

Ind 50 to 64

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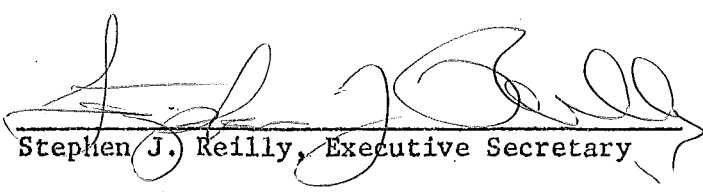
STATE OF WISCONSIN )  
 ) SS  
DEPARTMENT OF INDUSTRY, )  
LABOR AND HUMAN RELATIONS )

TO ALL TO WHOM THESE PRESENTS SHALL COME, GREETINGS:

I, Stephen J. Reilly, Executive Secretary of the Department of Industry, Labor and Human Relations, and custodian of the official records of said Department, do hereby certify that the attached rules to Wisconsin Administrative Code chapters Ind 50-64--Building and Heating, Ventilating and Air Conditioning Code, were adopted by the Department of Industry, Labor and Human Relations on October 6, 1975.

I further certify that said copy has been compared by me with the original on file in this Department and that the same is a true copy thereof and of the whole of such original.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the official seal of the Department at the Capitol, in the City of Madison, this 6 day of October, A.D., 1975

  
Stephen J. Reilly, Executive Secretary

ORDER OF  
DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS

Pursuant to authority vested in the Department of Industry, Labor and Human Relations by sections 101.01 to 101.20, Wis. Stats., the Department of Industry, Labor and Human Relations hereby amends, creates, repeals, repeals and recreates, and adopts rules of Wisconsin Administrative Code Chapters Ind 50-64--Building and Heating, Ventilating and Air Conditioning Code.

The rules attached hereto shall become effective January 1, 1976, as provided in chapter 227, Wis. Stats.

Section Ind 50.03 (4) Note to be created to read:

Note: Section 101.05, Wis. Stats., exempts from building code requirements buildings located on research or laboratory farms of public universities or other state institutions used primarily for housing livestock or other agricultural purposes.

Subsections Ind 50.10 (3) and (4) to be repealed and recreated to read:

(3) Information required on plans. At least 3 complete sets of plans, which are clear, legible and permanent copies, shall be submitted for approval. The plans shall be approved before work is commenced. Complete foundation and footing plans may be submitted for approval prior to submitting the building plans if the plot plan, itemized structural loads, complete footing or foundation design calculations and schematic floor plans are included showing exits, windows, and other pertinent information. The following information shall be a part of or shall accompany all plans submitted for approval:

- (a) Name of the owner of the building and address of the building.
- (b) 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.
- (c) 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 A-E 1.04 (4)--registration seals.
- (d) A floor plan for each floor locating all rooms, windows, toilet facilities, and structural elements.
- (e) Schematic diagrams showing exiting arrangements.  

Note: Diagrams should show normal paths of egress based on intended use of any area of the building.
- (f) A room schedule indicating the intended use of all rooms and the number of occupants accommodated therein.
- (g) Elevation and sections to illustrate and clarify the design, where required.
- (h) A description of the construction for walls, floors, ceilings and roof.
- (i) The location, size and type of all equipment.
- (j) The size and continuity of all pipe and duct work, dampers and grilles.
- (k) A description of construction and location of chimney(s).
- (l) The location of required fire or smoke dampers.
- (m) Known special hazards to occupants shall be noted; e.g., flammable and combustible liquids, explosives, toxic gases and chemicals, and radio-active materials.
- (n) Specifications shall be properly identified with the drawings.

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: Plumbing and swimming pool plans 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 and 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. 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 bracing of buildings, see Wis. Adm. Code chapter Ind 35, a supplement to chapters Ind 1000-2000, Wis. Safety and Health Code.

(b) Thermal performance data. Calculations shall be provided showing that the maximum average Btu per hour per square foot loss for the exterior envelope does not exceed the requirements set forth in subsection Ind 51.02 (16) (a) for the proposed construction.

(c) Heating and ventilating data. Calculations shall be provided including the construction losses for each typical room, total heat loss calculated in Btu per hour, CFM circulation, outside air and exhaust air required, and a summation(s) of total heating and ventilating requirements including:

1. A listing of specific heating and/or ventilating unit(s) with their input and net rating in Btu/hour to satisfy the summation(s). For direct-fired equipment, give input rating.
2. Where more than one heating and/or ventilating unit is to be installed, provide a separate summation for each unit.

Note: Cross reference: The department will accept as the basis for calculations and design data, the methods and standards recommended by the Mechanical Contractors' Association of America; the American Society of Heating, Refrigerating and Air Conditioning Engineers; and the Institute of Boiler and Radiator Manufacturers.

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

Subsection Ind 50.10 (7) to be repealed and recreated to read:

- (7) Drawings, specifications and calculations for buildings containing less than 50,000 cubic feet total volume and alterations to buildings containing less than 100,000 cubic feet total volume shall be submitted to cities certified by the department for examination and approval according to requirements of this code. Materials submitted to said cities for examination and approval need not be submitted to the department.

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

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

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Subsection Ind 51.01 (86) [following intro. par. and preceding (a)] the following notice to be created to read:

*NOTICE: 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.*

Subsection Ind 51.02 (18) to be created to read:

(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 provided if the roof has a slope greater than 6 in 12.

Section Ind 51.045 (Table 2) to be amended to read: (See attached Table 2.)

Section Ind 51.047 to be repealed and recreated to read:

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)].

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	1-1/2-hour
1-hour	3/4-hour
3/4-hour	3/4-hour

- (a) Doors leading to fire escapes, except doors leading to Class A fire escapes in apartments and row houses, shall be at least 3/4-hour fire-rated door assemblies.

Amendments to Table 2

	INSULATING MATERIAL	DESCRIPTION	MINIMUM REQUIREMENTS			
			4 Hr.	3 Hr.	2 Hr.	1 Hr.
Line 13.	(no change)	(no change)	10"	8"	6"	4"
Line 22.	Gypsum wallboard below 2-2" x 10"s 4'-0" o/c 1-1/8" plywood flooring or gypsum wallboard below 2" x 10"s 16" o/c	"t <sub>i</sub> " Insul.				5/8"
	1/2" plywood or 1" x 6" T&G subflooring	"t <sub>f</sub> " Flooring				5/8" plywood or 1" x 3" T&G
Line 23.	Noncombustible acoustical tile below 2" x 10"s 16" o/c	"t <sub>i</sub> " Insul.				5/8"
	5/8" plywood or 1" x 4" T&G subflooring	"t <sub>f</sub> " Flooring				1/2" plywood or 1" x 6" T&G

Note to Revisor: Complete table will be submitted in a separate package.

(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 1/8 inch on sides and top and 3/4 inch at bottom between sill or floor.
- (6) Door closing devices. All labeled fire-rated doors, where required, shall be equipped with an approved closing device.
  - (a) Doors with a self-closing device shall remain in a closed position except when in use.

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

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

Note: For type of closing device permitted, please refer to sections dealing with classes of construction and/or occupancy chapters.

Section Ind 51.048 to be renumbered Ind 51.050.

Section Ind 51.048 to be created to read:

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 3/4-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: Fire 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 54 inches maximum height.) For light fire exposure, the individual glass size is limited to 1,296 square inches. (Size limitation either 54 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, 1/4-inch thick, and shall be well bedded in approved glazing compound. All exposed joints between the metal shall be struck and pointed. The clearance between the edges of the glass and metal framing shall not exceed 1/8 inch.
- (c) Glass block. Glass block assemblies shall be installed according to the details of the tested assembly.

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

- (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.

Section Ind 51.049 to be created to read:

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 64.42.

Section Ind 52.001 to be repealed.

Subsection Ind 52.04 (3) (b) to be repealed and recreated to read:

(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% (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.

Subsection Ind 52.04 (4) to be repealed and recreated to read:

(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 subsection Ind 52.04 (4). All buildings with multiple uses shall comply with subsection Ind 52.04 (5).

Note: The footnotes in 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.
- (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 subsection 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 employes and less than 25 patrons per Ind 52.51 (1) (b) and Ind 52.12 (7).

(d) Buildings with multiple uses.

1. 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.
2. 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.

Note to Revisor: Upon the expiration of the 30-day notice (November 1, 1975) which includes the repeal of subsection Ind 52.04 (5), the order of adoption will include the renumbering of the above Ind 52.04 (4) (d) to Ind 52.04 (5) (a) and (b).

Table 52.04 to be repealed and recreated to read: (See following table)

TABLE 52.04  
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 <sup>1</sup>	Yes
II. Government-owned buildings . . . . .	Yes	Yes	Yes
III. Factories, office and mercantile buildings . . . . .	Yes	Yes <sup>1</sup>	Yes <sup>2</sup>
A. Dental and medical clinics and offices. . . . .	Yes	Yes	Yes
IV. Theaters and assembly halls. . . . .	Yes	Yes <sup>1</sup>	Yes
A. Churches (Ch. Ind 54 and 55). . . . .	Yes <sup>3</sup>	Yes <sup>4, 6</sup>	Yes <sup>5</sup>
B. Auditoriums, theaters, stadiums and permanent bleachers . . . . .	Yes	Yes <sup>6</sup>	Yes
C. Night clubs, bars, restaurants and recreational facilities (Ch. Ind 54 and 55)	Yes	Yes <sup>1, 7</sup>	Yes
V. Schools and other places of instruction. . . . .	Yes	Yes <sup>1, 7</sup>	Yes
VI. Libraries, museums and art galleries . . . . .	Yes	Yes <sup>1</sup>	Yes
VII. Residential occupancies. . . . .	Yes	Yes <sup>1</sup>	Yes
A. Apartments. . . . .	Yes <sup>8</sup>	Yes <sup>9</sup>	Yes <sup>10</sup>
B. Row houses and garden apartments. . . . .	Yes <sup>11</sup>	Yes <sup>9</sup>	Yes <sup>10</sup>
C. Hotels and motels . . . . .	Yes	Yes <sup>7, 12</sup>	Yes <sup>13</sup>
D. Group foster homes. . . . .	Yes	Yes <sup>14</sup>	Yes
VIII. Day care centers <sup>15</sup> . . . . .	Yes	Yes	Yes
IX. Hospitals and other health care facilities . . . . .	Yes	Yes	Yes <sup>16</sup>
X. Places of detention. . . . .	Yes	Yes <sup>1, 17</sup>	Yes
XI. Garage occupancies . . . . .	Yes	Yes <sup>1</sup>	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

<sup>1</sup>If 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.

<sup>2</sup>In 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.

<sup>3</sup>Churches 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%.

<sup>4</sup>Interior circulation is not required between floor levels.

<sup>5</sup>In 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.

<sup>6</sup>Interior 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 grade; the other half of the accessible seating spaces shall be designed for patrons using braces, crutches or similar aids. Ramp details [Ind 52.04 (7)] do not apply to the aisles in theater auditoriums.

<sup>7</sup>Interior circulation shall be provided to any level containing the only facility of its kind.

<sup>8</sup>Access, via a public entrance, shall be provided to a primary floor with living units.

<sup>9</sup>Interior 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.

<sup>10</sup>Grab bars and special lavatories or water closets are not required.

<sup>11</sup>In row houses, garden apartments, 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.

<sup>12</sup>Accessible 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.

<sup>13</sup>Self-rising toilet seats and glass tub enclosures are prohibited.

<sup>14</sup>In group foster homes, common-use areas and 10% of the sleeping rooms shall be accessible.

<sup>15</sup>Access, interior circulation, and toilet facilities do not apply to a change of use.

<sup>16</sup>Twenty 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.

<sup>17</sup>In penal institutions, 10% of the total number of required institutional living units shall be accessible. Vertical transportation between tiers of cells is not required.

Subsection Ind 52.04 (7) (e) to be amended to read:

- (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 5 feet of level clearance at the bottom of the ramps.

Subsections Ind 52.04 (8) (c) and (d) to be amended to read:

- (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.

Subsections Ind 52.04 (9) (a) and (b) to be repealed and recreated to read:

(9) Miscellaneous details.

(a) Doors.

1. Door sizes. All accessible doors shall be at least 32 inches wide.
2. Door thresholds. Thresholds at exterior doors shall not extend more than 5/8-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 closures 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, 16 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.

Subsection Ind 52.04 (9) (c) 3. to be repealed.

Subsection Ind 52.04 (9) (d) Note #1 to be amended to read:

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

Section Ind 52.10 to be repealed.

Section Ind 52.11 to be repealed.

Section Ind 52.12 to be repealed.

Section Ind 52.14 to be repealed.

Section Ind 52.18 to be repealed.

(Note to Revisor: The above sections, Ind 52.10, 52.11, 52.12, 52.14 and 52.18, have been incorporated in the new chapter Ind 64--Heating, Ventilating and Air Conditioning.)

Section Ind 53.14 to be amended to read:

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.

Section Ind 54.09 to be repealed.

Section Ind 56.06 to be repealed and recreated to read:

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 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 7-1/2 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.

(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.
- (6) Exit lights. All required exits indicated in subsection 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 subsection Ind 51.15 (5).

Section Ind 56.08 to be repealed and recreated to read:

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.
- (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.

Section Ind 56.10 to be repealed.

Subsection Ind 57.03 (1) to be amended to read:

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.



Subsection Ind 57.12 (4) to be amended to read:

- (4) Every elevator shaft, dumbwaiter shaft, clothes chute, wastepaper 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.

Section Ind 57.23 to be repealed.

Subsection Ind 57.25 (2) (d) to be amended to read:

- (d) Each living unit shall have attic access as specified in subsection Ind 51.02 (18) (a). The other provisions of Ind 51.02 (18) (b) need not be complied with.

Subsection Ind 57.50 (2) (a) 2. Note to be created to read:

Note: Section 167.19, Wis. Stats., 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.

Subsection Ind 57.53 (2) (g) to be repealed.

CHAPTER IND 64

HEATING, VENTILATING AND AIR CONDITIONING

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- Ind 64.64 Automobile showrooms
- Ind 64.65 General sanitation and service areas
- Ind 64.66 Kitchens
- Ind 64.67 Seasonal occupancies

Chapter Ind 59--Heating, Ventilating and Air Conditioning, is repealed and Chapter Ind 64 is created to read:

CHAPTER IND 64  
HEATING, VENTILATING AND AIR CONDITIONING

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.

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.

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 50.10 and Ind 50.13.

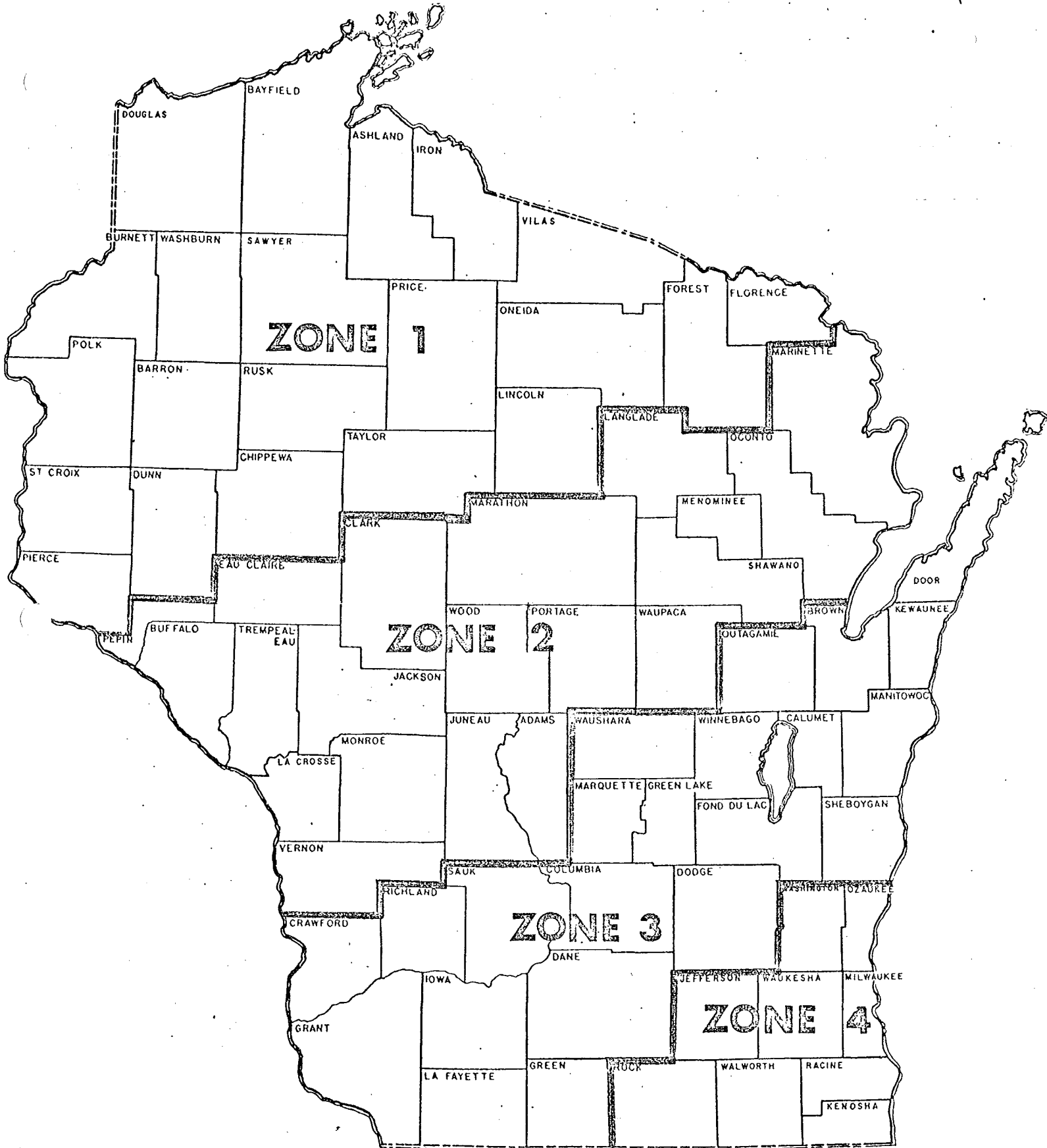
PART II--DESIGN REQUIREMENTS

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.

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.

MAP OF WISCONSIN SHOWING DESIGN TEMPERATURE ZONES



Zone 1 . . . . .	-25° below zero F
Zone 2 . . . . .	-20° below zero F
Zone 3 . . . . .	-15° below zero F
Zone 4 . . . . .	-10° below zero F

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.
- (2) Ventilation requirements. The ventilating system shall be designed, maintained and operated to accomplish the required ventilation indicated in Table 1.

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) 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: The intent of this statement is not to require full outside air when there is not full occupancy of the building. The opening of outside air intakes may be delayed one hour after initial occupancy of the building.

Note #2: See Ch. Ind 1000-2000, Wis. Safety & Health Code, for requirements for dust, fumes, vapors and gases.

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 1-1/2 times the distance below grade at the bottom of the opening.

Note: Width of clear space is the horizontal distance measured at right angles to the plane of the opening.

- (b) Outdoor openings 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 51.03-B and section Ind 64.19.

TABLE 1

Use or Occupancy	Minimum Inside Temp. (Deg. F)	Ventilation Classification <sup>2</sup>	Ventilation Requirements <sup>1</sup>			Applicable Occupancy Code Section (Ind No.)
			Basis of Capacity		CFM/net sq. ft. Floor Area	
			Determination of No. of Persons <sup>3</sup>	% of Openings <sup>4</sup>		
			Net sq. ft. per Person			
<b>Factories, office and mercantile buildings</b>						
Barber and beauty salons	67	(b)	20	3	--	64.54
(where hair spray is used)	67	(d)	20	3	--	64.54
Canning factories (June 1-Sep 15)	NMR	(b)	75	3	--	64.54, 64.67
(other months)	60	(a)	--	3	--	64.54
Computer rooms	67	(a)	75	--	--	64.54
Conference rooms	67	(b)	7	3	--	64.54
Court rooms	67	(b)	6	3	--	64.54
Factories and machine shops	60	(b)	75	3	--	64.54
First aid rooms	67	(b)	15	5	--	64.54 (5)
Flammable liquids storage	NMR	(d)	--	--	--	S&H Code
Foundries and boiler shops	50	(b)	75	3	--	64.54
Funeral homes:						
Chapel	67	(b)	6	5	--	64.54
Embalming room	67	(d)	--	--	2	64.54
Offices	67	(b)	75	3	--	64.54
Printing establishments	60	(b) and (d)	--	3	--	64.54 and S&H Code
Retail establishments (basement)	65	(b)	40	3	--	64.54
(other)	65	(b)	60	3	--	64.54
Security vaults (occupied)	65	(a)	300	--	--	64.54
Warehouses	NMR	--	--	--	--	64.18, 64.54
(See Theaters and places of assembly for places of worship, entertainment and recreation which accommodate less than 100 persons.)						
<b>Theaters and places of assembly</b>						
Arenas and field houses (use seated area)	60	(a)	6	--	--	64.55
Armories (drill halls)	55	(a)	30	--	--	64.55
Assembly halls (other than church)	67	(a)	6	--	--	64.55
Bowling alleys	67	(b)	15	--	--	Based on occupied areas
Cafeterias, dining areas, restaurants, billiard rooms	67	(b)	15	3	--	64.55
Churches and places of worship:						
Chapels	67	(b)	6	3	--	64.55 (3)
Dining and social rooms	67	(b)	15	3	--	64.55 (3)
Nave or auditorium	67	(b)	6	3	--	64.55 (3)
Sunday school rooms	67	(b)	20	3	--	64.55 (3)
Club rooms (seated)	67	(b)	6	3	--	64.55
(unseated)	67	(b)	15	3	--	64.55
Dance halls	67	(a)	15	3	--	64.55
Lodge halls	65	(b)	--	3	--	64.55
Places for entertainment and dining	60	(a) or (c)	15	--	--	64.55
Roller and ice skating rinks (indoor)	50	(a)	15	--	--	64.55
Ice resurfacing machine area	NMR	(c)	--	--	1/2	64.55
Taverns (50 or less persons)	67	(b)	20	3	--	64.55
(over 50 persons)	67	(a)	20	--	--	64.55
Tennis courts (indoor)	55	(b)	--	--	--	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 (5)
<b>Hospitals and nursing homes</b>						
Corridors	75	(a) and (d)	--	--	--	64.57
Day rooms	75	(b)	15	5	--	64.57
Laboratories	67	(a) and/or (d)	25	--	--	64.18 and S&H Code
Laundries	60	(d)	--	--	2	64.65
Nurses stations	75	(b)	15	5	--	64.57
Operating rooms	70	(a) and (d)	--	--	--	64.57
Private rooms, wards, dormitories	75	(b)	--	5	--	64.57
Recovery, labor, delivery, anesthesia, nurseries, isolation, therapy, autopsy rooms and bathrooms	75	(a) and (d)	--	--	--	64.57
Storage rooms for anesthetics, bed pans, soiled linen, and sterilizing rooms	60	(d)	--	--	2	64.65

CA = Cooking appliance.

LF = Lineal foot.

NMR = No minimum requirements.

S&amp;H Code = Chapters Ind 1000-2000, Wis. Safety and Health Code.

TF = Toilet facilities (water closets and urinals).

<sup>1</sup>Ventilation requirements. See sections Ind 64.06, 64.07 and 64.09 for mechanical, natural and exhaust ventilation systems; and sections Ind 64.11 through 64.18 for ventilation and air standards.<sup>2</sup>Ventilation classifications.

- (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 exempted.

<sup>3</sup>Determination 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.<sup>4</sup>Percent of openings. See section Ind 64.07 for special considerations on natural ventilation.

TABLE 1 (CONTINUED)

Use or Occupancy	Minimum Inside Temp. (Deg. F)	Ventilation Classification <sup>2</sup>	Ventilation Requirements <sup>1</sup>			Applicable Occupancy Code Section (Ind No.)
			Basis of Capacity			
			Determination of No. of Persons <sup>3</sup> Net sq. ft. per Person	% of Openings <sup>4</sup>	CFM/net sq. ft. Floor Area	
<u>Schools and other places of instruction</u>						
Administrative office space	67	(b)	75	3	--	64.56
Arts, crafts, drafting	67	(a) or (d)	30	--	--	64.56 (3) and S&H Code
Classrooms	67	(a)	20	--	--	64.56
Corridors	NMR	(a)	--	--	--	64.56 (2)
Gymnasiums, field houses, auditoriums, theaters (fixed seats)	55-67	(a)	6	--	--	64.56
Bleachers	--	(a)	2.75 or 18"/LF	--	--	64.56
Locker and shower rooms	70	(d)	--	--	2	64.65
Natatoriums	70	(d)	--	--	2 pool sf	64.65
Chlorine storage rooms	NMR	(d)	--	--	--	64.65
Home economics (non-cooking)	67	(a)	30	--	--	64.56
(cooking)	67	(a) and (d)	30	--	200/CA	64.66
Kitchens	60	(d)	--	--	2	64.66
Laboratories (science)	67	(a) and/or (d)	30	--	--	64.18 and S&H Code
Lecture halls	67	(a)	6	--	--	64.56
Libraries and resource centers	67	(a)	20	--	--	64.56
Reading rooms	67	(a)	20	--	--	64.56
Stack areas	67	(a) or (d)	100	--	1/4	64.56
Lunchrooms	65	(a)	10	--	--	64.56
Museums and art galleries	67	(a)	40	--	--	64.56
Music rooms (instrumental)	67	(a)	20	--	--	64.56
(vocal)	67	(a)	10	--	--	64.56
Special education	67	(a)	35	--	--	64.56
Study halls, common areas with nonfixed seating	67	(a)	10	--	--	64.56
Toilet rooms	65	(d)	--	--	2 or 60/TF	64.56
Vocational shops:						
With vehicle service and repair	60	(d)	--	--	3/4	64.18 and S&H Code
Without vehicle service and repair	60	(a)	50	--	--	64.18 and S&H Code
Wardrobes	NMR	(d)	--	--	2	64.65
<u>Penal institutions and places of detention</u>						
Cells	67	(a)	--	--	--	64.58
Corridors	67	(a) and (d)	--	--	--	64.58
<u>Residential occupancies</u>						
Living and sleeping areas	67	--	--	5	--	64.59
<u>Day care facilities</u>	67	(b)	35	5	--	64.60
<u>Garages and service stations</u>						
Automobile showrooms	60	(a) or (b)	--	--	--	64.55, 64.64
Garages (live storage):						
Less than 6 vehicles	NMR	NMR	--	--	NMR	
6 or more vehicles	NMR	(c)	--	--	1/2	64.63
Repair areas	60	(c)	--	--	3/4	64.61
Vehicle service buildings	60	(c)	--	--	1/2	64.62
<u>General sanitation and service areas</u>						
Chlorine storage rooms	NMR	(d)	--	--	1	64.65
Cloak rooms	NMR	(d)	--	--	2	64.65
Janitor closets	NMR	(c)	--	--	2	64.65
Locker rooms and shower rooms	70	(c)	--	--	2	64.65
Natatoriums	70	(c)	--	--	2 pool sf	64.65
Toilet rooms	65	(c)	--	--	2 or 60/TF	64.65
Kitchens	60	(d)	--	--	2	64.66
<u>Seasonal occupancies</u>						
Camps and lodges:						
Dining and recreational areas	NMR	(b)	15	3	--	64.67
Living and sleeping areas	NMR	--	--	5	--	64.67
Club houses	NMR	(b)	15	3	--	64.67
Drive-ins	NMR	(b)	15	3	--	64.67
Kitchens	NMR	(d)	--	--	2	64.66
Outdoor toilets	NMR	(d)	--	--	2	64.65

CA = Cooking appliance.

LF = Lineal foot.

NMR = No minimum requirements.

S&H Code = Chapters Ind 1000-2000, Wis. Safety and Health Code.

TF = Toilet facilities (water closets and urinals).

<sup>1</sup>Ventilation requirements. See sections Ind 64.06, 64.07 and 64.09 for mechanical, natural and exhaust ventilation systems; and sections Ind 64.11 through 64.18 for ventilation and air standards.

<sup>2</sup>Ventilation classifications.

- (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 exempted.

<sup>3</sup>Determination 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.

<sup>4</sup>Percent of openings. See section Ind 64.07 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 employes 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.

Note: Heat reclaim equipment for exhaust systems having more than 10,000 CFM capacity should be considered for energy savings.

Ind 64.09 COMBUSTION AIR INTAKES.

(1) Combustion air for burners. All burners shall be provided with combustion air by one of the following methods:

(a) Infiltration combustion air. Infiltration where total area of outdoor openings (doors and windows) is greater than 3% of the floor area in which the burner is located.

Note: See section Ind 64.25 for special conditions.

(b) Gravitational combustion air. Gravity intakes shall have a free area of at least one square inch for each 5,000 BTU per hour of fuel consumed to supply combustion air for atmospheric burners. The minimum free area of the intake shall be at least 100 square inches. For other equipment, a minimum free area of 0.5 square foot per 1,000,000 BTU per hour shall be provided.

1. Manually operated dampers are prohibited.

2. Motorized dampers are acceptable when interconnected with the burner of direct-fired equipment. Dampers shall be open when the burner is in operation. A safety interlock switch shall be installed to insure that the damper is in an open position before the burner is permitted to operate.

(c) Mechanical combustion air. Mechanical combustion air systems, such as makeup air units, are acceptable when complete design data, including the size of the combustion air intake, has been approved by the department.

Note: The department will accept 150% or more of theoretical combustion air requirements or burner manufacturer's recommendations.

(2) Combustion air for furnace rooms. All boiler and furnace rooms, and rooms containing flame-fired equipment, shall be provided with combustion air from the outside of the building as required by subsection (1) (b) or (c) above.

- (3) Burners in negative pressure locations. A natural-draft burner shall not be installed where the space in which the burner is located is under negative pressure due to an exhaust system.
- (4) Mounting height. Mounting height of the combustion air intakes shall be as required in section Ind 64.19 (c).

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.

### 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.

#### 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.
- (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.

#### 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.

#### 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.

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.

- (2) 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.
- (3) Air distribution. An adequate number of air supply, return and exhaust outlets or grilles shall be provided to insure a uniform distribution of air.
- (4) Recirculation and transfer air.
  - (a) Recirculation. No air contaminated by other than human occupancy shall be used for recirculation, except within the same occupancy classification. Air in a volume equal to the outside air required from a room may be discharged and recirculated through a corridor and exhausted through lockers, toilet rooms, kitchens, janitor closets and similar areas. Additional exhaust ventilation shall be provided where the volume of air exhausted from the corridor is less than the volume of air supplied.
  - (b) Transfer. Air shall not be transferred through elevator shafts and stairwells where doors are required at any floor level.

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.
  - (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.

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.

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 employes 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 tetrochloride, 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 lathers, shampoos and colognes.

1. The area shall have an exhaust system capable of maintaining a negative pressure within the enclosed area.
2. The volume and distribution of air movement within the area shall be such that the average threshold limit values of specific airborne contaminants are not exceeded. See Wis. Adm. Code Ch. 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.

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 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.

PART IV--HEATING EQUIPMENT REQUIREMENTS

Ind 64.20 BOILERS.

- (1) General. The boiler, ratings, safety devices and other auxiliary equipment shall be of a type approved by the department.

Note #1: See Wis. Adm. Code Ch. Ind 41--Boiler and Pressure Vessel Code.

Note #2: The department will accept manufacturers net ratings, but reserves the right to have the ratings verified by an independent testing agency.

- (2) Controls. The boiler shall be equipped with automatic controls that will shut off the fuel supply to the burner and pilot in case of ignition failure.

Ind 64.21 RADIATION AND CONVECTION EQUIPMENT. The rating of steam or hot water radiation and convection equipment shall be based on approved standards.

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.

Ind 64.22 GRAVITY DIRECT-INDIRECT SYSTEMS. The installation of gravity direct-indirect systems is prohibited.

Note: This rule is intended to prohibit the use of direct-indirect radiation whereby the outside air supply is admitted to the base and delivered at the top without mechanical assistance.

Ind 64.23 HOT WATER HEATING AND VENTILATING SYSTEMS. In hot-water systems installed in areas where ventilation is required under this code, the system hot water shall be circulated by mechanical means.

Ind 64.24 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 not less than 1/2-inch insulating material where the heat emission is objectionable, where piping is subject to freezing, or where the pipes pass through occupied areas.
- (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.

Ind 64.25 SPACE HEATERS.

- (1) Location. Space heaters are prohibited in hazardous occupancies. Space heaters may be used in motel guest rooms, individual apartments, individual offices and retail establishments, subject to the following provisions:
  - (a) Space heaters may be used in retail establishments provided the floor area of any story does not exceed 1500 square feet. Space heaters used in a retail establishment shall be provided with outside combustion air supplied directly to the burner.
  - (b) Space heaters may be used in offices located within a factory or warehouse building providing the total floor area of the office space or spaces does not exceed 500 square feet.
  - (c) Space heaters shall not be installed in any enclosed space having a volume less than 1000 cubic feet unless a combustion air supply is provided from the outside directly to the appliance.
- (2) Approved equipment. Space heaters shall be a type approved by the department. Space heaters not rated by a recognized testing laboratory shall have a net rating equal to 60% of fuel input. The rated input capacity shall not exceed 70,000 BTU per hour for each appliance.
- (3) Controls. Space heaters shall be equipped with an automatic pilot of the complete shut-off type for gas burners and an automatic valve in the oil supply line for oil burners that will close in case of ignition failure.
- (4) Minimum clearances. Space heaters shall be located at least 6 inches from any unprotected combustible wall or partition, unless approved by the department. Space heaters standing on a combustible floor shall be supported on legs securely fastened to the floor. The space under the unit shall not be enclosed.
- (5) Burners. 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.
- (6) Duct extensions. Space heaters shall not be equipped with duct extensions beyond the vertical and horizontal limits of the metal enclosure.

Ind 64.26 FURNACES.

- (1) Fan furnace installations. Forced-air heating systems shall be designed to prevent a negative pressure on the heat exchanger, except where systems are designed to supply 100% tempered outside air to replace a volume equal to that exhausted.
- (2) Gravity furnaces. Gravity furnaces shall be located so that the air supply circuits leading to and from them will be as short and direct as practicable. The outside air inlet to gravity furnace airways shall be such as to insure distribution of air to relatively unheated portions of the furnace proper and throughout the furnace airways. The top of such inlet shall not be higher than 2 inches below the top of the grates.

- (3) Rating. All furnaces not rated by a recognized testing laboratory shall have a net rating equal to 60% of fuel input.
- (4) Fire-resistive enclosure. The furnace shall be isolated in a fire-resistive enclosure constructed in conformity with the applicable provisions of the occupancy chapters of this code.
- (5) Approved type. Furnaces shall be a type approved by the department.
- (6) Controls. Furnaces shall be equipped with automatic controls that will shut off fuel supply to the burner and pilot in case of ignition failure.
- (7) Controls for fan furnace installations. All fan furnace installations shall be equipped with controls to shut off the heat-generating equipment whenever the bonnet air temperature exceeds a safe limit and to maintain air circulation through furnace airways whenever required to distribute the heat generated. The fan shall be of a capacity adequate to provide the required ventilation.

Note: The department recognizes equipment listed by Underwriters' Laboratories, American Gas Association, or other nationally recognized testing laboratories.

Ind 64.27 UNIT HEATERS, SUSPENDED FURNACES AND DUCT FURNACES. Appliances of this type are prohibited in theaters, assembly halls, places of worship, schools, hospitals, hotels, apartment houses, day care facilities, nursing homes, and places where more than 100 persons assemble for recreation, entertainment or dining purposes unless the equipment is located in a fire-resistive enclosure or located outside of the building.

- (1) Vented appliances. Vented appliances (where products of combustion are vented directly to the outside) are permitted in retail establishments, manufacturing plants, garages, service stations, machine shops, woodworking plants, foundries, offices, and similar areas, and shall comply with the following requirements:
  - (a) The appliance shall be suspended in an occupied space and be visible.
  - (b) The heating appliance shall be of an approved type.
  - (c) The heating appliance shall be supported by noncombustible brackets or hangers. All units shall be located at least 7 feet above any occupied floor, at least 6 inches away from any combustible wall, and at least 12 inches from any ceiling.

Note: The department will accept reduced clearances provided the equipment and clearances have been approved by a testing laboratory.

- (d) The oil-fired unit shall not be suspended over combustible material.
- (e) The appliance shall be equipped with automatic controls that will shut off fuel supply to the burner and pilot in case of ignition failure.
- (f) 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.
- (g) Floor-standing, direct-fired unit heaters, furnaces and boilers in metal fabricating plants, foundries and machine shops shall be isolated in a fire-resistive enclosure unless the building and contents are noncombustible.



- (2) Unvented appliances. Unvented direct-fired gas appliances designed to supply 100% outside air (where the products of combustion are mixed with the comfort air stream) are permitted in metal fabricating plants, foundries, machine shops, factories, and kitchens provided:
  - (a) The volume of air supplied to the occupied space is exhausted mechanically.
  - (b) The heater is equipped with automatic controls that will shut off fuel supply to the burner in case of ignition failure.
- (3) Duct connections. Supply duct connections are prohibited on "low static" direct-fired unit heaters.
- (4) Rating. Unit heaters, suspended furnaces and duct furnaces not rated by a recognized testing laboratory shall have a net rating equal to 60% of fuel input.

Note: The department recognizes equipment listed by the American Gas Association, Underwriters' Laboratories, Inc., and test data of any other nationally recognized testing laboratory.

Ind 64.28 GAS OR OIL-FIRED RADIANT HEATERS.

- (1) Unvented radiant heaters. Unvented, gas-fired, open-flame radiant heaters are permitted in machine shops, foundries, manufacturing plants, warehouses, garages and aircraft hangars.
- (2) Vented radiant heaters. Vented, gas- or oil-fired radiant heaters may be installed in the occupancies listed in (1) above. Vented radiant heaters may also be installed in the following types of buildings having a total capacity of less than 100 persons:
  - (a) Mercantile buildings (excluding theaters and exhibition halls);
  - (b) Woodworking plants, service stations; and
  - (c) Swimming pools, tennis courts, ice rinks, horse arenas and similar recreational facilities.
- (3) Equipment standards. The following requirements are applicable to vented and unvented radiant-fired heaters:
  - (a) The heaters shall be a type approved by the department.
  - (b) The heaters shall be equipped with an automatic pilot of the complete shut-off type or with a 100% shut-off electric ignition.
  - (c) 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.
  - (d) Exhaust openings for removing products of combustion shall be provided above the level of the radiant heaters.
  - (e) The heaters shall be supported by noncombustible brackets or hangers.
  - (f) The minimum clearances shall be maintained between the heater and combustible material, as determined in accordance with the test procedures and the standards approved by the department.
  - (g) Oil-fired radiant heaters shall not be suspended over combustible materials.
  - (h) Oil-fired radiant heaters shall be equipped with mechanical pressure-atomizing burners.

- (i) Oil-fired radiant heaters shall be vented.
- (j) Gas- or oil-fired radiant heaters, vented or unvented, not rated by a recognized testing laboratory, shall have a net rating equal to 60% of of the fuel input.

Note: The department will accept equipment listed by the American Gas Association, Underwriters' Laboratories, Inc., and any other nationally recognized testing laboratory.

Ind 64.29 ELECTRIC SPACE-HEATING EQUIPMENT.

- (1) Scope. This section includes electric furnaces, space heaters, unit heaters, cable heating devices, infrared radiant heaters, baseboard heaters, and heat pump systems.
- (2) Approved equipment. The equipment shall be a type approved by the department.
- (3) Controls. The equipment shall be provided with safety and temperature controls.
- (4) Minimum clearances. Not less than the minimum clearances shall be maintained between the electric-space heating equipment and combustible material, determined in accordance with test procedures and standards approved by the department.
- (5) Hazardous locations. Electric space-heating equipment shall not be installed in hazardous occupancies unless it is approved for such use. (See Wis. Adm. Code Electrical, Vol. 2.) An open-type resistance heating element is prohibited in hazardous occupancies.
- (6) Rating. Electric space-heating equipment shall be rated on the energy input to the heating element, expressed in BTU per hour.

Note: The department recognizes equipment listed by Underwriters' Laboratories, Inc.

Ind 64.30 OIL-BURNING EQUIPMENT. 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 pipe and an oil gauge. The vent pipe and fill pipe shall terminate outside of the building.

Note: For fuel oil storage location and piping requirements, see Wis. Adm. Code Ch. Ind 1000-2000--Wis. Safety and Health Code.

- (1) Approved equipment. The equipment shall be of a type approved by the department.
- (2) Controls. The equipment shall be provided with safety and temperature controls.
- (3) Rating. Oil-burning equipment not rated by a recognized testing laboratory shall have a net rating equal to 60% of fuel input.

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 American Society of Heating, Refrigerating and Air Conditioning Engineers, Guide and Data Book.

Ind 64.32 DUCT USE. No duct designed for the transmission of air shall be used for any other purpose.

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.

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: For acceptable standards see ASHRAE Guide and Data Book, published by the American Society of Heating, Refrigerating and Air Conditioning Engineers, or as illustrated in the Duct Manual, 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.

- (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.

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:
- (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.

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.

Ind 64.37 INSULATION. Heating supply ducts shall be covered with insulation unless an allowance is made for temperature drop in the system.

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.

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.

Ind 64.40 RELIEF VENTS. The use of barometric relief vents is prohibited where exhaust ventilation is required for occupancies classified as (a) and (b) 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.

Ind 64.41 SUSPENDED CEILING PLENUM. Plenums above ceilings shall be of noncombustible construction, as defined in subsection 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 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)].

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) 3/4-hour and one-hour rated floor assemblies and vertical shafts shall be protected with one-hour rated fire dampers.
  - (b) Two-hour rated assemblies and enclosures shall be protected with 1-1/2-hour rated fire dampers.
  - (c) 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 1-1/2-hour rated assemblies are of single blade, multi-blade and curtain types. Fire curtain doors classified by Underwriters' Laboratories as time rated (3 hour) and labeled (A) are of the curtain-blade type.

Note #3: See section Ind 64.66 for fire damper requirements in kitchen exhaust systems.

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.

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.

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.

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 5/8 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.

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.
  - (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 1/4 inch of asbestos covered by sheet metal.

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.

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 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 1-1/2 times the diameter. The above distances may be reduced by one-half if the wall or ceiling is covered with not less than 1/4-inch asbestos board covered with sheet metal or with equivalent protection.

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.

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, play-rooms 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 bodily contact with:
  - (a) Any surface temperatures that exceed 180° F;
  - (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.

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.
- (3) Instructions. The designer or installer shall provide the owner with written instructions for the operation and maintenance of the system and equipment.

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.

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 systems.
  - (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.

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, 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.

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.

- (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 or gases injurious to health.

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.

- (2) Ventilation. The air movement, supply and distribution shall conform to the requirements of section Ind 64.05, Table 1, and the following:

(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.

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 6 occupants for the purpose of overnight detention only, exhaust ventilation shall be provided on the basis of 6 air changes per hour for the occupied area.

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 57.001 (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) Ducts. Wood joists and stud spaces will be permitted to be used as return air ducts in individual living units provided with individual heating and ventilating systems.

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.

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.

- (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.

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.

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: A live storage area is any area used for storage of fire trucks, tractors, automobiles, trucks, and self-propelled vehicles driven in and out of the storage area under their own power, but does not include areas where vehicles or equipment are stored for seasonal periods, are displayed without batteries or the gasoline tanks are purged.

- (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.

Ind 64.64 AUTOMOBILE SHOWROOMS.

- (1) Scope. This classification includes all showrooms with offices and occupancies adjacent to repair or live storage areas.
- (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 volume of outside air shall be provided to satisfy the requirements found in Ch. Ind 1000-2000.



Ind 64.65 GENERAL SANITATION AND SERVICE AREAS.

- (1) Scope. This classification shall include toilet rooms, locker rooms, natatoriums, 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.
- (4) Air movement.
  - (a) The air movement in a natatorium shall be not less than 6 air changes per hour and the volume of outside air supplied and exhausted shall be not less than 2 cubic feet per minute per square foot of pool surface.
  - (b) Locker rooms used with natatoriums, shower rooms and toilet rooms shall be supplied with outside air.

Note: The air supplied may be exhausted through shower rooms or toilet rooms.

Ind 64.66 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 of the hood shall be sized to effectively capture grease vapors, but in no case shall these dimensions be less than the overall horizontal dimensions of the grease-producing equipment.
- (b) Canopy hood exhaust rates. The minimum volume of exhaust air for canopy-type hoods shall be not less than the following:
1. Hood open on all 4 sides:  $Q = 150 A$  (area).
  2. 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.
- Note:  $Q$  equals the exhaust air in cubic feet per minute;  $A$  equals the area of the hood in square feet;  $V$  equals the velocity in feet per minute.
- (c) Noncanopy hood exhaust rates. The minimum volume of exhaust air for non-canopy-type hoods (prefabricated backshelf) shall be not less than  $Q = 300 L$  (length).
- Note:  $Q$  equals the exhaust air in cubic 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).
- (d) Materials. Hoods shall be constructed and supported by steel not less than No. 18 manufacturers standard gauge, or stainless steel not less than No. 20 manufacturers standard gauge.
- (e) Seams. All seams and joints shall be liquid-tight.
- (f) Grease-removal devices. Approved grease extractors, grease filters or other grease-removal devices shall be provided.
- (g) 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).
- (h) 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).

- (i) 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 No. 16 manufacturers standard gauge, or stainless steel not lighter than No. 18 manufacturers standard gauge.

- (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.

Ind 64.67 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).

Pursuant to authority vested in the Department of Industry, Labor and Human Relations by section 227.02 (1) (b), Wis. Stats., the Department of Industry, Labor and Human Relations hereby amends as follows, which amendments do not require notice or hearing:

Subsection Ind 51.02 (5) (a) 1. to be amended to read:

1. Openings shall be protected by approved fire door or fire window assemblies as specified in sections Ind 51.047 and 51.048, or fire damper or fire curtain door assemblies as specified in section Ind 64.42.

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

Subsection Ind 51.02 (14) (e) 1. to be amended to read:

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).

Subsection Ind 51.14 (5) to be amended to read:

- (5) Fire window assemblies. All glazing in fire window assemblies shall be designed and installed in accordance with the requirements of Ind 51.048.

Subsection Ind 51.18 (3) to be amended to read:

- (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.

Subsection Ind 51.19 (4) to be amended to read:

- (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 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.

Subsection Ind 51.20 (1) (a) to be amended to read:

- (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.

Subsection Ind 52.02 (1) (intro. par.) Note to be amended to read:

Note: For windows and other outdoor openings used for natural ventilation, see Ind 64.07 and Ind 57.19.

Section Ind 52.18 to be amended to read:

Ind 52.18 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.

Subsection Ind 52.53 (4) (intro. par.) to be amended to read:

- (4) Every toilet room having more than one fixture (closets and urinals) shall be ventilated in accordance with the provisions of section Ind 64.65, except that this requirement shall not apply to chemical or septic toilets which are installed in accordance with the provisions of the chemical toilet code or the septic toilet code issued by the state department of health and social services.

Section Ind 52.54 to be amended to read:

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.

Subsection Ind 52.59 (3) to be amended to read:

- (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.

Note: Section 146.085, Wis. Stats., provides that not more than 50% of the toilet compartments of any public toilet room of any public building, other than licensed hotels and resorts, shall be kept locked.

Note to Revisor: In the following sections, the history note should follow the note (or notes):

Ind 53.01, 53.10, 53.11, 53.12, 53.313 and 53.40.

Section Ind 55.44 to be amended to read:

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 64.05. 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.

Subsection Ind 57.18 (5) (a) Note to be amended to read:

Note: For further restrictions, see Ind 64.07.

Subsection Ind 57.18 (7) (b) Note #2 and Note #3 to be amended to read:

Note #2: See Ind 50.10 (4) "Note: Cross reference" for the acceptance of nationally recognized association methods and standards as a basis for calculations and design data.

Note #3: The standards for winter heating are found in Chapter Ind 64 of this code.

Section Ind 57.19 Note to be amended to read:

Note: Also see Ind 52.02 and Ind 64.07.

Subsection Ind 57.50 (2) (b) to be amended to read:

- (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.

Subsection Ind 57.50 (3) (a) to be amended to read:

- (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 64.27.

Subsection Ind 57.51 (2) (d) to be amended to read:

- (d) All walls, or parts of walls, in buildings under par. (a) which are nearer than 5 feet to a boundary line between premises or to any other building shall be 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.

Subsection Ind 60.25 (1) (a) to be amended to read:

- (a) One-hour fire-resistive enclosure. The door in the enclosure shall be a 1-3/4-inch thick, solid wood core door. Combustion air shall be provided in accordance with section Ind 64.09.

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Ind 53.321 Types of masonry  
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Ind 53.52 Steel joist requirements  
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Ind 53.63 Minimum construction requirements



Notes to Revisor:

Chapter Ind 53, Structural Requirements:

Between Ind 53.01 (after second note) and Ind 53.10, amend heading to read:

PART I  
MINIMUM ALLOWABLE LOADS

Between Ind 53.14 and Ind 53.20, amend heading to read:

PART II  
FOUNDATIONS

Between Ind 53.28 and Ind 53.30, amend heading to read:

PART III  
MASONRY

Between Ind 53.36 and Ind 53.40, amend heading to read:

PART IV  
CONCRETE

Between Ind 53.42 and Ind 53.50, amend heading to read:

PART V  
METALS

Between Ind 53.56 and Ind 53.60, amend heading to read:

PART VI  
WOOD AND WOOD FIBER PRODUCTS

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CHILD DAY CARE FACILITIES

- Ind 60.001 Scope
- Ind 60.01 Definitions

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- Ind 60.10 Occupancy separation
- Ind 60.11 Capacity of buildings
- Ind 60.12 Doors
- Ind 60.13 Windows and outside openings
- Ind 60.14 Access to attic and roof
- Ind 60.15 Sanitary facilities
- Ind 60.16 Electrical work
- Ind 60.17 Illumination
- Ind 60.18 Heating and ventilating
- Ind 60.19 Operating features

PART II--DAY CARE CENTERS SERVING 4 TO 8 CHILDREN

- Ind 60.20 Class of construction
- Ind 60.21 Exiting
- Ind 60.22 Passageways
- Ind 60.23 Stair and shaft enclosure
- Ind 60.24 Fire extinguishers
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PART III--DAY CARE CENTERS SERVING 9 OR MORE CHILDREN

- Ind 60.30 Class of construction
- Ind 60.31 Exiting
- Ind 60.32 Required exit width
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- Ind 60.35 Fire extinguishers
- Ind 60.36 Fire alarm systems
- Ind 60.37 Hazardous areas
- Ind 60.38 Exit and emergency lighting

APPENDIX A

A-51.01 (151) is created to read:

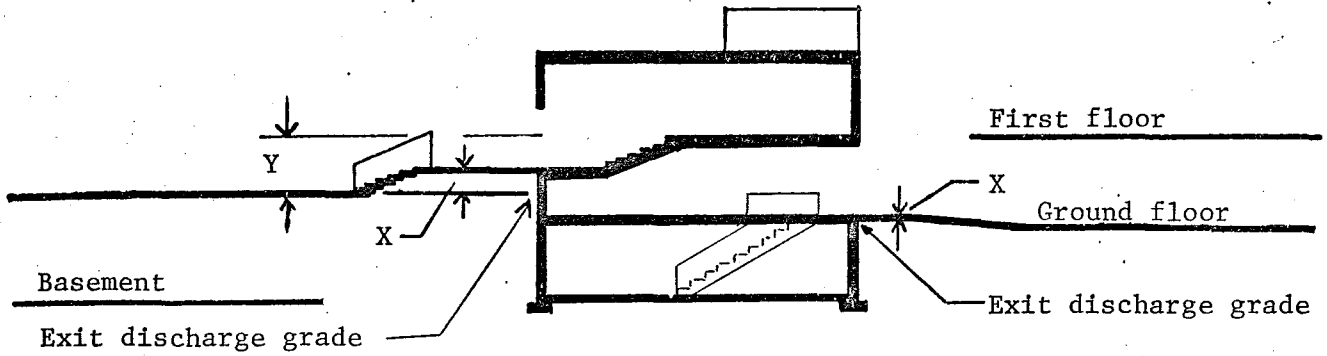
A-51.01 (151) WALL (PARTY). It is intended that a property consisting of joining plotted subdivisions owned by one individual, that can be owned by separate individuals, is included in the definition of party wall.

A-51.02 (14) is repealed and recreated to read: (See page 1 attached)

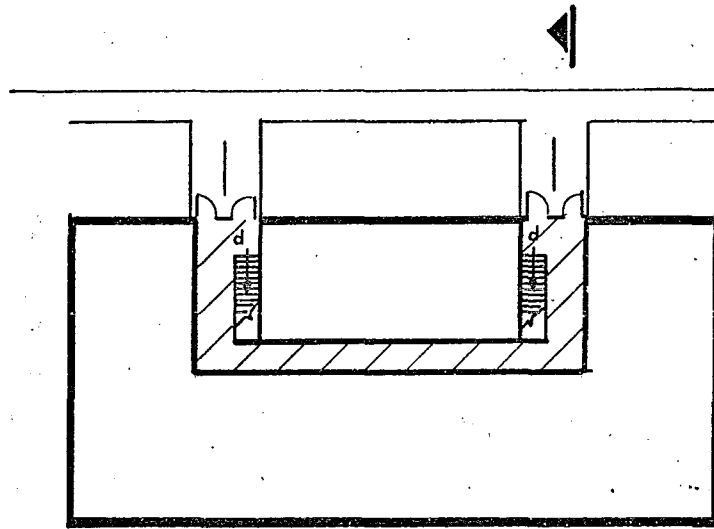
A-51.15 (6) is repealed and recreated to read: (See page 2 attached)

A-52.04 is repealed and recreated to read: (See pages 3-8 attached)

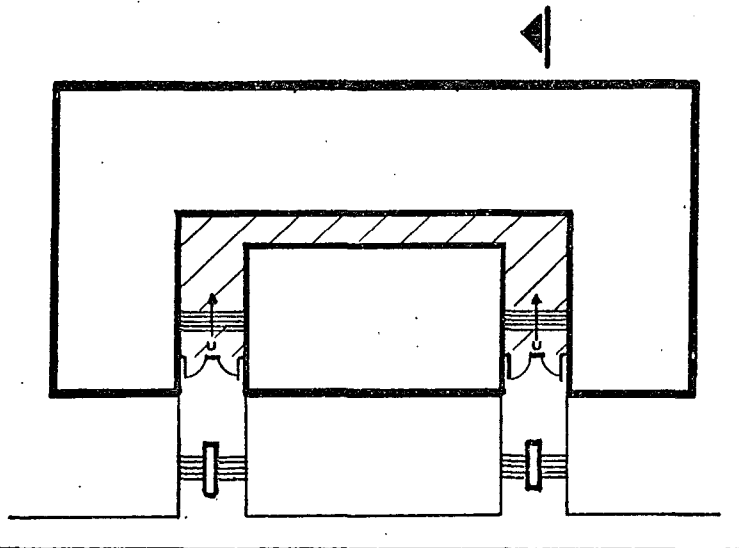
A-51.02 (14) DETERMINATION OF NUMBER OF STORIES. The following illustrations are provided to give visual aid to this rule and the definition of Ind 51.01 (121) Stories, Number of.



Note: X = 3'-0" (maximum)  
Y = 6'-0" (maximum)



Ground floor



First floor

A-51.15 (6) EXAMPLE TO DETERMINE TOTAL AGGREGATE EXIT WIDTH.

5	300	
4	400	
3	500	
2	200	
1	600	
		Grade
B <sub>1</sub>	100	
B <sub>2</sub>	300	
B <sub>3</sub>	400	

Type No. 1 sprinklered construction.

Aggregate exit width required from a floor into the stairwell is 30 inches per 100 people on that floor; i.e.,

5th floor to stairwell =  $3 \times 30 = 90''$

4th floor to stairwell =  $4 \times 30 = 120''$

3rd floor to stairwell =  $5 \times 30 = 150''$

Stair width required:

5th to 4th - 300 persons (100%)  $\times 30''/100$  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%) + 500 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"

B<sub>1</sub> to 1st - [100 persons (100%) + 300 persons (50%) + 400 persons (25%)]  $30''/100$  persons = 105" (Use 150")

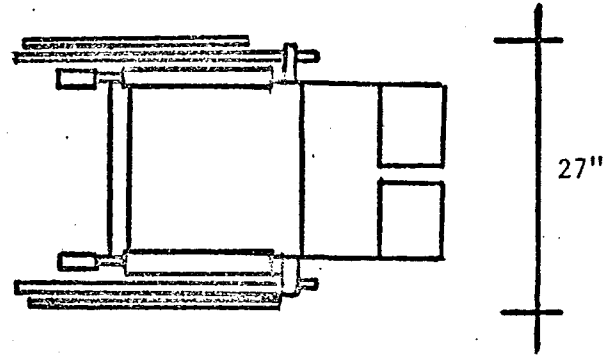
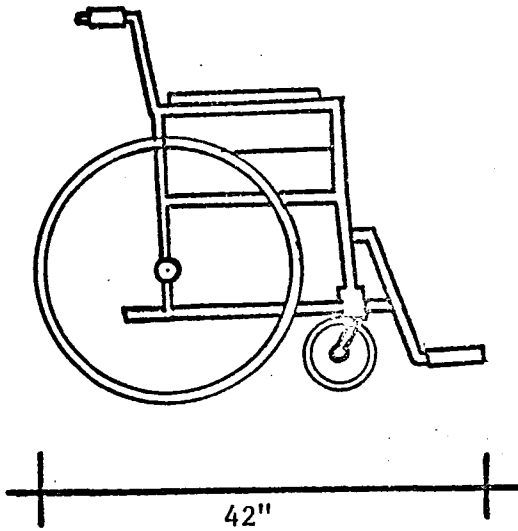
B<sub>2</sub> to B<sub>1</sub> - [300 persons (100%) + 400 persons (50%)]  $30''/100$  persons = 150"

B<sub>3</sub> to B<sub>2</sub> - 400 persons (100%)  $\times 30''/100$  persons = 120"

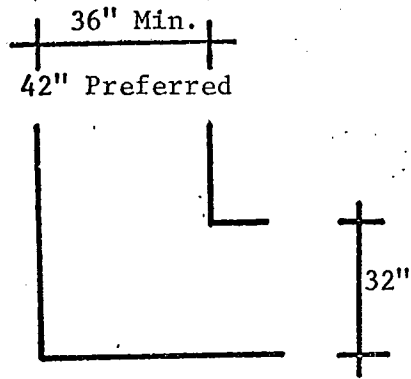
Stair width required from B<sub>1</sub> to 1 is 150" as stair cannot decrease in width along path to exit [Ind 51.16 (2) (c)].

A-52.04 REQUIREMENTS FOR BARRIER-FREE ENVIRONMENTS. The following illustrations are provided to give the designer visual aids for making facilities accessible.

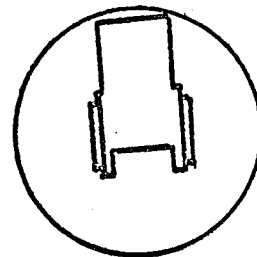
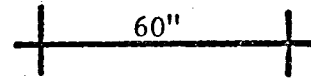
WHEELCHAIR DIMENSIONS



TURNING SPACE

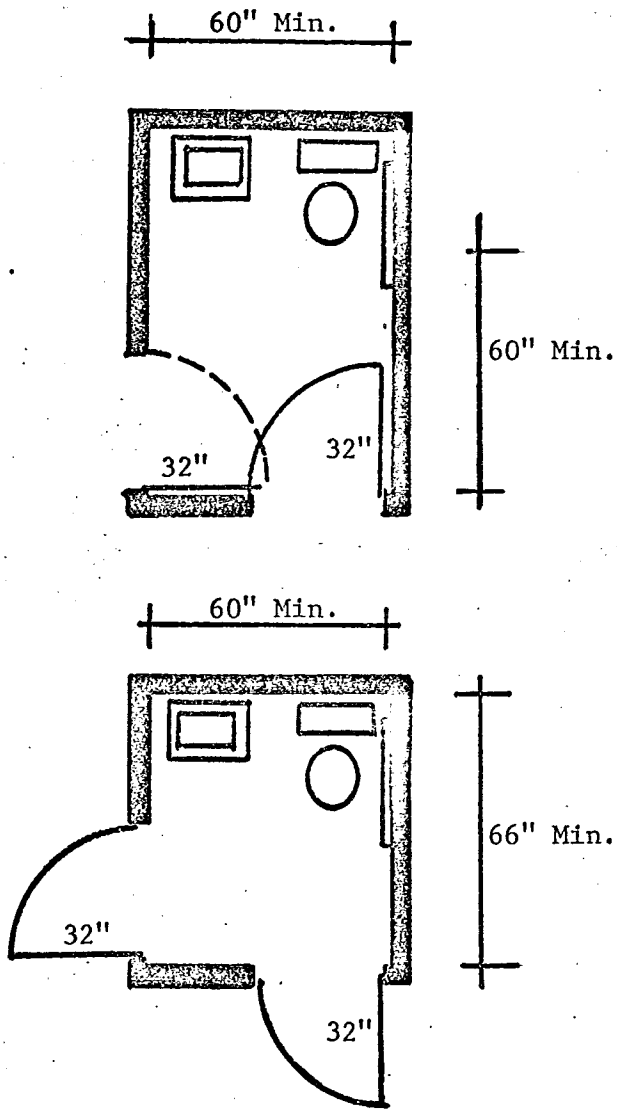


90° Turn

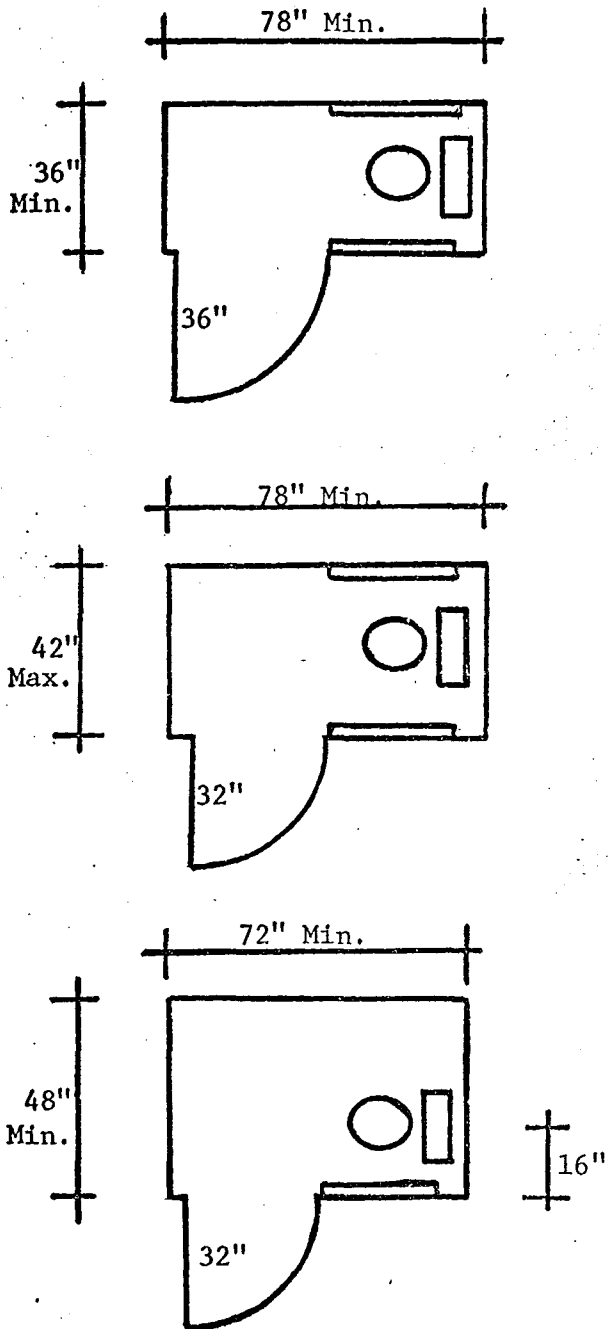


180-360° Turn

EXAMPLES OF ACCESSIBLE TOILET ROOMS  
CONTAINING ONE LAVATORY AND ONE WATER CLOSET



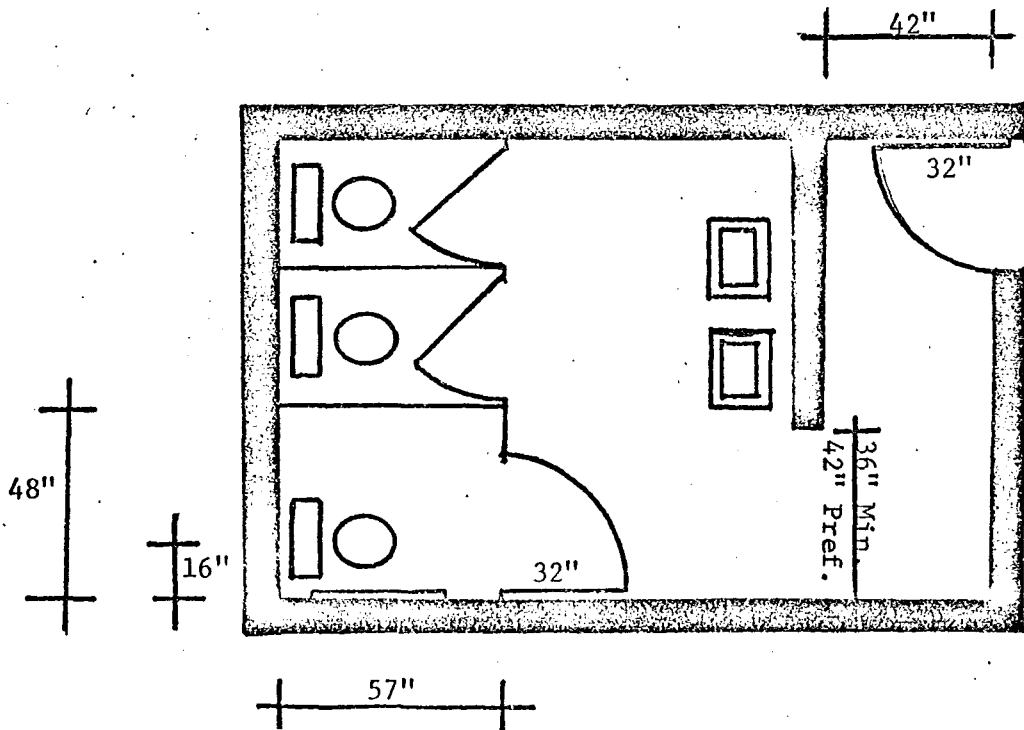
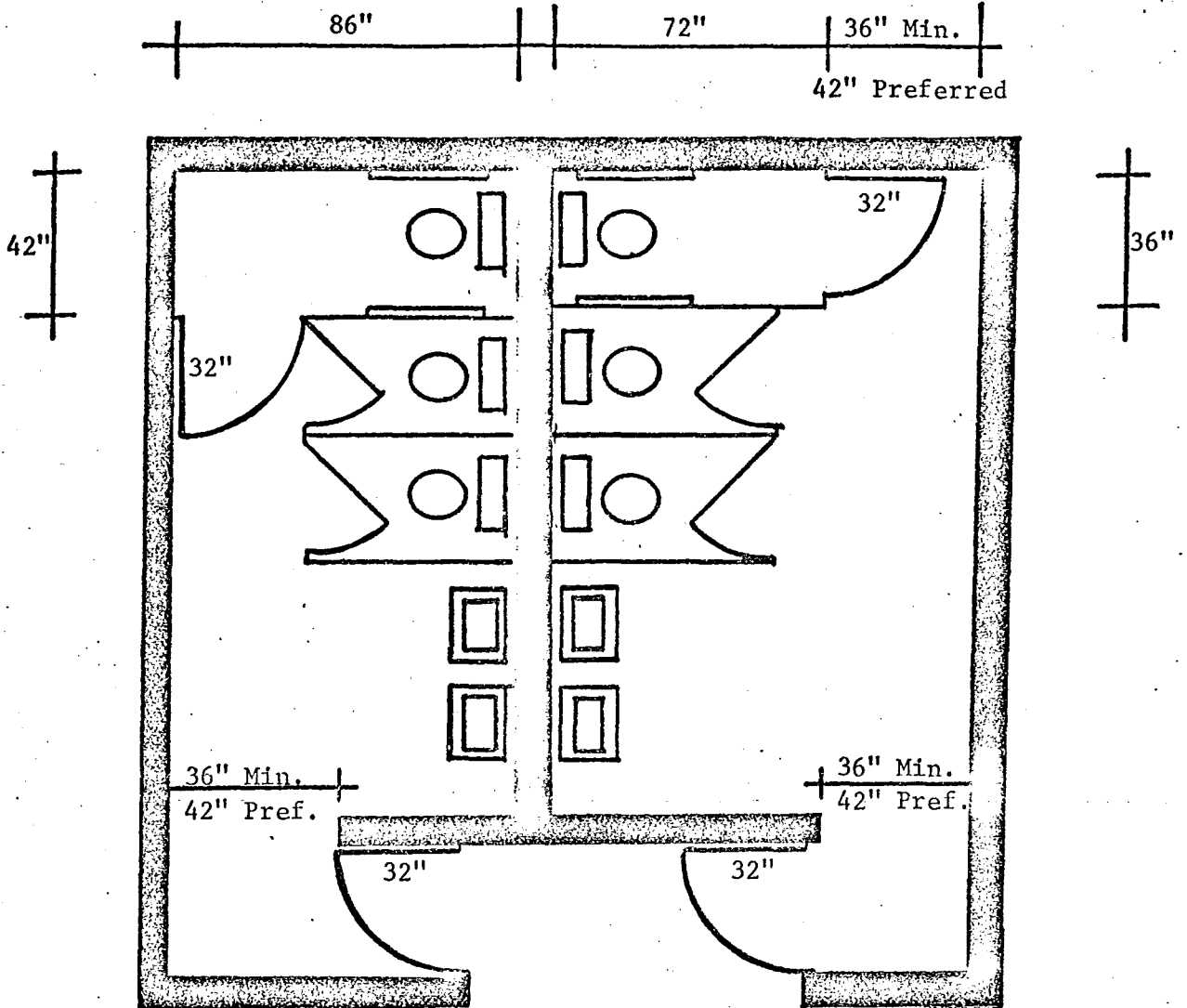
EXAMPLES OF WATER CLOSET COMPARTMENTS  
WITH A SIDE ENTRANCE APPROACH



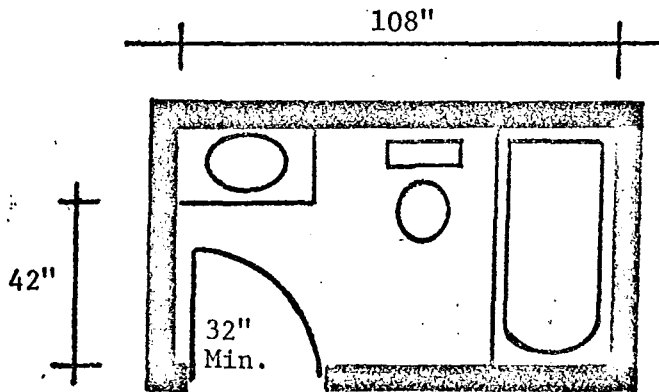
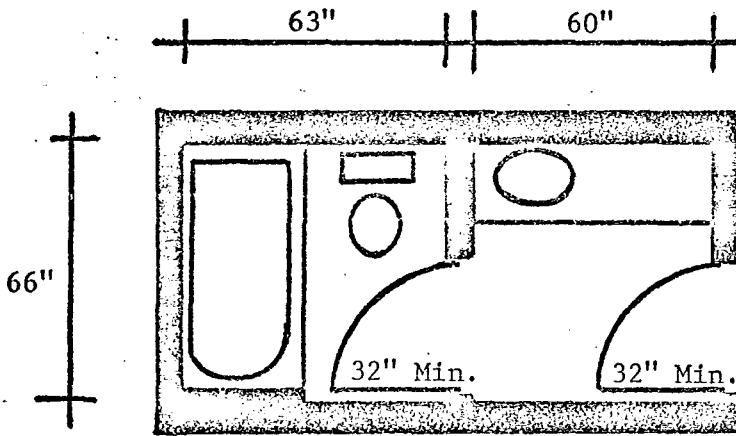
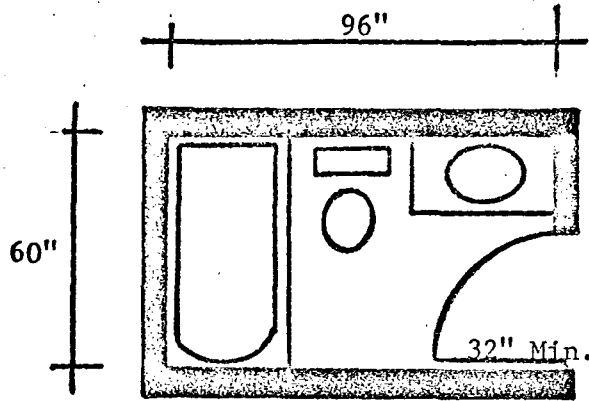
(The water closet compartments are located within a toilet room.)

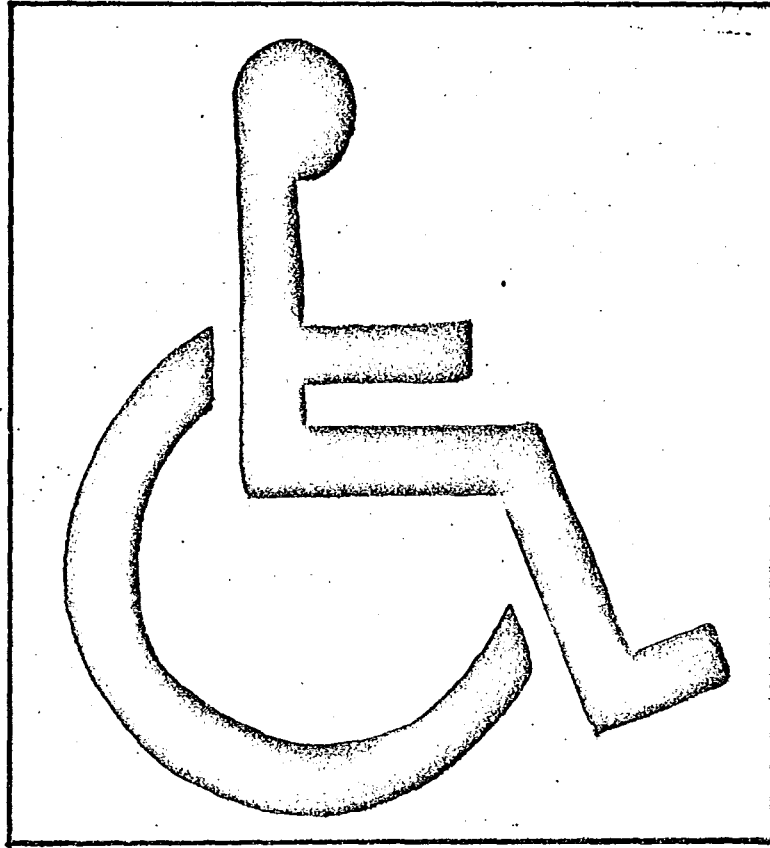


EXAMPLES OF ACCESSIBLE TOILET ROOMS



EXAMPLES OF ACCESSIBLE BATHROOM LAYOUTS  
FOR MOTELS AND RESIDENTIAL LIVING UNITS





INTERNATIONAL SYMBOL FOR BARRIER-FREE ENVIRONMENTS

## INDEX

*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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