Replaced Register, December 1978, Reg. # 276

Chapter Ind 64

HEATING, VENTILATING AND AIR CONDITIONING

Note: Chapter Ind 59 as it existed on December 31, 1975 was repealed and a new chapter Ind 64 was created effective January 1, 1976.

PART I—SCOPE

Ind 64.01 Scope. All heating, ventilating and air conditioning systems shall be designed, installed, maintained and operated so as to provide the service and results required within the provisions of this chapter. The minimum requirements established in each part of this chapter shall be complied with as they apply to that specific public

building or place of employment. The administrative rules pertaining to energy conservation may be applied retroactively to existing buildings.

Note: Compliance with this code shall not constitute assurance of proper installation or operation of the heating, ventilating and air conditioning system. This code is not to be used as a design manual, but it is established as a minimum standard for safety, health and general welfare of the public.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.02 Approval of drawings and specifications. All drawings and specifications shall be submitted to the department in accordance with the provisions of sections Ind 50.07 and Ind 50.12.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. Register, December, 1976, No. 252, eff. 1-1-77.

PART II—DESIGN REQUIREMENTS

Ind 64.03 Design. (1) BUILDING HEAT LOSS. The total building heat loss shall be equal to the sum of the building transmission losses and infiltration and/or ventilation losses, whichever are greater.

(2) HEATING SYSTEM DESIGN. The heating system shall be designed on the basis of the losses determined by (a) or (b) below, whichever is greater. Credit will be given for internal heat gains against the total design loss of the heating system, provided the heat gains are demonstrated by the designer.

(a) *Occupied periods.* The heating system shall be designed to equal building transmission losses and infiltration and/or ventilation losses during occupied periods; or

(b) *Unoccupied periods.* The heating system shall be designed to equal building transmission losses and infiltration losses during unoccupied periods.

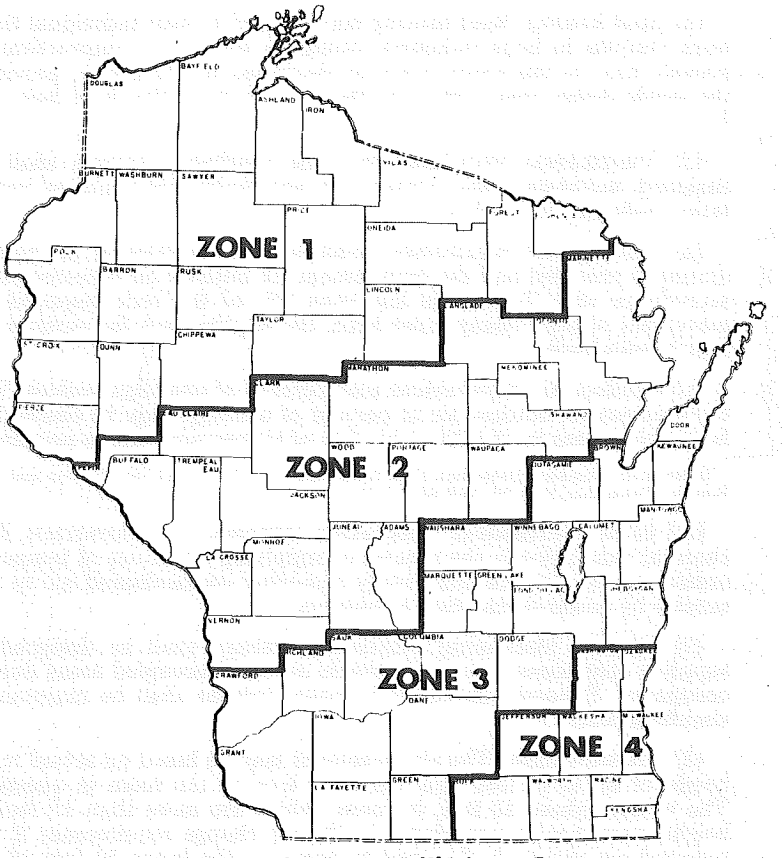
(3) CAPACITY AND ARRANGEMENT. The calculated capacity and the arrangement of all installations for required heating and ventilating shall be based upon simultaneous service to all parts of the building unless otherwise exempted by this code.

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

Ind 64.04 Outside temperature design conditions. In the accompanying map, the state of Wisconsin has been divided into 4 zones. The maximum heat losses for a heating system shall be calculated on the basis of the outdoor temperatures indicated on the map with reference to location of the project.

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

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.

(a) *Spot heating.* Spot heating may be used to heat individual fixed work stations in large industrial buildings where it is impractical to provide heat to the entire space as described in (1) above, provided the inside design temperature at the fixed work station is at least 60° F.

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

(a) *Outdoor air requirement waived.* If a mechanical air supply system is provided and the requirement for outdoor air determined in accordance with Table 1 is less than 5% of the code required air movement of 6 air changes per hour, the requirement for outdoor air may be eliminated.

(b) *Outdoor air requirement and percent of openings waived.* The requirement for outdoor air or percent of openings may be omitted in large volume spaces if 5,000 cubic feet of air per occupant is provided.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; cr. (1) (a), (2) (a) and (b), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.06 Mechanical ventilation systems. (1) DEFINITION. Mechanical ventilation is the process of supplying a mixture of tempered outside air and/or simultaneously removing contaminated air to the outside by power-driven fans or blowers.

(2) DESIGN. Mechanical ventilation systems shall be designed to supply a continuous source of outside air to all occupied areas during occupancy. Exhaust ventilation in equal volume shall be maintained simultaneously.

(3) AIR MOVEMENT. The air movement may be based on actual room height or up to 10 feet from the floor level of the room in question. The volume above 10 feet, in rooms which are more than 10 feet in height, need not be considered in the air change requirement if the required air change is designed to occur in the lower 10 feet of the occupied space.

(a) *Six air changes per hour.* The total air movement for all occupancies shall be at least 6 air changes per hour unless otherwise specified in this code.

(b) *Less than 6 air changes per hour.* An air movement of less than 6 air changes per hour will be permitted where mechanical cooling (air conditioning) is provided and the heat gain requirement for the space has been satisfied.

(c) *Air movement requirement wavied.* The air movement requirement for 6 air changes per hour may be omitted in spot heating applications. The air movement requirement may also be omitted in

buildings containing large volume spaces of at least 5,000 cubic feet of air per occupant and where the requirement for outside air is waived in accordance with section Ind 64.05.

(4) AIR DISTRIBUTION. An adequate number of air supply, return and exhaust outlets or grilles shall be provided to insure a uniform distribution of air.

(5) RECIRCULATION AND TRANSFER OF AIR. (a) *Recirculation.* No air contaminated by any source other than human occupancy shall be recirculated, except within the same ventilation classification.

(b) *Transfer.* Air in a volume equal to the outside air required for a room may be transferred through a corridor and exhausted through a locker room, toilet room, kitchen, janitor closet or a similar area. Air shall not be transferred through elevator shafts and stairwells where doors are required at any floor level.

(6) DIVERSIFIED MECHANICAL SYSTEMS. If the mechanical ventilation system is able to deliver required quantities of outside air to each area when needed, the department will recognize diversity and the system may be designed on the actual occupancy.

Note #1: This rule permits the opening of outside air intakes in schools, offices and retail establishments to be delayed one hour after initial occupancy and permits the closing of outside air openings one hour prior to the termination of the occupancy.

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

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; renum. (3) to be (6), renum. 64.15 (2) to be (3), 64.15 (3) to be (4), cr. (3) (c) and (5), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.07 Natural ventilation system. (1) OUTDOOR OPENINGS. Outdoor openings used for natural ventilation shall be within 100 feet, or 5 times the least dimensional width of the occupied area, whichever is the least.

(a) *Outdoor openings located below grade.* Outdoor openings below grade will not be accepted unless there is a clear space outside of the opening having a width not less than 1½ times the distance below grade at the bottom of the opening.

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

(b) *Outdoor openings located from a property line.* Outdoor openings shall be at least 5 feet from a property line and/or lot line or an adjacent building on the same property. This distance restriction does not apply to property lines along streets.

Note: For further restrictions, see Table 51.03-B and section Ind 64.19.

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

TABLE 1

Use or Occupancy	Minimum Inside Temp. (Deg. F)	Ventilation Requirements[1]				Applicable Occupancy Code Section (Ind No.)
		Ventilation Classification[2]	Basis of Capacity: Determination of No. of Persons[3] Net sq. ft. per Person	Basis of Capacity: % of Openings[4]	Basis of Capacity: CFM/net sq. ft. Floor Area	
Factories, office and mercantile buildings						
Barber and beauty salons	67	(b)	20	3	--	64.54
(where hair spray is used)	67	(d)	20	--	--	64.18
Canning factories	60	(b)	75	3	--	64.54, 64.68
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)	6	3	--	64.54
Flammable liquids storage	NMR	(d)	--	--	--	64.18
Foundries and boiler shops	50	(b)	75	3	--	64.13, 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
Places of worship, entertainment and recreation which accommodate less than 100 persons	†	(b)	†	3	--	64.54
Printing establishments	60	(b)	--	3	--	64.18, 64.54
Retail establishments (basement)	65	(b)	40	3	--	64.54
(other floors)	65	(b)	60	3	--	64.54
(shopping malls)	65	(b)	40	3	--	64.54
Security vaults (occupied)	65	(a)	300	--	--	64.54
Warehouses	NMR	--	--	--	--	64.18, 64.54
Theaters and places of assembly (which accommodate more than 100 persons)						
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	(a)	15	--	--	Based on occupied areas
Cafeterias, dining areas, restaurants, billiard rooms	67	(a)	15	--	--	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	(a)	6	--	--	64.55
(unseated)	67	(a)	15	--	--	64.55
Dance halls	67	(a)	15	--	--	64.55
Lodge halls	65	(a)	15	--	--	64.55
Roller and ice skating rinks (indoor)	50	(a)	15	--	--	64.55
Ice resurfacing	NMR	(d)	--	--	--	64.18
Taverns	67	(a)	20	--	--	64.55
Tennis courts (indoor)	55	(a)	--	--	--	64.55
Theaters	67	(a)	6	--	--	64.55
Lobbies	65	(a)	15	--	--	64.55
Lounge rooms	67	(a)	15	--	--	64.55

Motion picture booths	60	(a) or (c)	--	--	2	64.55 (5)
Hospitals and nursing homes						
Autopsy rooms	60	(d)	--	--	2	64.57
Bathrooms, toilet rooms	75	(d)	--	--	2 or 60 CFM/TF	64.57, 64.65
Day rooms (living, dining and recreational areas)	75	(b)	15	5	--	64.57
Delivery rooms	70	(b)	--	5	--	64.57
Laboratories (general)	67	(d)	--	--	--	64.18
Laundries	60	(c)	--	--	2	64.65
Nurses stations	75	(b)	--	5	--	64.57
Operating rooms	70	(a)	--	--	--	64.57
Patient rooms	75	(b)	--	5	--	64.57
Recovery, isolation rooms, nurseries	75	(b)	--	5	--	64.57
Storage rooms for flammable anesthetics	60	(e)	--	--	2	64.18, 64.57
Storage rooms for bedpans, soiled linens, soiled utility, and sterilizing equipment rooms	60	(d)	--	--	2	64.57
Therapy (physical and hydrotherapy)	75	(b)	--	5	--	64.57

CA = Cooking appliance.
LF = Lineal foot.
NMR = No minimum requirements
TF = Toilet facilities (water closets and urinals).

†See Theaters and places of assembly for inside design temperature and net square feet per person.

[1]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.

[2]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. In multiple-use occupancies, the area of each occupancy shall be considered separately.

(e) Requires a supply of outside air and exhaust determined on the basis of CFM per square foot of floor area. The area shall be provided with a negative pressure relationship with respect to the adjacent areas.

(f) Requires a percentage of openings.

[3]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. Where no value is indicated for net square feet per person, use the actual number of occupants to determine the required amount of outside air.

[4]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 Requirements[1]				Applicable Occupancy Code Section (Ind No.)
		Ventilation Classification[2]	Basis of Capacity			
			Determination of No. of Persons[3] Net sq. ft. per Person	% of Openings[4]	CFM/net sq. ft. Floor Area	
Schools and other places of instruction						
Administrative office space	67	(b)	75	3	—	64.56
Arts, crafts, drafting rooms	67	(a)	30	—	—	64.56 (3)
Classrooms	67	(a)	20	—	—	64.56
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	(c) or (d)	—	—	2	64.65
Natatoriums	70	(c)	—	—	1 or 2/pool sf	64.66
Chlorine storage rooms	NMR	(d)	—	—	1	64.65
Home economics	67	(a)	30	—	—	64.56
(cooking)	67	(d)	—	—	200/CA	64.67
Kitchens	60	(c) or (d)	—	—	2	64.67
Laboratories (science)	67	(a)	30	—	—	64.18
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	(c) or (d)	—	—	3/4	64.18
Without vehicle service and repair	60	(a)	50	—	—	64.18
Wardrobes	NMR	(d)	—	—	2	64.65
Penal institutions and places of detention						
Cells	67	(a)	—	—	—	64.58
Residential occupancies						
Living and sleeping areas	67	(f)	—	5	—	64.59
Day care facilities	67	(b)	35	5	—	64.60
Garages and service stations						
Automobile showrooms	60	(b)	—	3	—	64.64
Garages: 6 or more vehicles	NMR	(c) or (d)	—	—	1/2	64.63
Repair areas	60	(c) or (d)	—	—	3/4	64.61
Vehicle service buildings	60	(c) or (d)	—	—	1/2	64.62
General sanitation and service areas						

Chlorine storage rooms	NMR	(d)	--	--	1	64.65
Cloak rooms	NMR	(d)	--	--	2	64.65
Janitor closets	NMR	(d)	--	--	2	64.65
Locker rooms and shower rooms	70	(c) or (d)	--	--	2	64.65
Toilet rooms	65	(d)	--	--	2 or 60/TF	64.65
Natatoriums	70	(c)	--	--	1 or 2/pool sf	64.66
Kitchens	60	(c) or (d)	--	--	2	64.67
Seasonal occupancies						
Camps and lodges:						
Dining and recreational areas	NMR	(b)	15	3	--	64.68
Living and sleeping areas	NMR	(f)	--	5	--	64.68
Club houses	NMR	(b)	15	3	--	64.68
Drive-ins	NMR	(b)	15	3	--	64.68
Kitchens	NMR	(c) or (d)	--	--	2	64.67
Outdoor toilets	NMR	(d)	--	--	2	64.65

CA = Cooking appliance.
LF = Lineal foot.
NMR = No minimum requirements.
TF = Toilet facilities (water closets and urinals).

†See Theaters and places of assembly for inside design temperature and net square feet per person.

[1]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.

[2]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. In multiple-use occupancies, the area of each occupancy shall be considered separately.

(e) Requires a supply of outside air and exhaust determined on the basis of CFM per square foot of floor area. The area shall be provided with a negative pressure relationship with respect to adjacent areas.

(f) Requires a percentage of openings.

[3]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. Where no value is indicated for net square feet per person, use the actual number of occupants to determine the required amount of outside air.

[4]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.

(4) EXHAUST VENTS. All exhaust vents shall be ducted to the exterior of the building.

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

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; cr. (4), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.09 Combustion air intakes. Any room in which burners are located shall be supplied with combustion air for proper burner operation.

(1) COMBUSTION AIR FOR BURNERS. All burners shall be provided with combustion air by one of the following methods:

(a) *Combustion air by gravitational means.* Where combustion air is introduced by gravitational means, the minimum free area for combustion air intakes shall be calculated in square inches as indicated in Table 64.09. The values are based on the fuel input of the heating equipment.

TABLE 64.09

Atmospheric burners	Combustion Air Intakes Ducted from the Outside to an Interior Room	Combustion Air Intakes Located at the Outside Wall of an Exterior Room
Gas-fired, all occupancies except industrial	1 sq.in./1000 Btu/hr.	1 sq.in./2000 Btu/hr.
Gas-fired, industrial occupancies	1 sq.in./1000 Btu/hr.	1 sq.in./5000 Btu/hr.
Oil-fired, all occupancies	1 sq.in./1000 Btu/hr.	1 sq.in./2000 Btu/hr.

(b) *Combustion air for power burners.* The minimum free area for combustion air intakes for power burners shall be at least .5 square feet per 1,000,000 Btu per hour fuel input with a minimum free area of 10 square inches.

(c) *Combustion air by mechanical means.* Combustion air furnished by mechanical systems, such as makeup air units, may be used when complete design data is submitted and approved by the department.

(d) *Combustion air by infiltration.* If the heating equipment is not required to be located in a fire-resistive room, combustion air may be provided by means of infiltration where the total area of the outdoor openings (doors and windows) is greater than 3% of the floor area in which the burner is located.

Note: See section Ind 64.22 for special conditions.

(2) DAMPERS. (a) Manually operated dampers are prohibited.

(b) Motorized dampers are acceptable when interlocked with the burner. Dampers shall be open when the burner is in operation. A safety interlock switch shall be installed to insure that the damper is in an open position before the burner is permitted to operate.

(3) DUCTWORK. Where ductwork is required to bring combustion air into the building, the duct shall have the same cross-sectional area as the free area of the combustion air openings.

(4) SEGREGATION OF COMBUSTION AIR. The combustion air path shall be completely segregated from the outside air ventilation ductwork.

(5) BURNERS IN NEGATIVE PRESSURE LOCATIONS. An atmospheric burner shall not be installed where the space in which the burner is located under negative pressure due to an exhaust system.

(6) MOUNTING HEIGHT. Mounting height of the combustion air intakes shall be as required in section Ind 64.19 (1) (c).

(7) AIR-HANDLING EQUIPMENT LOCATED IN A BOILER OR FURNANCE ROOM. If the fuel input to the burner exceeds 400,000 Btu per hour, the air-handling equipment and the burner shall be interlocked to shut off the burner and the blower when any service door to the air-handling equipment is opened, unless an air barrier separation is provided between the burner and the air handling equipment.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; r. and recr. Register, December, 1976, No. 252, eff. 1-1-77; renum. (1) (b) and (c) to be (c) and (d), cr. (1) (b), and am. (7), Register, December, 1977, No. 264, eff. 1-1-78.

Ind 64.10 Refrigerants. The rules covering the use of refrigerants for air conditioning systems shall conform with Wis. Adm. Code chapter Ind 45, Mechanical Refrigeration.

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

PART III-VENTILATION AND AIR STANDARDS

Ind 64.11 Ventilation and air standards. The quantity of air used to ventilate a given space during periods of occupancy shall always be sufficient to maintain the standards of air distribution, air movement, recirculation, air quality and air temperature as required by the following sections: Ind 64.12 through Ind 64.19.

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

Ind 64.12 Definitions. (1) *"Air conditioning."* The process of treating air to control temperature, humidity, cleanliness and distribution to meet the requirements of the conditioned space.

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

(3) *"Recirculated air."* The transfer of air from a space through the air-handling equipment and back to the space.

(4) *"Tempered air."* Air transferred from a heated or cooled area of a building.

(5) *"Tempered outside air."* Outside air heated or cooled before distribution.

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

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

Ind 64.13 Tempered air requirements. (1) SUPPLY AIR. The design conditions of the supply air temperature to the occupied space shall be between 50° F and 140° F.

(2) TEMPERED AIR SUPPLY DEPENDING ON NEGATIVE PRESSURE. A supply of tempered air, depending on a negative pressure within the space, will be permitted in foundries, steel fabricating shops and similar areas.

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

Ind 64.14 Tempered outside air requirements. (1) MAKEUP AIR. A supply of tempered outside air shall be provided when the total volume of building exhaust from an area exceeds one air change per hour.

Note: See Ch. Ind 1000-2000, Wis. Safety & Health Code, for further requirements for makeup air for industrial exhaust systems.

(2) PROCESS HEAT. Process heat may be used to temper required outside air.

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

Ind 64.15 Air movement and distribution. (1) AIR DELIVERY CAPACITY. The air delivery capacity of all equipment supplying air for heating, ventilating and air conditioning purposes shall be based on standard air ratings.

Note: Standard air is substantially equivalent to dry air at 70° F and 29.92 inches (Hg) barometric pressure.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; renum. (2) and (3) to be 64.06 (3) and (4), r. (4), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.16 Air-cleansing devices. (1) AIR-CLEANSING ACCESS. Air-cleansing devices shall be designed and installed to permit access to the equipment for maintenance and to insure proper operation of the heating and ventilating system.

(2) AIR-CLEANSING FILTERS. Approved air-cleansing filters shall be designed and installed in a manner to filter the outside air and recirculated air used with mechanical heating and ventilating systems except as follows:

(a) Filters are not required in garages, factories, foundries and similar occupancies.

(b) Filters are not required for use with unit heaters designed for heating and recirculation.

(c) Where jet systems or blend-air systems are approved, air filters are not required in the ducts that are installed for the recirculation of air within the same occupied space.

Note: The department recognizes as approved, filters listed in the Building Materials List published by Underwriters' Laboratories, Inc., and test data of any other recognized testing agency for the purpose for which it is used.

(3) AIR-CLEANSING MATERIALS. Contaminated water shall not be used or recirculated through sprays affecting air used for ventilating purposes.

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

Ind 64.17 Automatic controls. Automatic controls shall be provided to maintain design temperature, control ventilation to provide a continuous air movement of not less than the minimum required by this code, and to provide a continuous supply of outside air and exhaust as determined by the provisions of section Ind 64.05, Table 1, during periods of occupancy.

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

Ind 64.18 Contamination of air. (1) CONTAMINATION. Air contaminated from odors, fumes, noxious gases, smoke, steam, dust, spray, or other contamination shall be diluted with uncontaminated air or exhausted to prevent the contaminated air from spreading to other parts of the building occupied by people.

Note: Cross reference: For requirements pertaining to all places of employment or occupancy where smoke, gas, dust, fumes, steam, vapor, industrial poisons, or other detrimental materials are used, stored, handled, or are present in the air in sufficient quantities to obstruct the vision, or to be injurious to the health, safety or welfare of the 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 chapters Ind 1000-2000—Wisconsin Safety and Health Code.

3. No direct-fired heating unit, with or without a heat exchanger, shall be located within this area, nor shall it recirculate air from this area.

4. The surface temperatures of any type of heating equipment used in these areas shall be below the temperature at which toxic materials may be released.

Note: Toxic materials are those covered in Wis. Adm. Code Ch. Ind 1000-2000—Wisconsin Safety and Health Code.

(b) *Transfer of contaminated air.* Air shall not be transferred from an area of greater contamination.

Note: The department will accept air transferred from: corridor to toilet room; corridor to cloak room or janitor closet; dining room to kitchen; locker room to toilet room; gymnasium to locker room; showroom to garage; and corridor to school vocational shops.

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

Ind 64.19 Location of outside ventilating air intakes or exhausts for mechanical ventilation systems. (1) LOCATION AND DISTANCE. (a) *Location to prevent contamination.* Outside air intake openings shall be located so as to minimize contamination of outdoor air, but in no case shall the distance be less than 10 feet (measured in any direction) from outlets emitting products of combustion, exhaust vents and plumbing vents.

Note: This requirement also applies to roof-top heating and ventilating equipment.

(b) *Distance to adjacent properties.* Air intakes and exhausts shall be at least 10 feet from a property line and/or lot line or an adjacent building on the same property. This distance restriction does not apply to property lines along streets or alleys.

(c) *Mounting height.* The lowest side of outside air intake openings shall be located at least 12 inches above outside grade, above adjoining roof surfaces, or above the bottom of an areaway.

Note: The department will accept outside air intakes in areaways provided the minimum horizontal cross section of the areaway is equal to the free area of the opening, a grating is provided over the areaway with a free area equal to the required air intake, and the grating is designed for a minimum of 100 PSF live load.

(2) SCREENS. All outside air intake openings shall be provided with a device to prevent intake of foreign material of ½-inch size or larger.

(3) WEATHER PROTECTION. All outside air intake openings shall be protected against weather and water with a weatherproof hood or louvers.

(4) ACCESSIBILITY AND CLEANLINESS. All outside air intakes shall be easily accessible for cleaning and shall be kept clean and sanitary.

(5) DAMPERS. (a) *Intake.* All required outside air intakes shall be equipped with a damper with automatic controls which will close the damper and prevent the intake of outside air into the building when the ventilating unit is not in operation.

(b) *Exhaust.* All exhaust openings shall be provided with automatic or self-activating back-draft dampers to prevent the intake of outside air into the building when the exhaust units are not in operation.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (5) (a), Register, December, 1976, No. 252, eff. 1-1-77.

PART IV-HEATING EQUIPMENT REQUIREMENTS

Ind 64.20 Equipment ratings and safety controls. (1) * TEST AND INSTALLATION STANDARDS. Oil and gas-fired heating equipment, electric heating equipment, and accessory equipment or devices shall be tested and installed in accordance with standards recognized by the department.

Note: For a list of standards acceptable to the department, refer to Appendix A.

(2) SAFETY CONTROLS. (a) *General.* The complete safety control package for the heating and ventilating equipment shall comply with standards accepted by the department.

(b) *Limits and controls.* Oil and gas-fired heating equipment and electric heating equipment shall be equipped with primary (flame safeguard) safety controls, safety limit switches, and burners or electric elements that comply with standards accepted by the department.

Note: The department recognizes UL 296—Oil Burners, and UL 795—Commercial-Industrial Gas-Heating Equipment, as acceptable standards that satisfy the requirements of Ind 64.20 (1) and (2).

(3) LISTED EQUIPMENT. Complete factory assembled heating units shall be labeled by listing agencies approved by the department.

Note: The department accepts heating equipment listed by American Gas Association and Underwriters' Laboratories.

(4) UNLISTED EQUIPMENT. If the heating equipment is unlisted, the following provisions shall be taken:

(a) *Manufacturer's statement.* A statement from the equipment manufacturer shall be provided indicating the national standard with which the equipment complies.

(b) *Tests.* A test by a Wisconsin registered engineer shall be conducted on the output and safety controls, in accordance with the national standard used by the manufacturer. A statement regarding the test of the rating and safety controls shall be furnished for each installation unless an approval for the equipment is obtained from the department in accordance with (5) below.

*See Appendix A for further explanatory material.

TABLE 64.21--LOCATION OF EQUIPMENT

Location and Type of Occupancy	VENTED UNITS					UNVENTED UNITS		ELECTRIC	WATER-LOW PRES. STEAM
	Gas or Oil Furnace		Gas or Oil Unit Heater	Gas or Oil Infrared	Gas or Oil Space Heater	Gas Dir. Fired Makeup Air[1]	Gas Infrared	Furnaces, Unit Heaters, Heat Pumps, Basebrd Heaters, etc.	Unit Ventilators, Heaters, Makeup Air Units, Baseboard Heaters, etc.
Location	Central Rated Enclosure	Suspended 7' above floor	7' above floor	7' above floor		7' above floor	7' above floor		
Type of occupancy									
Factories, office & mercantile bldgs.									
Factories	Yes	Yes	Yes	Yes	N.P.	Yes	Yes		
Mercantile	Yes	Yes	Yes	N.P.	N.P.[2]	N.P.	N.P.		
Offices	Yes	Yes	Yes	N.P.	Yes	N.P.	N.P.		
Places of assembly, entertainment, recreation and dining (less than 100 persons)	Yes	Yes	Yes	Yes	N.P.	N.P.[3]	N.P.		
Tennis facilities	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.		
Theaters and places of assembly, entertainment, and worship (100 persons or more)	Yes	N.P.	N.P.	N.P.	N.P.	N.P.	N.P.		
Restaurants	Yes	N.P.	N.P.	N.P.	N.P.	N.P.[3]	N.P.		
Tennis facilities (court areas only)	Yes	Yes[8]	Yes[8]	Yes	N.P.	N.P.	N.P.		
Tennis facilities (all other areas)	Yes	N.P.[8]	N.P.[8]	N.P.	N.P.	N.P.	N.P.		
Schools & other places of instruction	Yes	N.P.[4]	N.P.[4]	N.P.	N.P.	N.P.	N.P.	PERMITTED IN ALL OCCUPANCIES	PERMITTED IN ALL OCCUPANCIES
Hospitals, nursing homes & penal insts.	Yes	N.P.	N.P.	N.P.	N.P.	N.P.	N.P.		
Residential occupancies (apartments, hotels, motels, etc.)	Yes	N.P.	N.P.	N.P.	N.P.[5]	N.P.	N.P.		
Hazardous occupancies									
Garages	Yes	Yes[6]	Yes[6]	Yes[6]	N.P.	Yes[6]	Yes[6]		
Aircraft hangars	Yes	Yes[7]	Yes[7]	Yes[7]	N.P.	Yes[7]	Yes[7]		
Day care centers	Yes	N.P.	N.P.	N.P.	N.P.	N.P.	N.P.		

N.P. = Not permitted.
[1]Direct-fired makeup air units shall be mechanically exhausted in the range of 90% to 110% of the air supplied.
[2]Permitted in retail stores less than 1500 square feet gross area with combustion air ducted to unit.
[3]Permitted in kitchens to provide makeup air for kitchen exhaust systems if located outside building or in a rated enclosure.
[4]Permitted only in shops with a 4-hour separation from other parts of the building.
[5]Gas-fired, direct-vent wall furnaces are permitted in apartments and motels.
[6]Suspend heating units in garages at least 8 feet off the floor.
[7]Suspend unit 10 feet above the upper surface of the wings or engine enclosure of the aircraft.
[8]Spectator areas in tennis facilities may be served by suspended equipment located in court areas.
Unlisted occupancies - Use the above occupancy that is most similar to the listed occupancy.
Clearances - Equipment shall be installed in accordance with the clearances from combustibles indicated on the name plate of the unit.

(5) EQUIPMENT APPROVAL. Equipment approval may be obtained from the department upon submission of a technical report, based on the test required in (4) (b) above, together with the fee as specified in Wis. Adm. Code chapter Ind 69, Fee Schedule, for equipment approval.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-75; r. and recr. Register, December, 1976, No. 252, eff. 1-1-77; am. (5), Register, December, 1977, No. 264, eff. 1-1-78.

Ind 64.21 Location of equipment. The various types of heating equipment and the corresponding types of occupancies in which the equipment may be located are shown in Table 64.21. The footnotes below the table designate special requirements for the listed equipment.

Note: The department will accept net ratings as listed by Mechanical Contractors Association of America, Inc., Institute of Boiler and Radiator Manufacturers, and equipment tested according to commercial standard 140-47.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; r. and recr. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.22 Special requirements. (1) BOILERS AND PRESSURE VESSELS. (a) *Construction standards.* Boilers and pressure vessels shall be constructed and installed in compliance with the standards of the American Society of Mechanical Engineers, as adopted under the Wis. Adm. Code chapters Ind 41-42—Boiler and Pressure Vessel Code.

(b) *Installation registration.* Installation registration form SB-257 shall be filed with the department, in accordance with the requirements of section Ind 41.05, before the boiler or pressure vessel is put into operation.

(2) FURNACES. Forced-air heating systems shall be designed to prevent a negative pressure on the heat exchanger.

(3) SUSPENDED EQUIPMENT. Suspended gas or oil-fired heating and ventilating equipment shall be visible to persons within the room where it is suspended and in no way hidden and shall comply with the following:

(a) If the entering air to the heat exchanger of all gas-fired equipment is 30° F or lower, the heat exchanger and burners shall be constructed of corrosion-resistive materials.

(4) GAS OR OIL-FIRED RADIANT HEATERS. Gas or oil-fired radiant heaters are subject to the following provisions:

(a) The heaters shall be equipped with an automatic pilot of the complete shutoff type or with a 100% shutoff electric ignition.

(b) If unvented radiant heaters are used, gravity or mechanical means shall be provided to exhaust at least 4 CFM per 1000 Btu per hour input of installed heaters. Provisions shall be made for an equal supply of outside air.

(c) Exhaust openings for removing products of combustion shall be provided above the level of the radiant heaters.

(d) Oil-fired radiant heaters shall be equipped with mechanical pressure-atomizing burners.

(5) SPACE HEATERS. Space heaters shall comply with the following provisions:

(a) The burner of the appliance shall be enclosed with a metal housing so constructed that there will be no open flame and the burner housing shall be effectively guarded against personal contact. The arrangement shall be such that the shield will prevent any combustible material in the vicinity of the appliance from coming in contact with the flame or with the housing that encloses the burner. Oil-fired space heaters shall be equipped with a mechanical pressure atomizing burner.

(b) Space heaters shall not be equipped with duct extensions beyond the vertical and horizontal limits of the metal enclosure.

(6) EQUIPMENT IN HAZARDOUS LOCATIONS. The types of heating and ventilating equipment that may be installed in hazardous locations (as defined in Article 500 of the National Electrical Code) are as follows:

(a) Listed low-pressure steam or hot water unit heaters and makeup air units;

(b) Listed electric units.

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

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; r. and recr. Register, December, 1976, No. 252, eff. 1-1-77; r. (4) (d) and renum. (4) (e) to be (d), Register, December, 1977, No. 264, eff. 1-1-78.

Ind 64.23 Piping. (1) PIPE SIZES AND ARRANGEMENT. All steam and hot water supply and return piping, air-line piping and auxiliary equipment shall be of appropriate sizes, elevations and arrangements to accomplish the calculated services in practical operation, without undue noise, stress or other detriment.

(2) EXPANSION AND CONTRACTION. The piping for the heating system shall be equipped with anchors, expansion swings or joints, supports and similar devices to relieve stress and strains caused by temperature change of the pipe material.

(3) PIPE INSULATION. Steam, hot water supply and return piping shall be covered with insulating material where the pipes pass through occupied areas and the surface temperature exceeds 180° F, unless guarded.

(4) STEAM AND HOT WATER PIPES. No pipe carrying hot water or steam at a surface temperature exceeding 250° F shall be placed within one inch of any woodwork, pass through a combustible floor, ceiling or partition unless the pipe is protected by a metal tube one inch larger in diameter than the pipe or with approved pipe covering.

(5) GAS OR OIL INSTALLATIONS. (a) *Piping installations.* All gas piping and oil piping shall comply with the standards accepted by the department.

Note: The department will accept gas piping installations which conform to NFPA No. 54 (ANSI Z223.1), National Fuel Gas Code; and oil piping installations which conform to NFPA No. 31, Oil-Burning Equipment.

(b) *Oil tank installations.* All oil-burning equipment shall be supplied with oil from a supply tank having a capacity of not less than 250 gallons. The fuel oil tank shall be equipped with a fill pipe, vent pipe and oil gauge. The vent pipe and fill pipe shall terminate outside of the building.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; r. and recr. Register, December, 1976, No. 252, eff. 1-1-77.

PART V—AIR DELIVERY SYSTEMS

Ind 64.31 Duct design. All ducts shall be designed to promote the unrestricted flow of air.

Note: The department will accept air duct velocities designed in accordance with the standards of the ASHRAE Handbood of Fundamentals, published by the American Society of Heating, Refrigerating and Air Conditioning Engineers.

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

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

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

Ind 64.33 Underground duct construction and installation. (1) MATERIALS. (a) *Tile ducts.* All underground duct systems using cement tile, glazed clay tile and other tile having a composition of cement and mineral shall be waterproof and shall have sufficient strength to prevent failure of duct at the time of installation and while in service. All fittings shall be designed with bell and spigot or slip-joint connections. All joints shall be waterproof.

(b) *Plastic and metal ducts.* Metal, plastic-coated metal ducts, and other approved materials may be used for underground systems if encased in not less than 2 inches of concrete. The ducts shall be waterproof, noncombustible, smooth and of sufficient strength to prevent collapse.

Note: The department will accept polyvinyl ducts installed underground without concrete.

(2) DUCT INSULATION. Supply air ducts installed parallel and adjacent to an outside wall shall be insulated with a moistureproof material (thermal conductance factor of .19 BTU per hour per square foot per degree Fahrenheit) placed between the duct and outside wall. The insulation shall extend from the underside of the floor to 2 feet below the finished grade.

(3) DUCT DRAINAGE. Underground ducts shall be provided with drainage to a lower room of the building or to a sump. No duct shall be connected to a sewer.

(4) DUCT INLETS AND OUTLETS. A water-tight connection shall be provided where the inlet and outlet risers are connected to underground ducts.

(5) PIPING. Nonhazardous piping may be installed in underground ducts if it does not restrict the air flow.

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

Ind 64.34 Duct construction. (1) METAL DUCTS. All sheet metal ducts and fittings shall be constructed in compliance with standards approved by the department.

Note: The department will accept the standards for ducts in the ASHRAE Handbook of Fundamentals, published by the American Society of Heating, Refrigerating and Air Conditioning Engineers, or as illustrated in the Low Velocity or High Velocity Duct Construction Standards published by the Sheet Metal and Air Conditioning Contractors National Association, Inc.

(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.

(3) NONMETALLIC DUCTS. Ducts constructed of other than metal shall conform to the following:

(a) The method for fabricating, installing and supporting ducts shall be approved by the department.

Note: The department accepts Class 1 air ducts tested (Standards for Safety, UL 181) and listed by Underwriters' Laboratories, Inc., and constructed in accordance with fibrous glass duct construction standards published by the Sheet Metal and Air Conditioning Contractors National Association, Inc.

(b) The ducts shall resist puncture, deformation or collapse.

(c) The ducts shall not be used where the air temperature exceeds 250° F, for kitchen or fume exhaust ducts, or to convey solids or corrosive gases.

(d) The ducts shall not pass through required fire-resistive construction.

(e) The ducts shall not be connected to a furnace, duct heater or similar heat-producing appliance unless a connecting duct of steel, having a length of not less than 6 feet, is used to separate them from the appliance.

(4) SPIRALLY WOUND METAL DUCTS. Spirally wound metal ducts shall be constructed to provide structural strength equal to rectangular ducts. The metal may be one standard gauge lighter than required for round ducts.

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

Ind 64.35 Duct connectors. (1) FLEXIBLE DUCT CONNECTORS. Flexible duct connectors between duct systems and air outlets or air outlet units shall conform to the following:

(a) The duct material shall be approved for such use.

Note: Flame-retarded fabric or metal or mineral listed in the Building Materials List, published by Underwriters' Laboratories, Inc., are acceptable.

(b) The construction shall be approved by the department.

(c) The connector shall not be subject to deterioration from mildew or moisture.

(d) The connector shall not pass through required fire-resistive construction.

(2) VIBRATION CONTROL. Vibration isolation connectors at the joint between the duct and fan or heat-producing equipment shall conform to the following:

(a) Connectors shall be a type approved for such use.

Note: Flame-retarded fabric or metal or mineral listed in the Building Materials List, published by Underwriters' Laboratories, Inc., are acceptable.

(b) Connectors shall be not more than 10 inches wide.

(c) Connectors shall not be used where the air temperature is in excess of 250° F.

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

Ind 64.36 Vertical shafts. Every vertical shaft shall be enclosed with noncombustible material which is fire-resistive rated in accordance with Table 51.03-A.

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

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

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

Ind 64.38 Gravity ventilation ducts. (1) DESIGN. Horizontal runs in gravity ventilation ducts connected to siphon-type roof ventilators shall be avoided wherever possible and the maximum practicable inclination shall be provided in all cases. In no case shall the horizontal run exceed 30% of the vertical run unless the room has a mechanical supply of air or the ventilation duct is connected to an exhaust fan.

(2) SEPARATE DUCTS. Separate gravity ventilation ducts, from each area of similar occupancy, shall extend to a plenum at the base of a siphon ventilator.

(3) PLENUMS. Gravity ventilation ducts, used with mechanical ventilation supply systems, shall not terminate in an attic plenum unless the plenum is airtight, of noncumbustible construction, and the attic floor is smooth. All collecting plenums shall be connected to an approved siphon-type roof ventilator or to an exhaust fan discharging outside the building.

(4) DAMPERS. Dampers are prohibited in gravity ventilation ducts, except atmospheric back-draft dampers are permitted.

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

Ind 64.39 Ventilation discharge. All gravity and mechanical ventilation ducts shall be protected from the weather and shall be so located and constructed as to prevent contamination of an outside air supply. Gravity ventilation ducts shall extend not less than 2 feet above the highest portion of the roof or parapet wall and shall be surmounted with an approved type of siphon roof ventilator.

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

Ind 64.40 Relief vents. (1) BAROMETRIC RELIEF VENTS PERMITTED. The use of barometric relief vents is permitted for type (a) and (b) ventilation classifications designated in Table 1. Where barometric relief vents are installed on the roof, the discharge openings shall be not less than 2 feet above the roof.

(2) BAROMETRIC RELIEF VENTS PROHIBITED. The use of barometric relief vents is prohibited for type (c), (d) and (e) ventilation classifications designated in Table 1.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.41 Suspended ceiling plenum. Plenums above ceilings used for the supply, return and transfer of air shall be of noncombustible construction, as defined in section Ind 51.01 (86) (a). The installation of hazardous piping and cables is prohibited. Openings into the plenum that would affect the fire-resistive rating of the roof and ceiling are prohibited.

Note: This section permits the use of steel, painted steel bar joists and metal decking, concrete, plaster, and other inorganic materials and prohibits the use of plastic wire sheathing, plastic thermal insultation, plastic pipe, intumescent paint and organic materials which will not pass ASTM test procedure E-136 [Ind 51.25 (50)], except plastic control tubing that meets the criteria of ASTM test procedure D-635.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.42 Fire dampers and fire curtain doors. (1) REQUIRED FIRE DAMPERS AND FIRE CURTAIN DOORS. All heating and ventilating ducts which terminate at or pierce code-required, hourly rated wall, floor or floor-ceiling assemblies (Table 51.03-A) and rated enclosures shall be protected as follows:

(a) Two-hour rated assemblies and enclosures shall be protected with 1½-hour rated fire dampers.

(b) Three-hour and 4-hour rated assemblies and enclosures shall be protected with 3-hour "A" label fire curtain doors.

(2) EXCEPTIONS. Exceptions to Ind 64.42 (1) are:

(a) Any assembly, such as a floor-ceiling assembly, that has been certified for use without fire dampers and approved by a nationally recognized testing laboratory.

(b) Metal ducts which do not exceed a maximum area of 20 square inches.

(c) Combustion air ducts which extend from the exterior of the building and terminate at 2-hour rated enclosures and which do not pierce any other fire-rated assembly in other areas of the building.

(3) SERVICING FIRE DAMPERS. Access panels shall be provided next to fire dampers and fire curtain doors to permit viewing and servicing.

Note #1: The department will accept fire dampers and fire curtain doors listed by Underwriters' Laboratories, Inc. or an approved nationally recognized testing laboratory. The dampers must be installed in the vertical or horizontal position that the dampers were designed and tested for. The department will also accept fire damper and fire curtain door installations recommended in publications of the Sheet Metal, Air Conditioning Contractors National Association, Inc., and the National Fire Protection Association bulletins No. 80 and 90A.

Note #2: Fire dampers classified by Underwriters' Laboratories as 1-½ hour rated assemblies are of single blade, multi-blade and curtain types. Fire curtain doors classified by 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.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; r. (1) (a), renum. (1) (b) and (c) to be (1) (a) and (b), Register, December, 1976, No. 252, eff. 1-1-77; am. (2) (c), Register, December, 1977, No. 264, eff. 1-1-78.

Ind 64.43 Dampers and damper controls. (1) VOLUME DAMPERS AND DEFLECTORS. Volume dampers, splitters and deflectors shall be provided in all ducts to permit accurate balancing of the system. The dampers, splitters and deflectors shall be adjusted to satisfy the heating and ventilating requirements of the conditioned space and locked in place.

(2) AIR GRILLES. All air supply outlets and returns shall be equipped with grilles or devices which will provide a uniform distribution of air.

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

Ind 64.44 Fans and blowers. (1) TYPE AND CAPACITY. Fans and blowers shall be of a type and size that will satisfy the design conditions of the heating and ventilating system. Fans and blowers shall be rated in accordance with an approved test procedure.

Note: The department accepts certified ratings listed by the Air Moving and Conditioning Association, Inc.

(2) QUIET OPERATION. The sound generated by various fans and blowers shall not be objectionable.

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

PART VI—CHIMNEYS, GAS VENTS, MECHANICAL DRAFT AND VENTING DEVICES

Ind 64.45 Chimneys, smoke stacks, gas vents, mechanical draft and venting devices. (1) GENERAL REQUIREMENTS. Heating equipment using solid, liquid or gas fuels shall be vented to the outside. A natural draft chimney or other venting device shall have the height and area to remove the products of combustion.

(2) NONCOMBUSTIBLE SUPPORTS. All chimneys or gas vents shall be supported from noncombustible construction unless otherwise approved.

(3) TERMINATION. (a) *Gravity type.* All chimneys or vents depending on a gravity principle for the removal of the products of combustion shall extend at least 3 feet above the highest point where the chimneys and vents pass through the roof of the building, and at least 2 feet higher than any ridge, peak or wall within 10 feet of the chimney.

(b) *Mechanical type.* The height and cross-sectional area may be reduced for chimneys employing a mechanical draft system of either forced or induced draft when approved by the department.

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

Ind 64.46 Masonry chimneys. The design and construction of the chimney shall conform to the provisions of this section.

(1) MATERIALS. The walls shall be built of brick or other approved fire-resistive material. No chimney shall rest upon a flooring of wood nor shall any wood be built into or in contact with any chimney. Combustible headers, beams, joists and studs shall be located at least 2 inches from the outside face of a chimney. The foundation shall be designed and built in conformity with the requirements for foundations for buildings. In no case shall a chimney be corbeled out more than 8 inches from the wall and in every case the corbeling shall consist of at least 5 courses of brick.

(2) FLUE SIZE. Every masonry chimney shall have walls at least 8 inches in solid thickness, except that in a chimney with a flue not larger than 260 square inches where a fire clay or other suitable refractory clay flue lining is used for the full height of the chimney the walls shall not be less than 4 inches in solid thickness. No smoke flue shall have a cross-sectional area less than 64 square inches. Flue linings 7 inches by 7 inches inside, or 8 inches in diameter inside, may be used.

(3) FLUE LININGS. All flue linings shall be capable of withstanding reasonably high temperatures and flue gases and shall have a softening point not lower than 1800° F. Flue linings shall be not less than ⅝ inch in thickness and shall be built in as outer walls of the chimney are constructed. Flue linings shall start from a point not less than 8 inches below the bottom of the smoke pipe intake and shall be continuous to a point not less than 4 inches above the enclosing walls.

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

(5) CLEAN-OUT OPENING. Every chimney shall be provided with a clean-out opening at the base. Such openings shall be equipped with metal doors and frames arranged to remain closed when not in use.

(6) WIND PRESSURE. Every chimney shall be designed to withstand wind pressures in accordance with the requirements of section Ind 53.12.

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

Ind 64.47 Metal smokestacks. (1) SMOKESTACKS IN EXCESS OF 30 FEET. The thickness of the metal walls shall be at least 3/16 inch for smokestack heights up to 40 feet and ¼ 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 ¼ inch of asbestos covered by sheet metal.

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

Ind 64.48 Factory-built chimneys. (1) GENERAL. Factory-built chimneys or gas vents shall be of an approved type.

(2) TYPE "A". An approved type "A" chimney may be used with solid, liquid or gas-fired heating appliances where the flue gas temperature does not exceed 1000° F continuously, and does not exceed 1400° F for infrequent brief periods of forced firing.

(3) TYPE "B". An approved type "B" gas vent may be used with gas-fired appliances where the flue gas temperature does not exceed 550° F at the outlet of the draft hood.

(4) TYPE "BW". An approved type "BW" gas vent may be used with a vented recessed heater.

(5) TYPE "C". A type "C" gas vent may be used with gas-fired, low-heat appliances (low-pressure boilers, furnaces and space heaters). The vent shall be not less than No. 20 standard gauge galvanized iron or other approved corrosion-resistant material. The installation shall conform to the requirements of section Ind 64.49.

Note: The department recognizes as approved, chimneys designed as types "A", "B", "BW" and "C" and listed by American Gas Association and Underwriters' Laboratories, Inc.

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

Ind 64.49 Smoke pipes. (1) CONSTRUCTION AND INSTALLATION. The construction and installation of smoke pipes shall conform with the following requirements:

(a) *Concealed spaces.* No smoke pipe or breeching serving heating appliances shall pass through any outside window, door, or combustible outside wall, nor be concealed in any closet, attic or similar space.

(b) *Smoke pipes which pass through combustible partitions.* Every smoke pipe which passes through combustible partitions shall be encased with noncombustible material at least 4 inches thick, or with a double safety thimble made of 2 concentric rings of sheet metal with at least one inch open air space between and with the outer ring covered with at least ¼-inch asbestos.

(c) *Distance from materials.* No part of any smoke pipe shall be placed nearer to any non-fire-resistive partition or wall than the diameter of the pipe, nor nearer to any non-fire-resistive ceiling than 1-½ times the diameter. The above distances may be reduced by one-half if the wall or ceiling is covered with not less than ¼-inch asbestos board covered with sheet metal or with equivalent protection.

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

Ind 64.50 Gas vents. All gas ranges (except those for domestic use), water heaters and other gas-fired equipment shall be provided with vent pipes conforming to the requirements for smoke pipes as specified in section Ind 64.49.

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

PART VII—EQUIPMENT LOCATION, PROTECTION, MAINTENANCE AND OPERATION

Ind 64.51 Guarding and fire protection. (1) GUARDING OF EQUIPMENT. Heating and ventilating equipment in gymnasiums, playrooms and similarly occupied areas shall be fully recessed and protected, or located not less than 7 feet above the floor. Heating and ventilating equipment shall not block any part of the required aisles, passageways and corridors.

(2) GUARDING OF SURFACES. Equipment located in occupied areas and installed less than 7 feet above the floor shall be guarded to prevent contact with:

(a) Any surface temperatures that exceed 180° F;

Note: For electrical equipment, the department will accept the surface temperature defined in UL 1042—Standard for Safety, Electric Baseboard Heating Equipment, published by Underwriters' Laboratories, Inc.

(b) Surfaces that are likely to cause lacerations.

(3) GUARDING OF MECHANICAL APPARATUS. All mechanical apparatus shall be guarded to comply with the requirements of Wis. Adm. Code Ch. Ind 1000-2000—Wis. Safety and Health Code.

(4) FIRE PROTECTION. All installations under this chapter shall comply with the precautionary requirements of the department to reduce fire hazards.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (2), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.52 Maintenance and operation. (1) MAINTENANCE. All heating, ventilating, exhaust and air conditioning systems shall be maintained in good working order and shall be kept clean and sanitary.

(2) OPERATION. All heating, ventilating and exhaust systems shall be operated to satisfy the requirements of this chapter during periods the building is occupied.

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

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

Ind 64.53 Final test required. The designer, installer or recognized balancing agency shall be responsible for the testing and balancing of every heating, ventilating and air conditioning system.

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

PART VIII—OCCUPANCY REQUIREMENTS

Ind 64.54 Factories, office and mercantile buildings. (1) SCOPE. This classification shall include all places of employment, mercantile buildings, retail establishments where goods and commodities are bought and sold, and places where not more than 100 persons assemble for worship, recreation, entertainment or dining purposes.

(2) VENTILATION. The air movement, supply and distribution for all occupancies in this class shall conform to the requirements of section Ind 64.05, Table 1, except that natural ventilation or mechanical ventilation need not be provided in warehouses and cold storage buildings.

(3) INDUSTRIAL EXHAUST SYSTEM. (a) *Contaminants.* Industrial exhaust systems shall be installed and operated to remove harmful contaminants in conformance with Wis. Adm. Code Ch. Ind 1000-2000—Wisconsin Safety and Health Code.

(b) *Makeup air.* A volume of outside air shall be supplied to replace the air exhausted if the total volume of air exhausted exceeds one air change per hour. The quantity of makeup air shall equal at least 90% of the air exhausted.

(c) *Connections.* Connections between industrial exhaust systems that convey different materials, the combination of which may produce explosive, heat-generating, corrosive, toxic, or otherwise dangerous mixtures, shall be prohibited.

(4) LOCKER ROOMS. Locker rooms used in places of industrial employment shall be provided with outside air. See section Ind 64.05, Table 1.

Note: Exhaust air from locker rooms may be directed through the adjoining toilet room or shower room.

(5) FIRST AID REST ROOMS IN PLACES OF EMPLOYMENT. Ventilation shall be provided for all areas of this class to conform to the requirements of section Ind 64.05, Table 1.

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

Ind 64.55 Theaters and places of assembly. (1) SCOPE. This classification shall include auditoriums, arenas, armories, assembly halls, banquet halls, billiard rooms, bowling alleys, cafeterias, club rooms, dance halls, dining rooms, gymnasiums, lecture halls, lodge halls, playrooms, restaurants, school auditoriums, Sunday schools and places of worship, funeral home chapels, parochial schools, convents, indoor skating rinks, and theaters which accommodate more than 100 persons for entertainment, recreation, worship, or dining purposes.

Note: For areas that will accommodate less than 100 persons, see Ind 64.54.

(2) VENTILATION. The air movement, supply and distribution for all occupancies under this classification shall conform to the requirements of section Ind 64.05, Table 1.

(3) ALTERNATE SERVICE AND CAPACITY. Heating and ventilating systems installed in places of worship, Sunday schools, so-called community buildings and lodge halls may be arranged for selective delivery of the entire service to either the first floor area or to the basement floor area provided these areas are not used simultaneously.

(4) STAGES. The stage in any theater or assembly hall, for which a fire curtain is required, shall be supplied with sufficient air or other means to equalize the pressure to avoid deflecting the curtain.

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

Ind 64.56 Schools and other places of instruction. (1) SCOPE. This classification shall apply to all public and private schools, colleges, universities, academies, seminaries, libraries, museums, art galleries, all places used for vocational instruction and research such as laboratories, shops, science rooms, and all parts of buildings used for instructional purposes.

(2) VENTILATION. The air movement, supply and distribution for all occupancies under this classification shall conform to the requirements of section Ind 64.05, Table 1. For corridors provided with lockers, the air movement shall be not less than 10 cubic feet per minute per lineal foot of corridor. This air supply shall be accomplished by means of air inlets admitting air from adjacent classrooms or by a direct tempered air supply.

Note: This rule does not apply to corridors furnished with coat hooks.

(3) SCHOOL SHOP EQUIPMENT AND LABORATORY EXHAUST. An exhaust system, in accordance with the requirements of section Ind 64.54 (3), shall be provided for all equipment and processes that create dust,

fumes, vapors and gases injurious to health. Makeup air may be transferred from other areas of the building to replace the air exhausted from the equipment or process.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (3), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.57 Hospitals and nursing homes. (1) SCOPE. This classification shall include hospitals, nursing homes, public health centers and treatment centers where medical services are provided for treatment and care of "bedfast patients."

Note #1: A "bedfast patient" is a person who is normally confined to a bed or chair.

Note #2: For additional requirements, refer to Wis. administrative codes of the state department of health and social services.

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

Note: The department of health and social services requires a positive pressure relationship, with respect to adjacent areas, in corridors, operating rooms, delivery rooms, nurseries, day room areas, laboratories with media transfer, and nurses stations which are located in corridors.

(a) Exhaust ventilation shall be provided on the basis of 2 cubic feet per minute for each square foot of floor area from such rooms as baths, laboratories, laundries, anesthetic storage, bedpan, sterilizing, soiled utility, soiled linen, and janitor closets.

(b) The heating and ventilating system serving such rooms as operating, anesthesia, recovery, labor, delivery, nursery, isolation, therapy, and autopsy shall satisfy the following conditions:

1. A minimum air movement of not less than 6 air changes per hour.

2. Outside air of not less than 6 air changes per hour shall be provided.

3. The recirculation of air is not permitted in autopsy rooms.

4. Recirculation of air shall only be permitted within the system serving an individual room.

5. Mechanical exhaust shall be provided.

6. The relative humidity in rooms where anesthetic gases are used shall be maintained at not less than 50%.

(c) Private rooms, semi-private wards, day rooms, and nurses stations shall be ventilated in accordance with the requirements of section Ind 64.05, Table 1, unless an openable sash area has been provided and the content of the space is in excess of 400 cubic feet per occupant.

Note: See sections Ind 57.17 and 57.19.

(d) The air movement in corridors and halls shall be not less than 10 cubic feet per minute per lineal foot of corridor or hall.

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

Ind 64.58 Penal institutions and places of detention. (1) SCOPE. This classification shall include corridors and areas of compulsory occupancy in penal institutions, mental hospitals and other places of detention.

(2) VENTILATION. The air movement, supply and distribution for all areas of this class shall be accomplished by mechanical means and shall conform to the requirements of section Ind 64.05, Table 1. The air movement through the corridors shall be not less than 10 cubic feet per minute per lineal foot of corridor.

(3) OVERNIGHT LOCK-UPS. Where cells are provided for not more than 6 occupants for the purpose of overnight detention only, exhaust ventilation shall be provided on the basis of 6 air changes per hour for the occupied area.

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

Ind 64.59 Residential occupancies. (1) SCOPE. This classification shall include all apartments, row houses, rooming houses, hotels, motels, dormitories, and all other places of abode.

Note: See section Ind 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) RETURN AIR DUCTS. Unlined 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.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (3), Register, December, 1976, No. 252, eff. 1-1-77.

Ind 64.60 Day care facilities. (1) SCOPE. This classification shall include all public and private day care centers accommodating more than 4 children, including all buildings or parts of buildings used as child day care facilities.

(2) VENTILATION. The air movement, supply and distribution for all areas of this class shall conform to the requirements of section Ind 64.05, Table 1.

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

Ind 64.61 Repair areas. (1) SCOPE. This classification includes all areas where motor-driven vehicles are repaired.

(2) VENTILATION. The air movement, supply and distribution shall be provided in accordance with the requirements of section Ind 64.05, Table 1. The exhaust air shall be drawn from not more than 18 inches above the floor.

(3) TAIL PIPE EXHAUST. (a) *Mechanical exhaust system.* A mechanical exhaust system shall be provided in the repair area to remove the exhaust fumes from internal combustion engines. The duct system shall be designed with sufficient outlets to accommodate the total number of vehicles in the repair area. A flexible hose, equipped with a device for connecting it to the exhaust pipe of the vehicle and to the

exhaust system, shall be provided. Each outlet shall be provided with a shut-off valve that can be closed when not in use. The blower capacity shall be sufficient to exhaust a volume of air not less than 100 cubic feet per minute for each opening.

(b) *Nonmechanical exhaust.* A noncombustible flexible tube or hose not more than 10 feet long, connected to the engine exhaust (tail pipe) and terminating outside the building, may be used in lieu of the requirements stated in (a) above.

Note: The requirements stated in (2) need not be increased when satisfying requirements of either (3) (a) or (b). Also see Wis. Adm. Code Ch. Ind 1000-2000—Wis. Safety and Health Code.

(4) MISCELLANEOUS REPAIR AREAS. Areas involved in the servicing of small internal combustion engines such as lawnmowers, snowmobiles, chainsaws, cycles, boat engines, battery charging areas, etc. shall be provided with at least 3/4 cubic foot of outside air per square foot of enclosed service floor area and an equivalent exhaust. Exhaust from battery charging or battery storage areas shall be from the top of the area.

(5) CONTAMINANTS. If the provisions of this section do not provide sufficient ventilation to meet the standards for threshold limit values covered in Wis. Adm. Code Ch. Ind 1000-2000—Wis. Safety and Health Code, the additional exhaust requirements with an equivalent volume of outside air shall be provided to satisfy the requirements found in Ch. Ind 1000-2000.

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

Ind 64.62 Vehicle service buildings. (1) SCOPE. Buildings of this classification shall include liquid fuel dispensing stations and/or where vehicles can be driven into the building for washing, greasing, oil change, motor tune-up or repair, tire replacement, body repair, and similar operations.

(2) VENTILATION. The air movement, supply and distribution shall be provided in accordance with the requirements of section Ind 64.05, Table 1. The exhaust air shall be drawn from not more than 18 inches above the floor.

(a) *Repair area ventilation.* All service and/or workroom areas involving engine tune-up or repair requiring the operation of internal combustion engines shall be provided with ventilation to satisfy the requirements of section Ind 64.61 above.

(b) *Vehicle washing facilities.* Buildings or portions of buildings having a capacity of and used exclusively for washing 2 or more vehicles simultaneously shall be supplied and exhausted with a volume of outside air equal to 1/2 cubic foot per minute per square foot of floor area.

1. The minimum floor area calculated for wash areas provided with vehicle conveyor systems shall be based on that portion of the floor located between the termination of the conveyor system and the vehicle exit door.

(3) CONTAMINANTS. If the provisions of this section do not provide sufficient ventilation to meet the standards for threshold limit values covered in Wis. Adm. Code Ch. Ind 1000-2000—Wis. Safety and Health Code, the additional exhaust requirements with an equivalent volume of outside air shall be provided to satisfy the requirements found in Ch. Ind 1000-2000.

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

Ind 64.63 Garages. (1) SCOPE. This classification includes all buildings, or parts of buildings, where motor-driven vehicles are stored.

(2) VENTILATION. The air movement, supply and distribution shall be provided in accordance with the requirements of section Ind 64.05, Table 1. Live storage areas shall be provided with exhaust air drawn from a height not more than 18 inches above the floor unless the following requirements are satisfied:

(a) The floor is located at or above grade.

(b) A permanent open-wall area of at least 30% of the total wall area is provided. The openings shall be distributed to permit circulation of air throughout the storage area.

Note # 1: A live storage area is any area used for storage of fire trucks, tractors, automobiles, trucks, and similar self-propelled vehicles which are driven in and out of the storage area under their own power; it does not include areas where vehicles and equipment are stored for seasonal periods, or areas where vehicles are displayed without batteries and where the gasoline tanks of the vehicles are empty and free of fumes.

Note #2: The department will permit the use of a mechanical exhaust system in conjunction with openings in the exterior walls to provide the ventilation required by Table 1.

(3) CONTAMINANTS. If the provisions of this section do not provide sufficient ventilation to meet the standards for threshold limit values covered in Wis. Adm. Code Ch. Ind 1000-2000—Wis. Safety and Health Code, the additional exhaust requirements with an equivalent volume of outside air shall be provided to satisfy the requirements found in Ch. Ind 1000-2000.

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

Ind 64.64 Automobile showrooms. (1) SCOPE. This classification includes all showrooms with offices and occupancies adjacent to repair or live storage areas.

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

(2) VENTILATION. The air movement, supply and distribution shall be provided in accordance with the requirements of section Ind 64.05, Table 1.

(a) *Separate ventilating system.* A separate ventilating system shall be provided for showrooms or offices where such occupancies are adjacent to repair or live storage areas.

Note: Ventilation is not required if an openable area is provided to conform with the requirements of section Ind 64.07.

(b) *Recirculation.* Air shall not be recirculated from any repair, live storage or service area unless the total volume of air in circulation is in excess of the ventilation required. Excess air may be recirculated.

(c) *Contaminants.* If the provisions of this section do not provide sufficient ventilation to meet the standards for threshold limit values covered in Wis. Adm. Code Ch. Ind 1000-2000—Wis. Safety and Health Code, the additional exhaust requirements with an equivalent volume of outside air shall be provided to satisfy the requirements found in Ch. Ind 1000-2000.

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

Ind 64.65 General sanitation and service areas. (1) SCOPE. This classification shall include toilet rooms, locker rooms, shower rooms and janitor closets.

Note #1: A janitor closet is a service closet with one or more plumbing fixtures.

Note #2: For exhaust ventilation requirements in hospital service areas, see section Ind 64.57.

Note #3: For exhaust ventilation requirements in places of employment, see section Ind 64.54.

Note #4: The use of wall registers within 6 inches of the floor, baseboard registers, and floor registers is prohibited in these areas. (See section Ind 52.57, Note.)

(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.

1. Exception. Mechanical exhaust ventilation may be omitted from toilet rooms or bathrooms having one water closet or urinal, or from janitor closets having one service sink or receptor, where an approved ductless air circulating and treatment device is provided.

Note: The department will accept ductless air circulating and treatment devices conforming to standard C-10 as adopted by the National Sanitation Foundation (NSF).

Note: The department of health and social services prohibits the use of ductless air circulating and treatment devices in hospitals and nursing homes. See chapter H 24 and 32.

(c) *Locker, shower and toilet room ventilation.* Adjoining locker, shower and toilet rooms shall be exhausted at the rate of 2 cubic feet per minute per square foot of area, based on the floor area of the largest space. The rooms shall be provided with tempered makeup air supplied directly from the outside or transferred from other areas of the building in accordance with the requirements of section Ind 64.18. A negative pressure relationship shall be maintained in the shower and toilet rooms with respect to the locker room.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (1), cr. (3) (c) and r. (4), Register, December, 1976, No. 252, eff. 1-1-77; cr. (3) (b) 1, Register, December, 1977, No. 264, eff. 1-1-78.

Ind 64.66 Natatoriums. (1) POOL VENTILATION. In natatoriums, a volume of tempered outside air supply and exhaust shall be provided at the rate of at least 2 cubic feet per minute per square foot of pool surface. The volume of tempered outside air and exhaust may be reduced to a minimum of one cubic foot per minute per square foot of pool surface provided humidity controls are used to limit the relative humidity to 60%.

(2) AIR MOVEMENT. The air movement in a natatorium shall be not less than 6 air changes per hour unless mechanical cooling is provided to satisfy the heat gain requirement for the space.

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

Ind 64.67 Kitchens (1) SCOPE. This classification includes all areas where food is prepared (except in domestic science educational facilities from grades kindergarten through 12, and single unit apartments in hotels, motels and apartment buildings).

(2) EXHAUST VENTILATION SYSTEMS. Exhaust ventilation systems serving this occupancy shall not be used for any other service.

(a) *Required exhaust ventilation.* Mechanical exhaust ventilation shall be provided at a rate not less than 2 cubic feet per minute per square foot of floor area for every occupied area within the scope of this section.

(b) *Required exhaust hood.* Exhaust hoods shall be required where frying and/or broiling is done (includes deep-fat frying and surface frying), and where cooking is a regular commercial operation (includes ranges, griddles, fryers, broilers and similar grease-producing equipment).

(3) REPLACEMENT AIR. Adequate replacement air shall be provided to equal the air being exhausted by all exhaust systems.

(4) RECIRCULATION OF AIR. Recirculation of air as described under subsection Ind 64.15 (4) is prohibited during occupied periods.

(5) EXHAUST HOOD REQUIREMENTS. (a) *Size of hood.* The horizontal inside dimensions for canopy hoods shall be sized to effectively capture grease vapors, but in no case shall these dimensions be less than the overall horizontal dimensions of the grease-producing equipment. The horizontal inside dimensions for noncanopy, prefabricated backshelf hoods may be less than the overall horizontal dimensions of the grease-producing equipment.

(b) *Exhaust rates.* The kitchen exhaust hood shall be provided with a capture velocity to effectively capture the grease vapors and may be designed through engineering analysis or the empirical design formulas stated below:

1. *Canopy hood.* Hood open on all 4 sides: Q = 150 A (area).

2. *Wall hood.* Hood open on 3 sides or less: Q = 100 A (area).

3. *Slotted-type hood.* V = 350 feet per minute through the slot opening. The slot shall be at least 3 inches in width.

4. *Noncanopy hood.* The minimum volume of exhaust air for noncanopy type hoods (prefabricated backshelf) shall be not less than Q = 300 L (length).

Note: Q equals the exhaust air in cubic feet per minute; A equals the area of the hood over the grease-producing equipment in square feet; V equals the velocity in feet per minute; and L equals the total length in feet of the cooking appliance (s) being ventilated, and measured parallel to the front edge of the appliance (s).

(c) *Materials.* Hoods shall be constructed and supported by steel not less than .0478 inch U.S. standard gage (No. 18 manufacturers standard gage) or stainless steel not less than .0359 inch U.S. standard gage (No. 20 manufacturers standard gage) or other materials of equivalent strength, fire and corrosion resistance.

Note: The department will permit hoods constructed of aluminum, the thickness of which is not less than .050 inch.

(d) *Seams.* All seams and joints shall be liquid-tight.

(e) *Grease-removal devices.* Approved grease extractors, grease filters or other grease-removal devices shall be provided.

(f) *Exposed hood surfaces.* Hood surfaces and exposed exhaust ducts within 18 inches of combustible material shall be protected in accordance with the requirements of section Ind 64.67 (6) (f).

(g) *Concealed hood surfaces.* Hood surfaces that are concealed by or recessed into adjoining construction shall be protected in accordance with the requirements of section Ind 64.67 (6) (f).

(h) *Double-wall hoods utilizing outdoor air.* When hoods are connected to ducts supplying outside air, performance data shall be submitted.

Note: Double-wall hoods provided with a supply of outdoor air conserve energy.

(6) EXHAUST DUCTS FROM HOODS. (a) *Design.* All ducts shall lead, as directly as possible, to the exterior of the building without forming dips or traps which collect residues. Ducts exposed to the exterior shall be protected with a suitable weatherproof coating.

Note: Temperatures in excess of 2000° F may be experienced within ducts in the event of fire. A means of expansion of long ducts should be considered.

(b) *Materials.* Ducts shall be constructed of and supported by steel not lighter than .0598 inch U.S. standard gage (No. 16 manufacturers standard gage) or stainless steel not lighter than .0478 inch U.S. standard gage (No. 18 manufacturers standard gage) or other materials of equivalent strength, fire and corrosion resistance.

(c) *Seams and joints.* All seams and joints shall be liquid-tight.

(d) *Clean-out openings.* Accessible clean-out openings at the sides of ducts shall be provided at each change of direction of the duct for inspection and servicing.

(e) *Interior ducts.* Ducts shall not pass through required fire walls or partitions.

(f) *Concealed exhaust ducts.* 1. Horizontal ducts. Horizontal concealed ducts connected to hoods that pass through any other area of the building, including suspended ceilings, shall be protected with insulating material to withstand a flue temperature of not less than 1000° F. The temperature of the exposed surface of the insulating material shall not exceed 250° F.

Note: The department will accept the use of masonry chimneys or manufactured chimneys which are tested and approved for use at a flue gas temperature of not less than 1000° F, or insulating materials for fire endurance systems listed in the Fire Resistance Index published by Underwriters' Laboratories, Inc.

2. Vertical ducts. Vertical concealed ducts that pass through any other area of the building, including suspended ceilings, in one- and 2-story buildings, shall be protected with insulating material as specified in 1. above, or shall be located in 2-hour noncombustible fire-resistive enclosures. In buildings of 3 or more stories, vertical ducts shall be located in 2-hour noncombustible fire-resistive enclosures.

(g) *Exposed exhaust ducts.* Exposed exhaust ducts connected to hoods or canopies shall be located not less than 18 inches from combustible material unless the duct is protected in accordance with the requirements of (f) above.

(h) *Air discharge.* The air discharge shall be directed away from the roof or combustible materials.

(i) *Dampers.* Fire dampers shall not be installed in kitchen exhaust duct systems unless the assembly includes an approved extinguishing system designed to operate with a fire damper in the closed position.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; renum. from 64.66, r. and recr. (5) (a) to (d), renum. (5) (e) to (i) to be (5) (d) to (h), am. (6) (b), Register, December, 1976, No. 252, eff. 1-1-77; am. (5) (f) and (g), Register, December, 1977, No. 264, eff. 1-1-78.

Ind 64.68 Seasonal occupancies. When approved in writing by the department, heating requirements may be waived (but not ventilation required by section Ind 64.05, Table 1) during the period of June 1 through September 15 for the following or similar occupancies: drive-in eating places, club houses, outdoor toilets, camp lodge buildings, canning factories, and migrant labor camps (also see chapter Ind 49—Migrant Labor Camps).

Note: Rules on migrant labor can be found in chapter Ind 201.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; renum. from 64.67, Register, December, 1976, No. 252, eff. 1-1-77.

APPENDIX A

The material contained in this appendix is for clarification purposes only. The notes, illustrations, etc. are numbered to correspond to the number of the rule as it appears in the text of the code.

A-50.10-50.25 FORMS. The following forms (SB2, 8, 8A, 118, 198, 224B and SBD-4927) are referred to in sections Ind 50.10, 50.12, 50.14, 50.18, 50.20 and 50.25. Copies of these forms are available from the Division of Safety and Buildings, P.O. Box 7946, Madison, Wisconsin 53707.

SB-2
REV. 7/74

Department of Industry, Labor and Human Relations

Inspection Report and Orders

INSPECTION DATE				FILE NO. E -
OWNERS NAME			OCCUPANCY INSPECTED	
MAILING ADDRESS			LOCATED AT (STREET ADDRESS)	
CITY	STATE	ZIP CODE	CITY	COUNTY

An Inspection of the above occupancy discloses violations of orders of the Dept. of Industry, Labor & Human Relations promulgated under authority of Chapter 101 of the Revised Statutes of Wisconsin.

SEE REVERSE SIDE FOR APPLICABLE WISCONSIN STATUTES

NOTE	ITEM	ORDER	REQUIREMENTS · ☐ Building ☐ Safety

IMPORTANT

- Please report when orders are completed • Avoid Delay
- Forfeiture for violations are $10 to $100 each day for each violation
- Keep us informed

"Failure of an employer reasonably to enforce compliance by employes with such statute or order of the Department Shall constitute failure by the employer to comply with such statute or order." Sec. 102.57 Wis. Stats.

COMPLIANCE DATE	VIOLATIONS EXPLAINED TO:	TITLE

By _____ Deputy DISTRICT NO. _____ Safety & Buildings Division

Address all Correspondence Safety and Buildings Division, Department of Industry, Labor and Human Relations, P.O. Box 7946 Madison, Wisconsin 53707

Register, December, 1977, No. 264
Building and heating, ventilating and air conditioning code

SB-816/771
PETITION FOR MODIFICATION
OF A RULE IN THE
WISCONSIN ADMINISTRATIVE CODE

**WISCONSIN DEPARTMENT OF
INDUSTRY, LABOR AND HUMAN RELATIONS
DIVISION OF SAFETY & BUILDINGS
P. O. BOX 7946, MADISON, WI 53707**

PETITION REVIEW FEE – $75.00

Name of Owner		Building Occupancy or Use		Agent, Architect or Engineering Firm	
Company		Tenant Name, if any		Street & No.	
Street & No.		Building Location, Street & No.		City	State & Zip
City	State & Zip	City	County	Phone	

1. Rule Ind. _____ of the Wisconsin Adminstrative code cannot be entirely satisfied because:

2. In lieu of complying exactly with the rule, the following alternative is proposed as a means of providing an equivalent degree of safety:

3. Supporting arguments are:

Vertification by owner

_____, being duly sworn, says he is the petitioner herein, that he has read the foregoing petition and that the same is true, as he verily believes.

_____
signature of owner

subscribed and sworn to me this ___ day of _____, 19___, in _____County, Wisconsin.

_____
Notary Public

My commission expires: _____

Commission Action	
Secretary	Date

–PETITION IS VALID ONLY IF NOTARIZED

Register, December, 1977, No. 264
Building and heating, ventilating
and air conditioning code

POSITION STATEMENT:
To be compiled by
Chief of Fire Department
SB 8-A (2-77)

WISCONSIN DEPARTMENT OF
INDUSTRY, LABOR AND HUMAN RELATIONS
DIVISION OF SAFETY & BUILDINGS
P.O. BOX 7946 MADISON WI 53707

Name of Owner	Building Occupancy or Use	Agent, Architect or Engineering Firm
Company	Tenant Name, if any	Street & No.
Street & No.	Building Location, Street & No.	City State & Zip
City State & Zip	City County	Phone

1. I have read the petition for modification of rule: Ind

2. I recommend (Check appropriate box)	Denial	Approval	Conditional Approval	No Comment*

3. Explanation for Recommendation:

* If desired, Fire Departments may indicate "No Comment" on non-fire safety issues such as sanitary, energy conservation, structural, barrier free environments, etc.

4. ☐ I find no conflict with local rules and regulations
☐ I find that the petition is in conflict with local rules and regulations

Explanation

Signature of Fire Chief	Date

PLEASE COMPLETE AND SUBMIT PROMPTLY TO DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS AT THE ADDRESS SHOWN ABOVE.

PLANS APPROVAL APPLICATION
SB 118 (Rev 6/77)

Department of
INDUSTRY, LABOR AND HUMAN RELATIONS

Safety & Building Division
Box 7946
201 E. Washington Avenue
Madison, Wisconsin 53707

INSTRUCTIONS: Fill in all applicable data. Submittal of Plan Approval Application form is required with each plan submittal. Examination and inspection fees, as determined on back of form, are required to be submitted with a minimum of three sets of plans. Data required on plans is described in code section Ind 50.12
Codes can be purchased from the Department of Administration, Document Sales, 202 S. Thornton Ave., Madison, 53703

1. THIS APPLICATION IS FOR ☐Building Plan Approval ☐Heating Plan Approval ☐Other _____

2. PLANS FOR ☐New Building ☐Addition ☐Alteration ☐Structural ☐Footing & Foundation
☐Revision to previously approved plans ☐Other _____

3. PROJECT INFORMATION

Name of Owner	Building Occupancy or Use	Designer or Design Firm
Company	Tenant Name, if any	Street & No.
Street & No	Building Location, Street & No.	City State & Zip
City State & Zip	City ☐ Village ☐ Town ☐ County	Phone
Previous Owner if any	Return Plans to ☐Owner ☐Designer	

4. DETERMINATION OF FEES SEE CHAP. IND. 69 FOR FULL SCHEDULE
SEE BACK OF PAGE FOR FEE CALCULATION AND ABBREVIATED FEE SCHEDULE

Total Volume _____

4a. Building Plan Fee $ _____
4b. Heating Ventilation Fee $ _____
4c. Other $ _____
4d. Inspection $ _____
4e. TOTAL $ _____

FOR OFFICE USE ONLY
Amount Rec'd _____
Date Rec'd _____
Receipt No _____

5. OTHER INFORMATION

5a. Type of Construction
☐Fire Resistive Type A ☐Metal Frame Protected ☐Exterior Masonry ☐Wood Frame Protected
☐Fire Resistive Type B ☐Heavy Timber ☐Metal Frame Unprotected ☐Wood Frame Unprotected

5b. Mechanical Information Type of Heating _____ Net Rating of Heating Units _____

5c. SOIL BEARING CAPACITY (See Ind 53.21)
Method used to determine capacity
Check One Verified ☐ Presumptive ☐
Check Value Used PSF 2000 ☐, 3000 ☐, 4000 ☐
6000 ☐, 7000 ☐, Other _____

Yes	No
☐	☐ Sprinkler System Provided?
☐	☐ Fire Alarm Provided?
☐	☐ Other Detection System Provided?
☐	☐ Emergency Power Provided?

6. DESIGN AND SUPERVISION (IND 50.13)
The design, plans, computations and specifications for this project have been prepared under my supervision. I am registered as an ☐ Architect ☐Engineer ☐Designer in Wisconsin as provided in Section 443.01 of the Wisconsin Statutes. ☐I am not registered. If this building, existing and additions, contains over 50,000 cu. ft. total volume, it must be designed by a registered person.

Signature of designer	Registration Number	Date

If this building, existing and additions, contains over 50,000 cu. ft. total volume, the construction of this project shall be under the supervision of a Wisconsin registered architect, engineer, or in the case of heating and ventilating, designer.

Plans for buildings over 50,000 cu. ft. will not be approved until the name of the supervising professional is known.

Name of Supervising Professional	Registration Number

NOTE: The supervising professional shall file a written report with the Department upon completion of construction. [Ind 50.13 (3) (c)]

4. DETERMINATION OF FEES

INSTRUCTIONS:

1. Refer to fee schedule shown below.
2. Enter area of each floor in appropriate space.
3. Enter height of each floor (Height includes attic and space between floors).
4. Compute volume of each floor/attic space and total volume for building.*
5. Compute building and/or heating fee per building.
6. Enter other fee (if any) in space per building.
7. Compute inspection fees per building.
8. Total fees and transfer information to front page.

*The "total volume" is determined by the overall outside dimensions of length, width and height.

EXAMINATION FEES PER BUILDING

Building Plan Fee: Fee. 60 per 1000 cu. Ft. Minimum Fee $25.00
Heating & Ventilating Plan Fee: Fee. 40 per 1000 cu. ft. Minimum Fee $25.00
Alterations to bldgs: Fee $1.50 per $1,000 est. cost. Minimum fee $25.00
*Structural Plans $25.00 per Bldg.
Revision to approved Plan $25.00
*Exhaust Systems $25.00 per plan (Govt. Owned only)
*Spray Booths $25.00 per Plan (Govt. Owned only)
Permit to Start Construction (SB-198) $35.00 per Bldg.
*Footing & Foundation Plans $25.00 per Bldg.
*Stadium, Grandstand, Bleacher $10.00/1000 Seats Minimum Fee $25.00
*Fire Escapes $25.00 per fire escape

NOTE

(1) Heating & Ventilating Plans submitted separately require an inspection fee of $44.00.
*(2) Plans other than building or heating require an inspection fee of $25.00.
(3) Warehouses-Reduce plan examination fees (Not inspection fees) by 30%.
(4) Building plan fee for Bldgs. exceeding 1,000,000 cu. ft. is $600 plus $0.40 per 1,000 cu. ft. in excess of 1,000,000 cu. ft..
(5) Heating & Ventilation plan Fee for Buildings exceeding 1,000,000 cu. ft. is $400 plus $0.25 per 1000 cu. ft. in excess of 1,000,000 cu. ft.

INSPECTION FEES PER BUILDING:

Building Volume/Alt. Cost	Fee
Up to 25,000 cu. ft./dollars	$50.00
25,001 - 100,000 cu. ft./dollars	$75.00
100,001 - 500,000 cu. ft./dollars	$100.00
500,001 - 1,000,000 cu. ft./dollars	$125.00
In excess of 1,000,000 cu. ft./dollars	$150.00

No. of Floors	Area	Height	Total each Floor	Total Vol./1000 x Exam Fee	Building Plan Fee
Basement/Ground	x		= cu. ft.	x .60 =	$
1st Floor	x		= cu. ft.	Total Vol./1000 x Exam Fee	Heating Ventilating Fee
2nd	x		= cu. ft.	x .40 =	$
3rd	x		= cu. ft.	☐Structural $25.00 ☐Alteration $1.50/1000	Other
4th & 5th attic & etc.	x		= cu. ft.	☐Permit to start $35.00 ☐Exhaust $25.00 ☐Ftg. & Found $25.00 ☐Revision $25.00	$
	Total Volume or Total Cost of Alteration		=		Inspection Fee $
					Total $

TRANSFER ALL DOLLAR AMOUNTS AND VOLUME TO FRONT PAGE _____

SB–196
Rev. 5/77

DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS
SAFETY & BUILDINGS DIVISION
P.O. BOX 7946
MADISON, WISCONSIN 53707

PERMIT TO START CONSTRUCTION
FEE $35.00 (per bldg.) IN ADDITION TO EXAMINATION/INSPECTION FEES

Location of Project:

Owner:_____ E_____

Street:_____ Plan File Number_____

City:_____ Date Plans Rec'd_____

County:_____

Occupancy:_____

We, the undersigned, request to begin footing and foundation work prior to approval of the plans.

Complete plans have been submitted to the Department of Industry, Labor & Human Relations, Division of Industrial Safety and Buildings, and all information requested by Code Ind. 50.12 has been included with the submittal.

We have reviewed the specific code requirements for the building or structure including, but not limited to, Ind. 54.01, Ind. 55.02, Ind. 56.02, Ind. 57.01 (construction, height and allowable area), Ind. 50.12, Ind. 51.03, Ind. 53, Ind. 55.05 and Ind. 54.50, when applicable, and have shown compliance on the drawings.

We agree to make any changes required after the plans have been reviewed and to remove or replace noncode complying parts of the foundation and/or footings.

We agree to proceed with the footings and foundation only and will not continue with the remainder of the building or structure until approval has been received.

_____
Owner's Signature Date

Name:_____

Address:_____

_____

_____
Designer's Signature Date

Name:_____

Address:_____

_____

_____
Accepted By Date

Dept. of Ind., Labor & Human Relations
Div. of Industrial Safety & Buildings

Not Accepted Because_____

_____

Plans will be examined within the next _____ days.

NOTE: Footing and foundation plans submitted prior to final building plans will not be accepted for this permit.

Register, December, 1977, No. 264
Building and heating, ventilating
and air conditioning code

INSPECTION PROGRESS REPORT
SB-224B
Rev. 7/75

Wisconsin Department of Industry, Labor & Human Relations
DIVISION OF SAFETY AND BUILDINGS
P.O. Box 7946 · Madison, Wisconsin 53707

S.101.102(2), Wisconsin Statutes, requires a $15 inspection fee for each building inspection conducted, payable at time of plan review. Owner will be billed $15 for each inspection required to obtain compliance after the final inspection. Failure to comply with safety code provisions may result in issuing formal charges against the owner.

Designer will be notified of time of final inspection so he may accompany safety specialist on inspection and make corrections necessary before building is turned over to owner.

E NO. PLAN FILE NO.

OCCUPANCY

BUILDING ADDRESS

CITY ZIP CODE COUNTY

TO: OWNER ☐ DESIGNER ☐

NAME

ADDRESS

CITY STATE ZIP

DATE INSPECTED	CHECK ONE
_____ 1	☐ SB-191
_____ 2	
_____ 3	☐ TYPE ORDERS
_____ 4	
_____ FINAL	
_____ H & V	COMPLIANCE DATE
_____ OTHER	

(X) NOT DONE (✓) DONE

INSP. 1	2	3	4	Final	ORDER NUMBER	FINDINGS

PERSON CONTACTED TITLE

DEPUTY SIGNATURE REG. NO.

OWNERS NAME (IF DIFFERENT FROM ABOVE)

ADDRESS

CITY STATE ZIP

IF YOU HAVE ANY QUESTIONS I WILL BE IN MY OFFICE on:

TELEPHONE

Register, December, 1977, No. 264
Building and heating, ventilating and air conditioning code

Appendix

DILHR-SBD-4927

CERTIFICATE OF COMPLETION

Date_____

TO: Department of Industry, Labor and Human Relations
Safety and Buildings Division
P. O. Box 7946
201 E. Washington Avenue
Madison, WI 53707

Gentlemen:

RE: File Number: _____

Plan Number: _____

Owner: _____

Occupancy: _____

Building Street Address: _____

City: _____ County: _____

This is to certify that construction of the referenced project was under my supervision, in accordance with Ind 50.10, and that to the best of my knowledge and belief it has been completed in substantial compliance with the approved plans and specifications with the following exceptions: (IF NONE, STATE NONE)

_____

_____

_____

_____

_____

_____

This certificate covers: Building ☐

Heating & Ventilation ☐

Structural ☐

Other ☐ (Specify) _____

Name: _____

Registration Number: _____

Address: _____

_____

A-50.20 FEES. The following reprint of section Ind 69.09 may be used to determine the amount of fee required for building-related services offered by the department:

Ind 69.09 Buildings, structures, heating and ventilating. (1) PLAN EXAMINATION AND APPROVAL FEES. Fees for the examination and approval of all plans submitted in accordance with the requirements of Wis. Adm. Code chapters Ind 50-64 will be determined in accordance with the following schedules.

(a) *Building; heating and ventilating.* Fees for the examination and approval of all building and heating and ventilating plans will be computed on the basis of the total volume of the building and at the following rates:

Note: For the purpose of determining fees, the volume is determined by the overall outside dimensions of length, width and height.

Total volume	Building plans	Heat & vent plans
0-1,000,000 cubic feet	$0.60 per 1000 cubic feet. Minimum fee-$25.00 per plan.	$0.40 per 1000 cubic feet. Minimum fee-$25.00 per plan.
Over 1,000,000 cubic feet	$600 plus $0.40 per 1000 cubic feet in excess of 1,000,000 cubic feet.	$400 plus $0.25 per 1000 cubic feet in excess of 1,000,000 cubic feet.

1. Exceptions.

a. Warehouses. The fees for plan examination and approval of warehouses shall be determined in accordance with Ind 69.09 (1) (a) except that the fee may be reduced by 30%. Minimum fee—$25.00.

b. *Replacement of heating equipment.* The replacement of a boiler or a furnace in an existing heating system with no alterations to the heating system requires no fee. See Ind 69.03 (5) for registration fee for boilers and pressure vessels.

(b) Permit to start.....$35.00 per permit.

(c) Alteration plans for buildings and structures and heating and ventilating may be determined in accordance with (1) (a), based on total building volume affected by such alteration, or the following:

$1.50 for every $1000 or fraction of $1000 estimated cost. Minimum fee— $25.00 per plan.

(Estimated fee need not include cost of razing, piping, electrical, painting or decorating.)

(d) Revisions to previously examined plans.....$25.00 per plan.

(Applies when plans are revised, for reasons other than those that were requested by the department, before construction of the specific item commences.)

(e) Footing and foundation plans submitted separately .....$25.00 per plan.

(f) Structures.....$25.00 per plan.

(Applies when submitted separately and not included with general building plans, such as trusses, precast concrete and other structures.)

(g) Fire escapes.....$25.00 per plan.

(h) Stadia, grandstands and bleachers .....$10.00 per 1000 seats or fraction of 1000 seats. Minimum fee—$25.00.

(i) Industrial exhaust systems for dusts, fumes, vapors and gases (government owned only) .....$25.00 per plan.

(j) Spray booth plans (government owned only) .....$25.00 per plan.

(2) APPROVAL NUMBERS. The fee for approval numbers issued by the department for the approval of materials, equipment and devices ..... $200.00 per approval.

Register, December, 1977, No. 264
Building and heating, ventilating
and air conditioning code

(3) INSPECTION FEES. Field inspection fees shall be remitted for each building or structure in accordance with the following:

(a) *General building, heating and ventilating inspection fees.* When plans for the building and the heating and ventilating system are submitted together, inspection fees shall be determined in accordance with the following:

New building construction (cubic feet)	Fee
Up to 25,000 cubic feet	$50.00
25,001 - 100,000 cubic feet	75.00
100,001 - 500,000 cubic feet	100.00
500,001 - 1,000,000 cubic feet	125.00
1,000,001 cubic feet and over	150.00

(b) *Heating and ventilating inspection fees.* Heating and ventilating inspection fee, when plans are submitted separately from building plans.....$44.00.

(c) *Inspection fees for alterations to existing buildings.* Inspection fees for alterations to existing buildings shall be determined in accordance with (3) (a) or the following:

Alteration or repair (dollar amount)	Fee
Up to $25,000	$50.00
$25,001 - $100,000	75.00
$100,001 - $500,000	100.00
$500,001 - $1,000,000	125.00
$1,000,001 and over	150.00

(d) *Miscellaneous inspection fees.* Miscellaneous inspection fees include fire escapes, stadia and grandstands, exhaust systems, spray booths and other structures for which plan submission is required.....$25.00.

(4) COLLECTION OF FEES. All fees shall be remitted at the time the plans are submitted. No plan examinations, approvals or inspections will be made until the fees are received.

(5) MICROFILM FEES. Microfilm prints of approved plans for the years 1967-1972 are available at a nominal cost upon approval of the original designer.

(6) PETITIONS FOR MODIFICATION. The department will consider and may grant modification to an administrative rule upon receipt of a fee of $75.00, a completed petition for modification form from the owner, and a position statement from the fire department having responsibility and an interest in the rule, provided an equivalent degree of safety is established in the petition for modification which meets the intent of the rule being petitioned.

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

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

A-51.01 (67a) HABITABLE ROOM. It is the intent that rooms designated as recreation, study, den, family room, office, etc. and providing the only space for living and/or sleeping are considered habitable rooms.

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

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

A-51.01 (144) WALL (DIVISION).

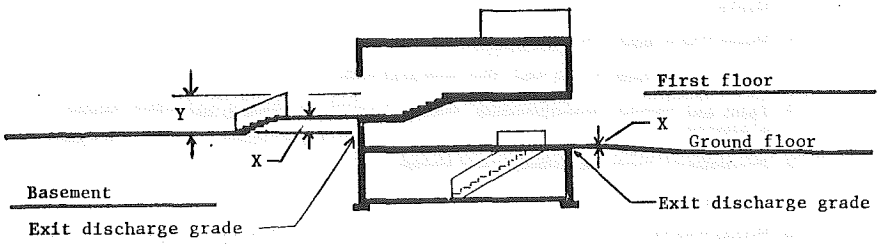
(a) *Building division wall* is intended to denote a wall constructed in a manner sufficient to meet requirements for a party wall [see "Wall (Party)"] and is acceptable as a dividing wall or enclosing wall when determining the volume of a building as referred to in sections Ind 50.07, 50.10 and 50.12.

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

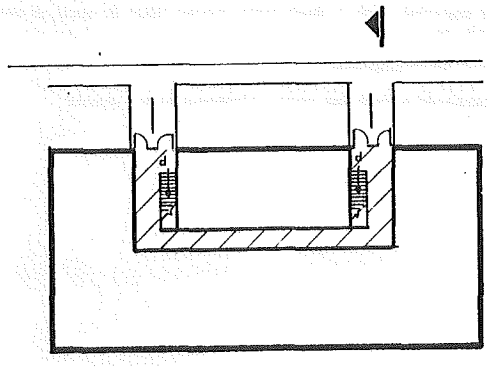
A-51.01 (151) WALL (PARTY). It is intended that a property consisting of joining plotted subdivisions owned by one individual, that can be owned by separate individuals, is included in the definition of party wall.

Appendix

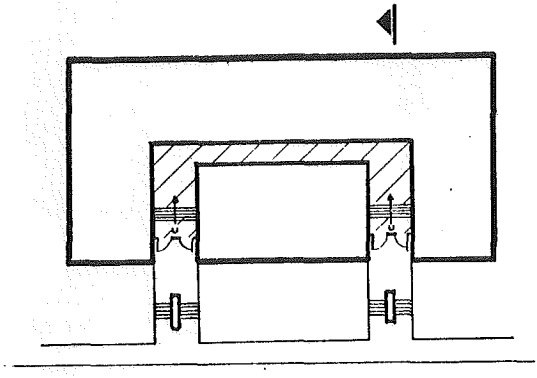
A-51.02 (14) DETERMINATION OF NUMBER OF STORIES. The following illustrations are provided to give visual aid to this rule and the definition of Ind 51.01 (121) Stories, Number of.



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



Ground floor

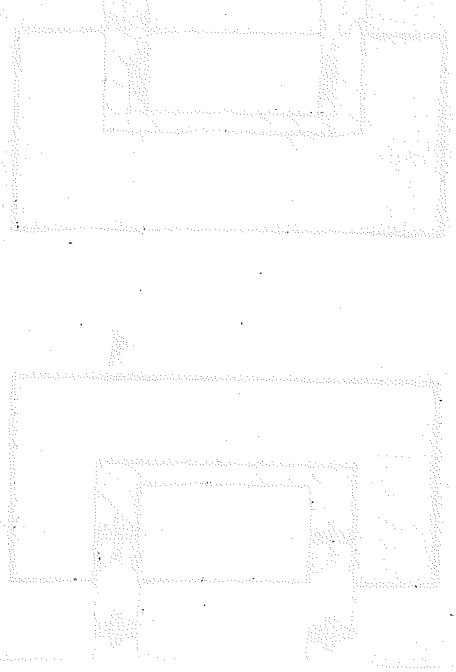


First floor

A-51.042 (5) The use of the term "high hazard" as referred to in this section is intended to apply to the following list of operations and occupancies:

1. Aircraft hangars.
2. Dry cleaning establishments: using or storing gasoline or other volatile flammable liquids.
3. Enameling or japanning operations.
4. Mills: sugar, starch, cereal, feed, flour and grist mills.
5. Paint and varnish: manufacturing, storing, handling, spraying, and other related operations.
6. Pyroxylin products: manufacture and storage.
7. Repair garages.
8. Smoke houses.
9. Storage of: explosive gases under pressure (15 psi and over 2,500 cubic feet) such as acetylene, hydrogen, natural gas, etc.
10. Storage of: materials with a flash point under 200° F. such as celluloid products, kerosene, oils, etc.
11. Woodworking establishments.

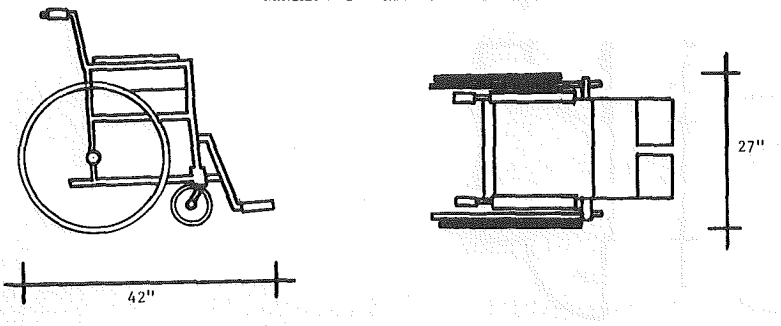
A-51.15 (6) EXAMPLE TO DETERMINE TOTAL AGGREGATE EXIT WIDTH.



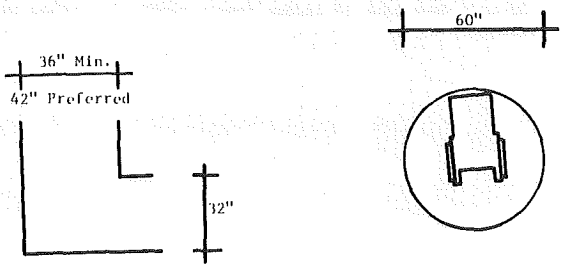
Appendix

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

WHEELCHAIR DIMENSIONS



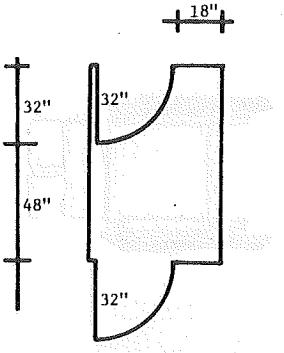
TURNING SPACE



90° Turn

180-360° Turn

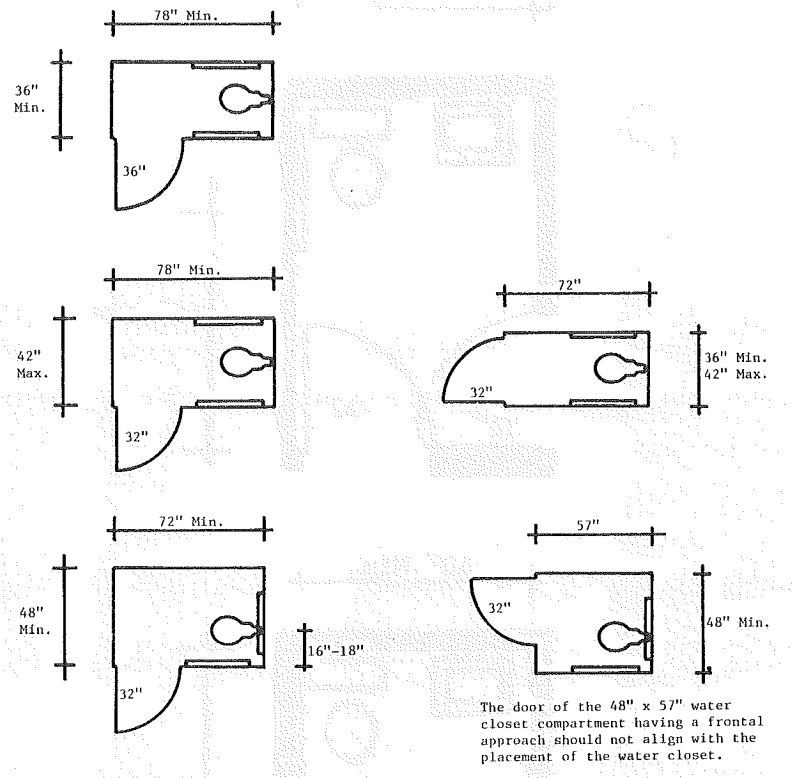
DOORS IN SERIES



Doors in series should be hinged on the same side and should swing in the same direction. A minimum of 18 inches of clear space should be provided on the door knob side of the door. The length of the vestibule should be a minimum of 48 inches plus the width of the door in the open position (i.e., 32-inch door plus 48 inches length equals 80 inches overall length of vestibule).

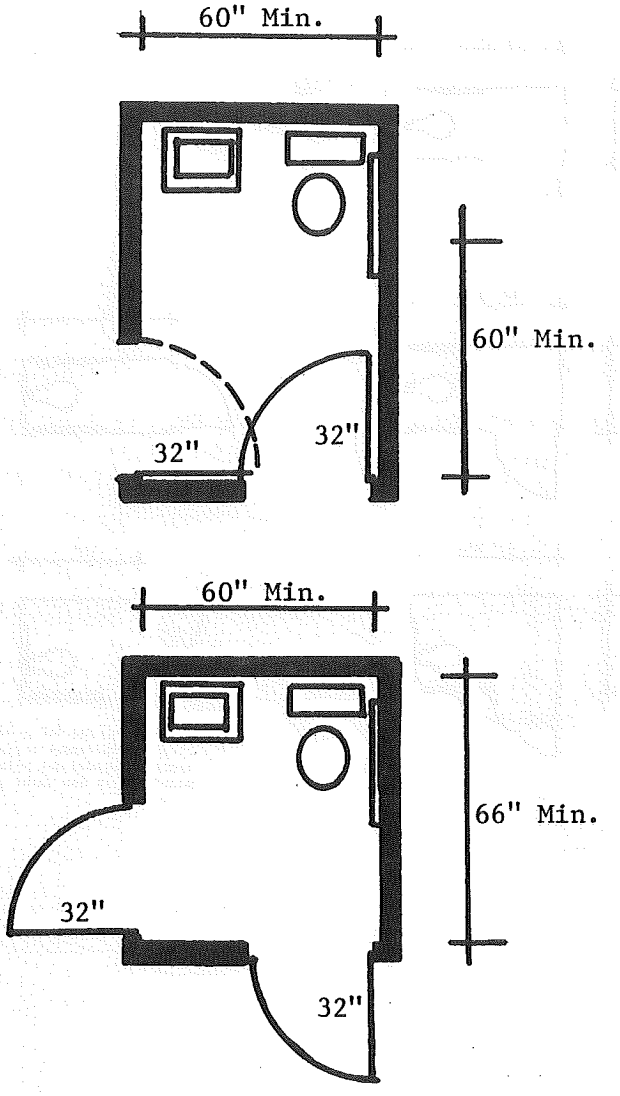
Appendix

EXAMPLES OF ACCESSIBLE TOILET COMPARTMENTS
AS SPECIFIED IN TABLE 52.04-A



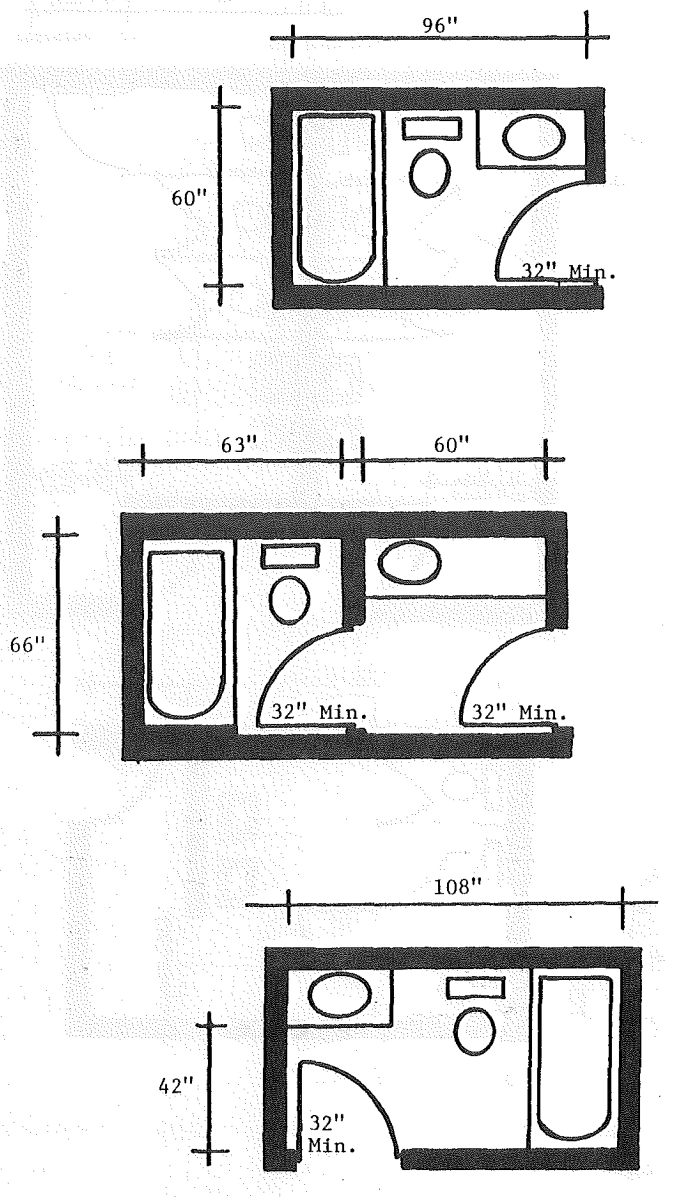
The door of the 48" x 57" water closet compartment having a frontal approach should not align with the placement of the water closet.

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

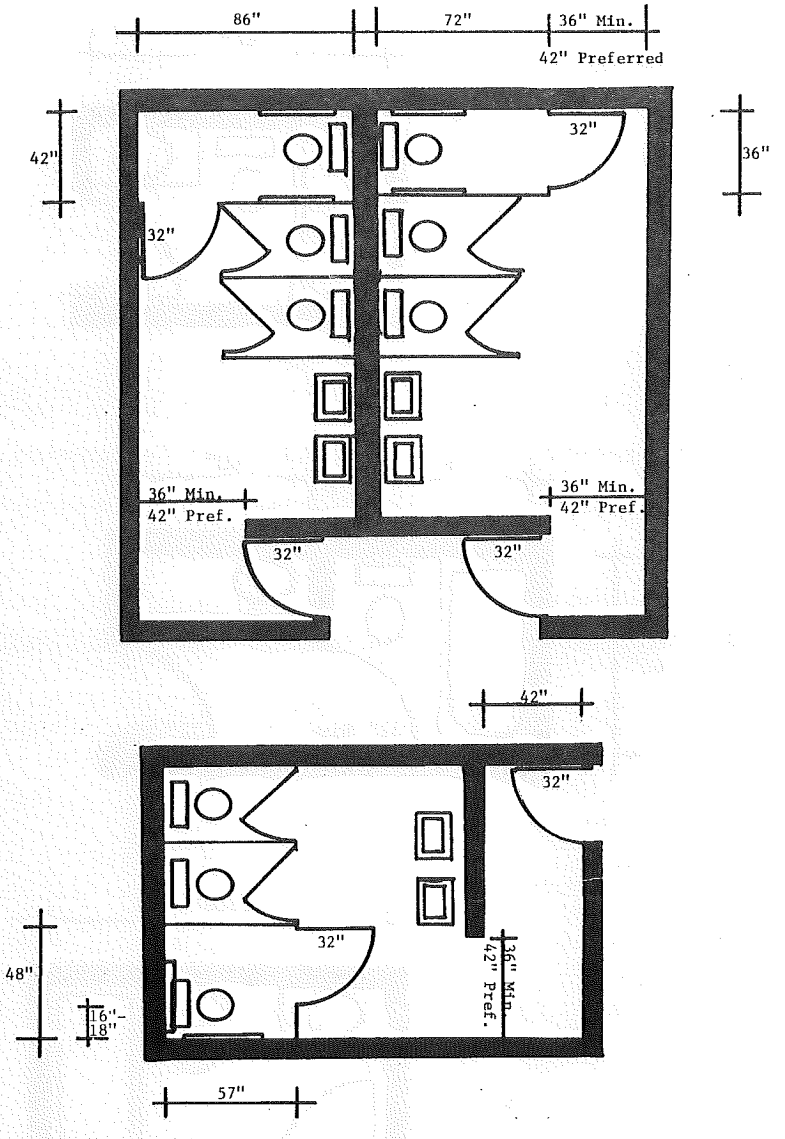


Appendix

EXAMPLES OF ACCESSIBLE BATHROOM LAYOUTS
FOR RESIDENTIAL LIVING UNITS



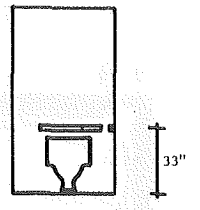
EXAMPLES OF ACCESSIBLE TOILET ROOMS



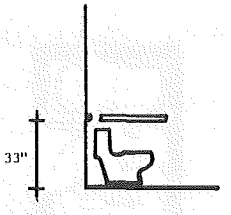
Register, December, 1977, No. 264
Building and heating, ventilating and air conditioning code

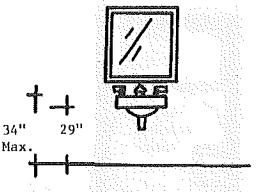
Appendix

ACCESSIBLE TOILET ROOMS

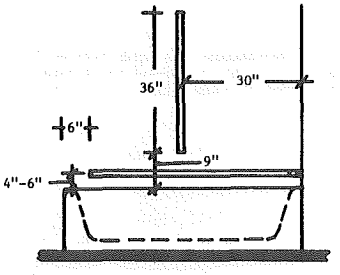


It is recommended that grab bars be from 30 to 42 inches in length and located no more than 12 inches from the back wall.

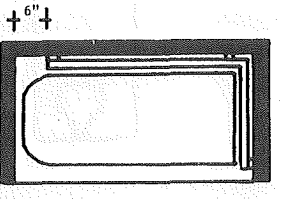


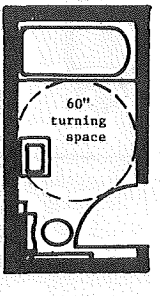


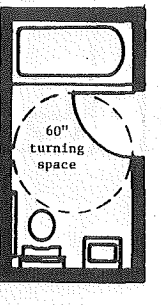
ACCESSIBLE BATHING FACILITIES



Grab bar location is measured from the rim of the tub.

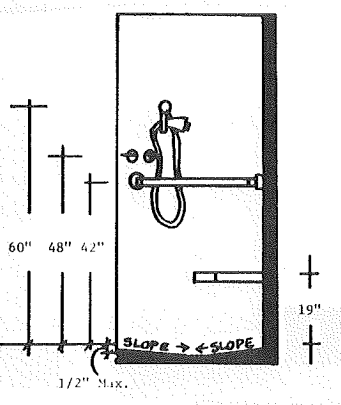


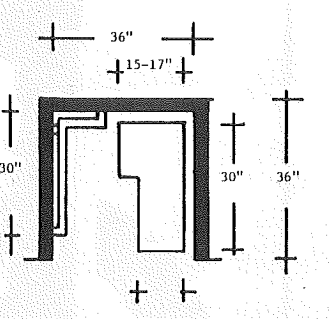


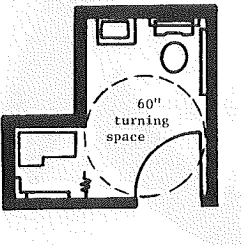


Appendix

ACCESSIBLE BATHING FACILITIES







INTERNATIONAL SYMBOL FOR BARRIER-FREE ENVIRONMENTS

Register, December, 1977, No. 264
Building and heating, ventilating and air conditioning code

Appendix

A-52.04 (4) (b) *Lifts for the physically disabled.* The stair-mounted lifting devices, providing interior circulation for the physically disabled, are either of a platform type accommodating the wheelchair and its user or a seat type which requires the person to transfer from the wheelchair.

In new construction, the seat-type lifting device will be acceptable only in private group type occupancies such as, but not limited to, senior citizen centers, fraternal organizations, small churches with less than 100 occupants, and private residences. In remodeled situations where adequate space for other lifting devices is not available, a seat-type lifting device will be acceptable.

The following guidelines should be used for lifting devices provided for interior circulation:

1. If the lifting device is to be located in a required exit stairway, the lifting device, in its open position, cannot infringe upon the required exit width for the floor the stairway serves. To determine the required exit width, refer to the specific occupancy chapters of this code.

2. The department recommends that the building plans submitted for approval indicate the type of lifting device to be used, the location, and the width of the lifting device in its open position.

3. The guidelines of the elevator section of this department require platform lifts to be designed with proper safety devices such as 42-inch high sides and gates, gate locks and contacts, guarding of space under the lift, etc., to provide safety for the public and persons using the lift with aids such as wheelchairs, crutches, braces or canes.

4. Vertical lifts having a travel distance in excess of 56 inches are considered to be elevators and must comply with the requirements for passenger elevators, Wis. Adm. Code chapter Ind 4, Elevator Code.

5. After the building plans are approved for the location and use, 3 sets of mechanical drawings for the lifting device must be submitted to the elevator section in accordance with chapter Ind 4, Elevator Code.

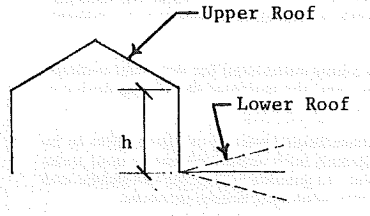
   a. Two copies of the elevator application form are required to be submitted along with an examination fee and an inspection fees.

   b. A copy of the building approval letter should accompany the mechanical drawings.

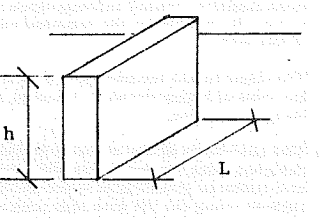
A-53.11 (4) (b) *Increase in roof loads.* The following design provisions may be used to determine the increase in roof loads as required by this section.

SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS

ROOF SHAPES

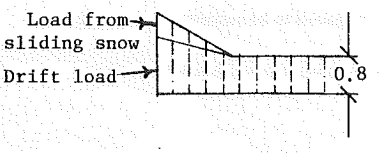


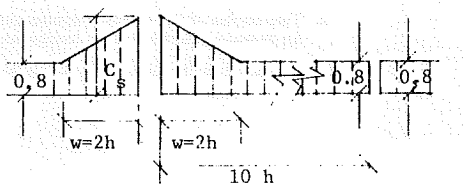
Lower of multi-level roofs with upper roof sloped towards lower roof



Roof areas adjacent to projections and obstructions on roofs

SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS. LIMITATIONS





Design lower roof for loads applicable to multi-level roofs plus a portion of the sliding snow from the upper roof

Design upper roof for loads applicable to single-level roofs

$C_s = 10 \frac{h}{g}$

When $10 \frac{h}{g} < 0.8$ use $C_s = 0.8$

When $10 \frac{h}{g} > 2.0$ use $C_s = 2.0$

When $L < \frac{g}{6}$ use $C_s = 0.8$

$w = 2\ h$

When $h < 5$ ft use $w = 10$ ft

When $h > 15$ ft use $w = 30$ ft

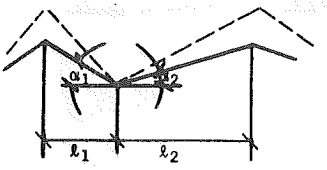
h = height of projection in ft

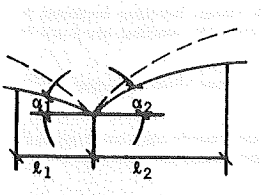
g = roof live load in psf [53.11 (4)]

w = width of snow drift in ft

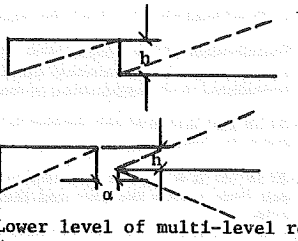
L = length of projection in ft

ROOF SHAPES





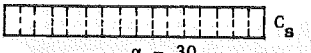
Valley areas of two-span and multiple series sloped or curved roofs



Lower level of multi-level roofs (when upper roof is part of the same building or on an adjacent building not more than 15 ft. away)

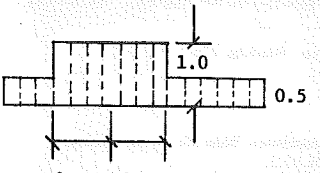
SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS LIMITATIONS

Case I



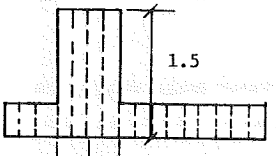
$C_s = 0.8 - \frac{\alpha - 30}{50}$

Case II



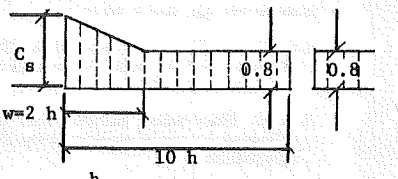
$\frac{\ell_1}{2}$ $\frac{\ell_2}{2}$

Case III



$\frac{\ell_1}{4}$ $\frac{\ell_2}{4}$

$\beta = \frac{\alpha_1 + \alpha_2}{2}$



$C_s = 15 \frac{h}{g}$

when $15 \frac{h}{g} < 0.8$ use $C_s = 0.8$

when $15 \frac{h}{g} > 3.0$ use $C_s = 3.0$

$w = 2\ h$

when $h < 5$ ft use $w = 10$ ft
$h > 15$ ft use $w = 30$ ft

h = difference of roof heights in ft
g = roof live load in PSF [Ind 53.11(f)]
w = width of drift from higher bldg. in ft
α = distance between buildings < 15 ft

Design upper roof for loads applicable to single-level roofs

For $\beta \leq 10°$ use Case I only
For $10° < \beta < 20°$ use Case I and II
For $\beta \geq 20°$ use Case I, II and III

Register, December, 1977, No. 264
Building and heating, ventilating and air conditioning code

A-53.15 LOAD COMBINATIONS. It is the intent of this section that the loads specified in sections Ind 53.10 through Ind 53.13 be considered to act in the following combinations, whichever is critical, for the design of the building frame, foundation or structural member:

1. Dead load plus live load.

2. Dead load plus wind load.

3. Dead load plus live load plus wind load.

4. Dead load plus live load plus crane loads.

Distribution of live loads which would cause the maximum shear, bending moment or stress in structural members should be investigated. Alternate span loading need not be considered in the application of roof loads.

A-57.18 The intent of this section is to apply to floor levels not more than one story below grade (at building).

A-57.18 (6) It is the intent of this subsection that each living unit needs only one means of exit from within the unit and that the entire building be provided with no less than 2 exits.

A-60.19 (4). The standard is available from the National Fire Protection Association, 470 Atlantic Ave. Boston, Massachusetts 02210.

A-60.24 Class A fires are fires in ordinary combustible materials such as wood, cloth, paper, rubber, and many plastics. Class B fires are fires in flammable liquids, gases and greases.

A-60.35 See A-60.24.

A-60.36 (1) (a). See A-60.19 (4).

A-62.25 (1) *Clearance limitations.* The intent is to require the minimum 7 feet 0 inches clearance only in traffic lanes and in all areas normally used by the public to leave and return to their vehicles.

A-64.20. EQUIPMENT RATINGS AND SAFETY CONTROLS. The department recognizes the following reference standards for the testing and installation of heating and ventilating equipment:

(1) National Fire Protection Association, 470 Atlantic Ave., Boston, Mass. 02210:

(a) OIL-BURNING EQUIPMENT, NFPA No. 31;
(b) NATIONAL FUEL GAS CODE, NFPA No. 54.

(2) American National Standards Institute, Inc., 1430 Broadway, New York, N.Y. 10018:
(a) GAS-FIRED ROOM HEATERS, Vol. 1, ANSI Z21.11.1;
(b) GAS-FIRED LOW PRESSURE STEAM AND HOT WATER BOILERS, ANSI Z21.13;
(c) GAS UNIT HEATERS, ANSI Z21.16;
(d) DOMESTIC GAS CONVERSION BURNERS, ANSI Z21.17;
(e) GAS APPLIANCE PRESSURE REGULATORS, ANSI Z21.18;
(f) AUTOMATIC GAS IGNITION SYSTEMS AND COMPONENTS, ANSI Z21.20;
(g) AUTOMATIC GAS VALVES, ANSI Z21.21;
(h) RELIEF VALVES AND AUTOMATIC GAS SHUTOFF DEVICES FOR HOT WATER SYSTEMS, ANSI Z21.22;
(i) GAS APPLIANCE THERMOSTATS, ANSI Z21.23;
(j) GAS-FIRED DUCT FURNACES, ANSI Z21.34;
(k) GAS FILTERS ON APPLIANCES, ANSI Z21.35;
(l) GAS-FIRED GRAVITY AND FAN TYPE DIRECT VENT WALL FURNACES, ANSI Z21.44;
(m) GAS-FIRED GRAVITY AND FORCED AIR CENTRAL FURNACES, ANSI Z21.47;
(n) GAS-FIRED GRAVITY AND FAN TYPE FLOOR FURNACES, ANSI Z21.48;
(o) GAS-FIRED GRAVITY AND FAN TYPE VENTED WALL FURNACES, ANSI Z21.49;
(p) VENTED DECORATIVE GAS APPLIANCES, ANSI Z21.50;
(q) GAS-FIRED SINGLE FIREBOX BOILERS, ANSI Z21.52;
(r) GAS-FIRED HIGH PRESSURE STEAM AND HOT WATER BOILERS (Inputs not over 400,000 Btu/hour), ANSI Z21.59;

(s) DECORATIVE GAS APPLIANCES FOR INSTALLATION IN VENTED FIREPLACES, ANSI Z21.60;
(t) DIRECT GAS-FIRED MAKE-UP AIR HEATERS, ANSI Z83.4;
(u) GAS-FIRED HEAVY DUTY FORCED AIR HEATERS, ANSI Z83.5;
(v) GAS-FIRED INFRARED HEATERS, ANSI Z83.6.

(3) Underwriters' Laboratories, Inc., 207 East Ohio St., Chicago, Illinois 60611:
(a) OIL BURNERS, UL 296;
(b) CONTROLS, PRIMARY SAFETY FOR GAS- AND OIL-FIRED APPLIANCES, UL 372;
(c) HEATING APPLIANCES, ELECTRIC, UL 499;
(d) HEAT PUMPS, UL 559;
(e) OIL-FIRED BOILER ASSEMBLIES, UL 726;
(f) OIL-FIRED CENTRAL FURNACES, UL 727;
(g) HEATERS, AIR, AND DIRECT-FIRED HEATERS, OIL-FIRED, UL 733;
(h) COMMERCIAL-INDUSTRIAL GAS HEATING EQUIPMENT (Inputs over 400,000 Btu/hour), UL 795;
(i) HEATERS, ELECTRIC, FOR USE IN HAZARDOUS LOCATIONS; Class I, Groups A, B, C and D, and Class II, Groups E, F and G, UL 823;
(j) ELECTRIC BOILERS, UL 834;
(k) HEATERS, ELECTRIC DRY BATH, UL 875;
(l) FAN COIL UNITS AND ROOM FAN HEATER UNITS, UL 883;
(m) HEATERS, ELECTRIC AIR, UL 1025;
(n) HEATING EQUIPMENT, ELECTRIC BASEBOARD, UL 1042;
(o) HEATING EQUIPMENT, ELECTRIC CENTRAL AIR, UL 1096.

Note: The table on the following page is a tabular summary of UL 296 and UL 795.

TABULAR SUMMARY UL STANDARD 296 AND UL STANDARD 795

FUNCTION/BURNER INPUTS	OIL BURNERS UL 296				COMMERCIAL/INDUSTRIAL GAS UL 795				
					Mechanical Draft Burners				
	3 GPH 400,000 Btu or less	7 GPH 1 million Btu or less	20 GPH 3 million Btu or less	Over 20 GPH 3 million Btu	Over 400,000 to 2,500,000	Over 2,500,000 to 5,000,000	Over 5,000,000 to 12,500,000	Over 12,500,000	ATM Draft
Prepurge timing	--	--	--	--	4	4	4	4	90 sec[3]
Air changes	--	--	--	--	4	4	4	4	--
Interlock Controls (Recycle)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Proven combustion air	[8]	[8]	[8]	[8]	Yes	Yes	Yes	Yes	--
Valve seal overtravel[9]	--	--	--	--	--	Optional	Yes	Yes	13
Low gas pressure	--	--	--	--	--	Yes[20]	Yes[20]	Yes[20]	13
High gas pressure	--	--	--	--	--	Yes[20]	Yes[20]	Yes[20]	13
Low fire start	11	11	11	11	11	11	11	11	13
High limit (press. or temp.)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Low water cutoff	Boilers[21]	Boilers[21]	Boilers[21]	Boilers[21]	Boilers	Boilers	Boilers	Boilers	13
Pilot - Intermittent	Optional	Optional	Optional	--	Optional	Optional	Optional	Optional	12
Pilot - Interrupted	[19]	[19]	[19]	Yes[5]	Optional	Optional[2]	Optional[2]	Optional[2]	2, 10
Direct spark ignition	Yes	Yes	Yes	[5]	--	--	--	--	--
System & sequence approved safety control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Approved safety shutoff valves (SSOV)	IN	BURNER	DESIGN		Yes[14]	Yes[14]	Yes[14]	Yes[14]	Yes[13, 14]
No vent valve	--	--	--	--	--	--	--	Yes	13
Pilot valve	[18]	[18]	[18]	Yes	Yes[5]	Yes	Yes	Yes	Yes
Proved pilot	Optional [17]	Optional [17]	Optional [17]	Yes	Yes	Yes	Yes	Yes	Yes
Trial for pilot				15 sec	15 sec	10 sec	10 sec	10 sec	13
Trial for main flame	90 sec[2,17]	30 sec[2, 17]	15 sec[2, 17]	10/30 sec[7]	15 sec[22]	10 sec	10 sec	10 sec	13
Flame failure response time	90 sec[17]	4 sec max[16,17]	4 sec max[15,17]	4 sec max	4 sec max	4 sec max	4 sec max	2 sec max	13
Valve closing time (max.)	[23]	[23]	[23]	[23]	5 sec max	1 sec max	1 sec max	1 sec max	13
Supervise main flame	17	17	17	Yes	--	Yes[2]	Yes[2]	Yes[2]	2, 10
Action on flame failure	Recycle optional[1]	1	1	Lockout or recycle	Lockout or recycle[6]	Lockout	Lockout	Lockout	13
Action on limit open	Close SSOV	Close SSOV	Close SSOV	Close SSOV	Close SSOV	Close SSOV	Close SSOV	Close SSOV	13

See following page for footnotes.

Appendix

FOOTNOTES TO TABULAR SUMMARY UL STANDARD 296 AND UL STANDARD 795:

SSOV=Safety shutoff valve.

[1]May relight if ignition is re-energized within 0.8 sec. See 15 and 16.

[2]Where intermittent pilot is desired, it is allowable to switch from pilot detector to main flame detector if main flame detector responds to main flame only.

[3]Without shutters, no prepurge required.

[4]Options (whichever is chosen, a minimum of 4 air changes must be provided): 30 sec at high fire rate; OR
60 sec at ½ high fire rate; OR
90 sec at ⅓ high fire rate.

[5]With 2-stage lightoff, direct ignition is permitted if first stage is 20 gph or less (requirements for 20 gph or less apply). Pilot is required if igniting more than 20 gph.

[6]Lockout on interrupted pilot applications; recycle on intermittent pilot applications.

[7]10 sec for distilllate fuel (No. 1 or No. 2); 30 sec for residual fuel (No. 4, 5, 6).

[8]Conventional type pressure burner—none needed. Needed for applications with combustion air supply separate from oil supply.

[9]Valve seal overtravel switch can be wired into either the start circuit or pre-ignition interlock circuit (if provided).

[10]Interrupted pilot over 2.5 million Btuh if modulating or high/low firing rate. Otherwise over 5 million Btuh.

[11]If low fire start is not proved, UL will test for smooth lightoff at high fire.

[12]Intermittent up to 5 million Btuh unless firing rate control is over 2,500,000 Btuh.

[13]Requirements same as mechanical draft burners.

[14]See Table 1 at end of footnotes for main gas valves.

[15]Up to 15 sec is permitted if intermittent ignition is employed, or if the ignition system is re-energized in not more than 0.8 sec after flame is extinguished.

[16]Up to 30 sec is permitted if intermittent ignition is employed, or if the ignition system is re-energized in not more than 0.8 sec after flame is extinguished.

[17]If proved pilot igniter is used, timings for over 20 gal flame safeguard control may be applied.

[18]Required for electrically ignited, gas-piloted systems.

[19]Interrupted pilot may be required if using flame safeguard control with a proved pilot. Otherwise, interrupted pilot is optional.

[20]Safety shutdown by this limit can be accomplished either by manual reset limits or in the programmer limit circuit.

[21]Required on boilers fired by oil burners—not a requirement of UL 296.

[22]If intermittent pilot is used, no main burner flame-establishing period is required.

[23]If a separate oil valve is used, it must close within 5 sec max when de-energized.

TABLE 1—AUTOMATIC MAIN GAS SAFETY SHUTOFF VALVES (SSOV) FOR MECHANICAL OR ATMOSPHERIC BURNERS—UL 795 REQUIREMENTS, EFFECTIVE OCTOBER 1, 1974

	400,000 to 2,500,000 BTUH	Over 2,500,000 to 5,000,000 BTUH	Over 5,000,000 to 12,500,000 BTUH	Over 12,500,000 BTUH
Main Valve Requirement	One valve rated for safety shutoff services (SSOV). Closing time 5 sec.	Two SSOV's in series, or one SSOV of the type incorporating a valve seal overtravel interlock. Closing time 1 sec max.	Two SSOV's in series, one of which incorporates a valve seal overtravel interlock. Closing time 1 sec max.	Two SSOV's in series, one of which incorporates a valve seal overtravel interlock. When fuel gas has specific gravity of less than 1.0, include a N.O. ¾ inch or larger electrically operated valve in a vent line between the two SSOV's.