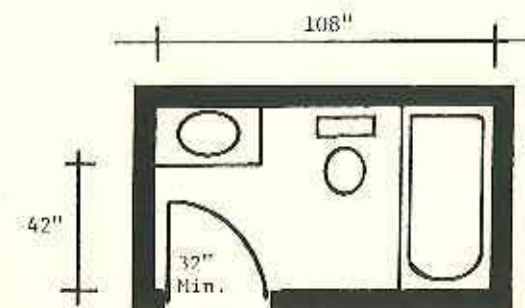
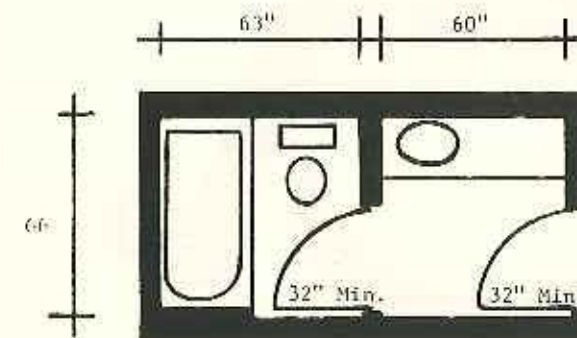
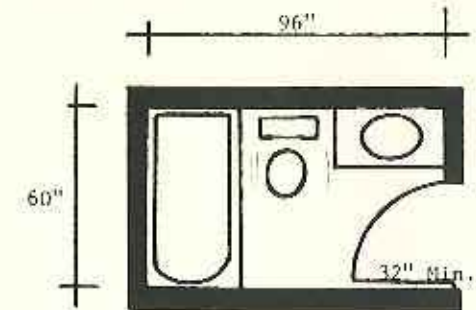
(The water closet compartments
are located within a toilet
room.)

EXAMPLES OF ACCESSIBLE TOILET ROOMS



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EXAMPLES OF ACCESSIBLE BATHROOM LAYOUTS
FOR MOTELS AND RESIDENTIAL LIVING UNITS





INTERNATIONAL SYMBOL FOR BARRIER-FREE ENVIRONMENTS

Appendix

A-57.19 The intent of this section is to apply to floor levels not more than one story below grade (at building).

A-57.18 (6) 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.

A-60.19 (4) The standard is available from the National Fire Protection Association, 470 Atlantic Ave. Boston, Massachusetts 02210.

A-60.24 Class A fires are fires in ordinary combustible materials such as wood, cloth, paper, rubber, and many plastics. Class B fires are fires in flammable liquids, gases and greases.

A-60.35 See A-60.24.

A-60.36 (1) (a). See A-60.19 (4).

A-64.20. EQUIPMENT RATINGS AND SAFETY CONTROLS. The department recognizes the following reference standards for the testing and installation of heating and ventilating equipment:

(1) National Fire Protection Association, 470 Atlantic Ave., Boston, Mass. 02210:

- (a) OIL-BURNING EQUIPMENT, NFPA No. 31;
- (b) NATIONAL FUEL GAS CODE, NFPA No. 54.

(2) American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018:

- (a) GAS-FIRED ROOM HEATERS, Vol. 1, ANSI Z21.11.1;
- (b) GAS-FIRED LOW PRESSURE STEAM AND HOT WATER BOILERS, ANSI Z21.13;
- (c) GAS UNIT HEATERS, ANSI Z21.16;
- (d) DOMESTIC GAS CONVERSION BURNERS, ANSI Z21.17;
- (e) GAS APPLIANCE PRESSURE REGULATORS, ANSI Z21.18;
- (f) AUTOMATIC GAS IGNITION SYSTEMS AND COMPONENTS, ANSI Z21.20;
- (g) AUTOMATIC GAS VALVES, ANSI Z21.21;
- (h) RELIEF VALVES AND AUTOMATIC GAS SHUTOFF DEVICES FOR HOT WATER SYSTEMS, ANSI Z21.22;
- (i) GAS APPLIANCE THERMOSTATS, ANSI Z21.23;
- (j) GAS-FIRED DUCT FURNACES, ANSI Z21.34;
- (k) GAS FILTERS ON APPLIANCES, ANSI Z21.36;
- (l) GAS-FIRED GRAVITY AND FAN TYPE DIRECT VENT WALL FURNACES, ANSI Z21.44;
- (m) GAS-FIRED GRAVITY AND FORCED AIR CENTRAL FURNACES, ANSI Z21.47;
- (n) GAS-FIRED GRAVITY AND FAN TYPE FLOOR FURNACES, ANSI Z21.48;
- (o) GAS-FIRED GRAVITY AND FAN TYPE VENTED WALL FURNACES, ANSI Z21.49;
- (p) VENTED DECORATIVE GAS APPLIANCES, ANSI Z21.50;
- (q) GAS-FIRED SINGLE FIREBOX BOILERS, ANSI Z21.52;
- (r) GAS-FIRED HIGH PRESSURE STEAM AND HOT WATER BOILERS (Inputs not over 400,000 Btu/hour), ANSI Z21.59;
- (s) DECORATIVE GAS APPLIANCES FOR INSTALLATION IN VENTED FIREPLACES, ANSI Z21.60;
- (t) DIRECT GAS-FIRED MAKE-UP AIR HEATERS, ANSI Z83.4;
- (u) GAS-FIRED HEAVY DUTY FORCED AIR HEATERS, ANSI Z83.5;
- (v) GAS-FIRED INFRARED HEATERS, ANSI Z83.6.

(3) Underwriters' Laboratories, Inc., 207 East Ohio St., Chicago, Illinois 60611:

- (a) OIL BURNERS, UL 298;
- (b) CONTROLS, PRIMARY SAFETY FOR GAS- AND OIL-FIRED APPLIANCES, UL 372;
- (c) HEATING APPLIANCES, ELECTRIC, UL 499;
- (d) HEAT PUMPS, UL 559;
- (e) OIL-FIRED BOILER ASSEMBLIES, UL 726;
- (f) OIL-FIRED CENTRAL FURNACES, UL 727;
- (g) HEATERS, AIR, AND DIRECT-FIRED HEATERS, OIL-FIRED, UL 733;
- (h) COMMERCIAL-INDUSTRIAL GAS HEATING EQUIPMENT (Inputs over 400,000 Btu/hour), UL 735;
- (i) HEATERS, ELECTRIC, FOR USE IN HAZARDOUS LOCATIONS, Class I, Groups A, B, C and D, and Class II, Groups E, F and G, UL 823;
- (j) ELECTRIC BOILERS, UL 834;
- (k) HEATERS, ELECTRIC DRY BATH, UL 875;
- (l) FAN COIL UNITS AND ROOM FAN HEATER UNITS, UL 883;

- (m) HEATERS, ELECTRIC AIR, UL 1025;
- (n) HEATING EQUIPMENT, ELECTRIC BASEBOARD, UL 1042;
- (o) HEATING EQUIPMENT, ELECTRIC CENTRAL AIR, UL 1096.

Note: The table on the following page is a tabular summary of UL 298 and UL 795.

TABULAR SUMMARY OF STANDARD 296 AND UL STANDARD 795

FUNCTION/BURNER INPUTS	OIL BURNERS UL 296				COMMERCIAL/INDUSTRIAL GAS UL 795				ATH Draft
	3 GPH 400,000 Btu or less	7 GPH 1 million Btu or less	20 GPH 3 million Btu or less	Over 20 GPH 3 million Btu	Over 400,000 to 2,500,000	Over 2,500,000 to 5,000,000	Over 5,000,000 to 12,500,000	Over 12,500,000	
Prepurge timing	—	—	—	—	—	—	—	—	90 sec ²
Air changes	—	—	—	—	—	—	—	—	—
Interlock Controls (Recycle)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Proven combustion air	—	—	—	—	—	—	—	—	—
Valve seal overtravel ⁹	—	—	—	—	—	Optional	Yes ¹⁰	Yes ¹⁰	—
Low gas pressure	—	—	—	—	—	Yes ¹⁰	Yes ¹⁰	Yes ¹⁰	—
High gas pressure	—	—	—	—	—	Yes ¹⁰	Yes ¹⁰	Yes ¹⁰	—
Low fire start	—	—	—	—	—	—	—	—	—
High limit (press. or temp.)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	—
Low water cutoff	Boilers ²¹	Boilers ²¹	Boilers ²¹	Boilers ²¹	Boilers	Boilers	Boilers	Boilers	—
Pilot - Intermittent	Optional ¹⁸	Optional ¹⁸	Optional ¹⁸	—	Optional ¹⁸	Optional ¹⁸	Optional ¹⁸	Optional ¹⁸	—
Pilot - Interrupted	—	—	—	Yes ⁵	Optional ¹⁸	Optional ¹⁸	Optional ¹⁸	Optional ¹⁸	—
Direct spark ignition	Yes	Yes	Yes	—	—	—	—	—	—
System & sequence approved safety control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Approved safety shutoff valves (SSOV)	IN	BURNER	DESIGN	—	Yes ¹⁴	Yes ¹⁴	Yes ¹⁴	Yes ¹⁴	Yes ¹⁴
No vent valve	—	—	—	—	—	—	—	—	—
Pilot valve	—	—	—	—	—	—	—	—	—
Proven pilot	Optional ¹⁷	Optional ¹⁷	Optional ¹⁷	Yes	Yes ⁵	Yes	Yes	Yes	Yes
Trial for pilot	—	—	—	—	—	—	—	—	—
Trial for main flame	90 sec ^{2,17}	30 sec ^{2,17}	15 sec ^{2,17}	10/30 sec ²	15 sec	10 sec	10 sec	10 sec	—
Flame failure response time	90 sec ¹⁷	4 sec max ^{6,17}	4 sec max ^{15,17}	4 sec max ²¹	4 sec max	4 sec max	4 sec max	2 sec max	—
Valve closing time (max.)	—	—	—	—	5 sec max	1 sec max	1 sec max	1 sec max	—
Supervise main flame	—	—	—	—	—	Yes ²	Yes ²	Yes ²	—
Action on flame failure	Recycle optional ¹	—	—	Lockout or recycle	Lockout or recycle ²	Lockout	Lockout	Lockout	—
Action on limit open	Close SSOV	Close SSOV	Close SSOV	Close SSOV	Close SSOV	Close SSOV	Close SSOV	Close SSOV	—

See following page for footnotes.

FOOTNOTES TO TABULAR SUMMARY UL
STANDARD 298 AND UL STANDARD 795

SSOV—Safety shutoff valve.

*May relight if ignition is re-energized within 0.8 sec. See 15 and 16.

*Where intermittent pilot is desired, it is allowable to switch from pilot detector to main flame detector if main flame detector responds to main flame only.

*Without shutters, no prepurge required.

*Options (whichever is chosen, a minimum of 4 air changes must be provided): 30 sec at high fire rate; OR
60 sec at $\frac{1}{2}$ high fire rate; OR
90 sec at $\frac{1}{3}$ high fire rate.

*With 2-stage lightoff, direct ignition is permitted if first stage is 20 gph or less (requirements for 20 gph or less apply). Pilot is required if igniting more than 20 gph.

*Lockout on interrupted pilot applications; recycle on intermittent pilot applications.

*10 sec for distillate fuel (No. 1 or No. 2); 30 sec for residual fuel (No. 4, 5, 6).

*Conventional type pressure burner: none needed. Needed for applications with combustion air supply separate from oil supply.

*Valve seal overtravel switch can be wired into either the start circuit or pre-ignition interlock circuit (if provided).

*Interrupted pilot over 2.5 million Btuh if modulating or high/low firing rate. Otherwise over 5 million Btuh.

*If low fire start is not proved, UL will test for smooth lightoff at high fire.

*Intermittent up to 5 million Btuh unless firing rate control is over 2,500,000 Btuh.

*Requirements same as mechanical draft burners.

*See Table 1 at end of footnotes for main gas valves.

*Up to 15 sec is permitted if intermittent ignition is employed, or if the ignition system is re-energized in not more than 0.8 sec after flame is extinguished.

*Up to 30 sec is permitted if intermittent ignition is employed, or if the ignition system is re-energized in not more than 0.8 sec after flame is extinguished.

*If proved pilot igniter is used, timings for over 20 gal flame safeguard control may be applied.

*Required for electrically ignited, gas-piloted systems.

*Interrupted pilot may be required if using flame safeguard control with a proved pilot. Otherwise, interrupted pilot is optional.

*Safety shutdown by this limit can be accomplished either by manual reset limits or in the programmer limit circuit.

*Required on boilers fired by oil burners—not a requirement of UL 298.

*If intermittent pilot is used, no main burner flame-establishing period is required.

*If a separate oil valve is used, it must close within 5 sec max when de-energized.

Appendix

TABLE 1—AUTOMATIC MAIN GAS SAFETY
SHUTOFF VALVES (SSOV) FOR MECHANICAL OR
ATMOSPHERIC BURNERS—UL 756 REQUIREMENTS,
EFFECTIVE OCTOBER 1, 1974

	400,000 to 2,500,000 BTUH	Over 2,500,000 to 5,000,000 BTUH	Over 5,000,000 to 12,500,000 BTUH	Over 12,500,000 BTUH
Main Valve Requirement	One valve rated for safety shutoff services (SSOV). Closing time 5 sec.	Two SSOV's in series, or one SSOV of the type incorporating a valve seal overtravel interlock. Closing time 1 sec. max.	Two SSOV's in series, one of which incorporates a valve seal overtravel interlock. Closing time 1 sec. max.	Two SSOV's in series, one of which incorporates a valve seal overtravel interlock. When fuel gas has specific gravity of less than 1.0, include a N.O. ½ inch or larger electrically operated valve in a vent line between the two SSOV's.

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See also first page of each chapter for listing of section headings.

NOTE: An asterisk (*) following a subject reference indicates further requirements will be found in the "occupancy chapters" of the code—chapters Ind 54 through 60.

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