

Chapter ILHR 64

HEATING, VENTILATING AND AIR CONDITIONING

Part I—Scope		ILHR 64.38 Gravity ventilation ducts (p. 375)	
ILHR 64.01	Scope (p. 356)	ILHR 64.39 Ventilation discharge (p. 376)	
ILHR 64.02	Approval of drawings and specifications (p. 356)	ILHR 64.40 Relief vents (p. 376)	
Part II—Design Requirements		ILHR 64.41 Plenums (p. 376)	
ILHR 64.03	Design (p. 356)	ILHR 64.42 Fire dampers and fire curtain doors (p. 378)	
ILHR 64.04	Outside temperature design conditions (p. 356)	ILHR 64.43 Dampers and damper controls (p. 378)	
ILHR 64.05	Inside design temperatures and ventilation requirements (p. 357)	ILHR 64.44 Fans and blowers (p. 379)	
ILHR 64.06	Mechanical ventilation systems (p. 358)	Part VI—Chimneys, Gas Vents, Mechanical Draft and Venting Devices	
ILHR 64.07	Natural ventilation system (p. 361)	ILHR 64.45	Chimneys, smoke stacks, gas vents, mechanical draft and venting devices (p. 379)
ILHR 64.08	Exhaust ventilation system (p. 361)	ILHR 64.46	Masonry chimneys (p. 379)
ILHR 64.09	Combustion air intakes (p. 362)	ILHR 64.47	Metal smokestacks (p. 380)
ILHR 64.10	Refrigerants (p. 363)	ILHR 64.48	Factory-built chimneys and gas vents (p. 381)
Part III Ventilation and Air Standards		ILHR 64.49	Gas vents (p. 381)
ILHR 64.11	Ventilation and air standards (p. 363)	ILHR 64.50	Chimney and vent connectors (p. 382)
ILHR 64.12	Definitions (p. 364)	Part VII—Equipment Location, Protection, Maintenance and Operation	
ILHR 64.13	Tempered air requirements (p. 364)	ILHR 64.51	Guarding and fire protection (p. 383)
ILHR 64.14	Tempered outside air requirements (p. 364)	ILHR 64.52	Maintenance and operation (p. 384)
ILHR 64.15	Air movement and distribution (p. 364)	ILHR 64.53	Final test required (p. 384)
ILHR 64.16	Air-cleansing devices (p. 364)	Part VIII—Occupancy Requirements	
ILHR 64.17	Controls (p. 365)	ILHR 64.54	Factories, office and mercantile buildings (p. 384)
ILHR 64.18	Contamination of air (p. 365)	ILHR 64.55	Theaters and places of assembly (p. 385)
ILHR 64.19	Location of outside ventilating air intakes or exhausts for mechanical ventilation systems (p. 366)	ILHR 64.56	Schools and other places of instruction (p. 385)
Part IV—Heating Equipment Requirements		ILHR 64.57	Health care facilities (p. 386)
ILHR 64.20	Equipment ratings and safety controls (p. 367)	ILHR 64.58	Penal institutions and places of detention (p. 386)
ILHR 64.21	Location of equipment (p. 368)	ILHR 64.59	Residential occupancies (p. 386)
ILHR 64.22	Special requirements (p. 370)	ILHR 64.60	Day care facilities (p. 387)
ILHR 64.23	Piping (p. 372)	ILHR 64.61	Repair areas (p. 387)
Part 5—Air Delivery Systems		ILHR 64.62	Vehicle service buildings (p. 388)
ILHR 64.31	Duct design (p. 373)	ILHR 64.63	Garages (p. 388)
ILHR 64.32	Duct use (p. 373)	ILHR 64.64	Vehicle showroom (p. 388)
ILHR 64.33	Underground duct construction and installation (p. 373)	ILHR 64.65	General sanitation and service areas (p. 389)
ILHR 64.34	Duct construction (p. 374)	ILHR 64.66	Natatoriums (p. 390)
ILHR 64.35	Duct connectors (p. 375)	ILHR 64.67	Kitchens (p. 390)
ILHR 64.36	Vertical shafts (p. 375)	ILHR 64.68	Seasonal occupancies (p. 393)
ILHR 64.37	Insulation (p. 375)		

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. Chapter Ind 64 was renumbered to be chapter ILHR 64 effective January 1, 1984.

Part I—Scope

ILHR 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.

ILHR 64.02 Approval of drawings and specifications. All drawings and specifications shall be submitted to the department in accordance with the provisions of ss. ILHR 50.07 and 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

ILHR 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 or ventilation losses, whichever are greater.

(2) **HEATING SYSTEM DESIGN.** The primary heating system intended to maintain the inside design temperature of s. ILHR 64.05 (1) shall be designed to equalize building transmission losses and infiltration or ventilation losses during occupied periods. 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.

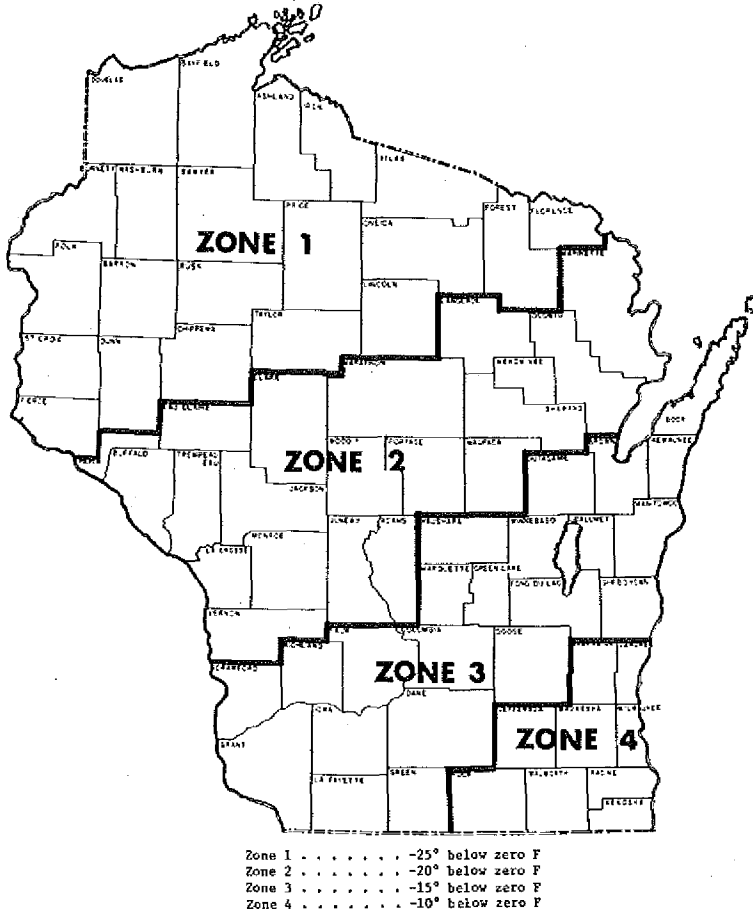
(3) **CAPACITY AND ARRANGEMENT.** The calculated capacity and the arrangement of all installations for required heating and ventilating shall be based upon simultaneous service to all parts of the building unless otherwise exempted by this code.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (1) and (2)(a), Register, January, 1980, No. 289, eff. 2-1-80; am. (2), Register, December, 1981, No. 312, eff. 1-1-82.

ILHR 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.
Register, August, 1985, No. 356

MAP OF WISCONSIN SHOWING DESIGN TEMPERATURE ZONES



ILHR 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 containing 5,000 cubic feet per occupant.

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; am. (2) (b), Register, December, 1978, No. 276, eff. 1-1-79; am. table, Register, August, 1985, No. 356, eff. 1-1-86.

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

(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 as specified in Table 1 of s. ILHR 64.05.

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

(c) *Air movement requirement waived.* The air movement requirement for 6 air changes per hour may be omitted in the following applications:

1. Spot heating.
2. Buildings where the requirement for outside air is waived in accordance with s. ILHR 64.05(2)(b).
3. Buildings utilizing percentage of openings as specified in s. ILHR 64.05, Table 1.

(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.

WISCONSIN ADMINISTRATIVE CODE

Heating, Ventilating and Air Conditioning

Use or Occupancy	Minimum Inside Temp. (Deg. F)	Ventilation Classifier (See 7)	Mechanical No. of Branches per person	Ventilation Requirements		Equivalent Area of Opening ¹	CFM/ft ² of Floor Area	Applicable Company Code Section (ILHR No.)
				Net sq. ft. per person	Percent of Opening ²			
Schools and other places of instruction								
Administrative office space	67	(b)	75	—	3	—	—	64.56
Actg, craftg, drafting rooms	67	(a)	30	—	—	—	—	64.56
Classrooms	67	(a)	20	—	—	—	—	64.56
Gymnasiums, field houses, auditoriums, theaters (fixed seats)	67	(a)	6	2.78 or 15/12	—	2	—	64.56
Classrooms (movable seats)	67	(c) or (d)	—	—	—	—	—	64.65
Lecture and seminar rooms	67	(a)	75	—	—	—	—	64.56
Offices (fixed desks, auditoriums, theaters (movable seats))	67	(a)	30	—	—	200/25	—	64.56
Home occupancies (cooking)	67	(d)	—	—	—	—	—	64.56
Kitchens	67	(c) or (d)	—	—	—	—	—	64.56
Laboratories (science)	67	(a)	30	—	—	—	—	64.56
Lecture halls	67	(a)	6	—	—	—	—	64.56
Library and resource centers	67	(a)	20	—	—	—	—	64.56
Reading rooms	67	(a)	30	—	—	—	—	64.56
Stairways	67	(a)	100	—	—	—	—	64.56
Lobbies	67	(a)	40	—	—	—	—	64.56
Musical and art galleries	67	(a)	10	—	—	—	—	64.56
Musical rooms (instrumental) (vocal)	67	(a)	20	—	—	—	—	64.56
Special education	67	(a)	10	—	—	—	—	64.56
Study halls, common areas with nonfixed seating	67	(a)	35	—	—	—	—	64.56
Toilet rooms	67	(a)	10	—	—	—	—	64.56
Toilet rooms	67	(d)	—	—	—	—	—	64.65
Workshop shops:								
Rich vehicle services and repair without vehicle service and repair vehicles	60	(c) or (d)	—	—	—	3/4	—	64.10
Workshop shops:								
Rich vehicle services and repair without vehicle service and repair vehicles	60	(a)	50	—	—	—	—	64.10
Workshop shops:								
Rich vehicle services and repair without vehicle service and repair vehicles	60	(d)	—	—	—	2	—	64.65
Detention and correctional facilities								
Sleeping rooms	67	(d)	—	—	4	—	—	64.56
Residential occupancies								
Living and sleeping areas	67	(f)	—	—	4	—	—	64.56
Living and sleeping areas	67	(b)	35	—	4	—	—	64.60
Day care facilities								
Compass and service stations								
Automobile showrooms:								
Less than 6 vehicles	60	(b)	—	—	3	—	—	64.64
6 or more vehicles	60	(c) or (d)	—	—	—	1/2	—	64.64
Garages: less than 6 vehicles	NR	(b)	—	—	3	—	—	64.62, 64.63
Garages: 6 or more vehicles	NR	(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								
Childcare changing rooms	NR	(d)	—	—	—	1	—	64.65
Janitor closets	NR	(d)	—	—	—	2	—	64.65
Locker rooms and shower rooms	70	(c) or (d)	—	—	—	2	—	64.65
Toilet rooms	60	(d)	—	—	—	2 or 60/75	—	64.65
Toilet rooms (outdoor stations)	50	(d)	—	—	—	2 or 60/75	—	64.65
Laundries								
Laundries	60	(c)	—	—	—	2	—	64.65
Manufacturing								
Manufacturing	70	(c)	—	—	—	1 or 2/100	—	64.66
Kitchens								
Kitchens	60	(c) or (d)	—	—	—	2	—	64.67
Recreational occupancies								
Camps and lodges:								
Dining and recreational areas	NR	(b)	15	—	3	—	—	64.68
Living and sleeping areas	NR	(f)	—	—	4	—	—	64.68
Club houses	NR	(b)	15	—	3	—	—	64.68
Active-line	NR	(b)	15	—	3	—	—	64.68
Kitchens	NR	(c) or (d)	—	—	—	—	—	64.67
Locker lockers	NR	(d)	—	—	—	2	—	64.65

CA = Cooking appliance.

LF = Linear foot.

NR = No minimum requirements.

TR = Toilet facilities (water closets and urinals).

Flow: theaters and places of assembly for inside design temperature and net square foot per person.

Ventilation requirements. See ss. 64.06, 64.07 and 64.08 for mechanical, natural and exhaust ventilation systems and ss. 64.11 to 64.13 for ventilation and air economizers.

Ventilation classifications:

- (a) Requires a supply of outside air and an equal amount of exhaust ventilation to be provided at the rate of 5 CFM per person and a minimum air movement of 6 air changes per hour.
- (b) Requires a supply of outside air and an equal amount of exhaust ventilation to be provided at the rate of 5 CFM per person and a minimum air movement of 6 air changes per hour, or a percentage of openings.
- (c) Requires a supply of outside air and exhaust ventilation determined on the basis of 120 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 specified. In multiple-occupancies, the area of each occupancy shall be considered separately.
- (e) Requires a supply of outside air and exhaust ventilation 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.

(g) Does not require a separate supply of outside air provided the outside air introduced in the space areas adjacent to the wall is circulated through and exhausted from the stopping rail corridor area.

Percentage of number of openings. In determining the number of openings in a given space, the Architect will accept the net square foot per person as listed in Table 1 or the actual number of persons, whichever is the greater, to determine the required percentage. Where no value is indicated for net square foot per person, the actual number of occupants shall be used to determine the required amount of outside air.

¹Percent of openings. See ss. 64.07 for special considerations on natural ventilation.

(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, 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; am. (3) (c) 2., Register, January, 1980, No. 289, eff. 2-1-80; am. (3) (c) 3., Register, December, 1981, No. 312, eff. 1-1-82.

ILHR 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 or lot line or both 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 s. ILHR 64.19.

(2) **VESTIBULE OPENINGS**. Vestibule type openings may be used to satisfy the requirements specified in sub. (1) only for the areas of the building into which the vestibule opens.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; cr. (2), Register, December, 1981, No. 312, eff. 1-1-82.

ILHR 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. FP

(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.

Register, August, 1985, No. 356

(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.

(5) **GRAVITY SIPHON-TYPE ROOF VENTILATORS.** (a) Except as provided in par. (b), gravity siphon-type roof ventilators shall be sized to provide a free area so that the velocity of the air does not exceed 300 feet per minute.

(b) The allowable velocity specified in par. (a) may be increased to 600 feet per minute provided the outside air is supplied by mechanical means.

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; cr. (5), Register, December, 1983, No. 336, eff. 1-1-84.

FP ILHR 64.09 Combustion air intakes. Any room in which fuel-burning equipment, including fireplaces and process equipment, is located shall be supplied with combustion air for safe operation.

(1) **COMBUSTION AIR.** Combustion air shall be provided 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 for gas- and oil-fired equipment are based on the fuel input of the equipment. The value for solid-fuel equipment and fireplaces is based on the fuel input of the equipment, the area of the chimney connector or the listing for the specific piece of equipment. (See Table 64.09).

TABLE 64.09

Atmospheric Combustion	Combustion Air Intakes Ducted from the Outside to an Interior Room or Fireplace	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.
Solid-fuel fired equipment and fireplaces, all occupancies	1 sq. in./1000 Btu/hr for furnace type units. ½ of the chimney connector area for free standing and fireplace type units. In accordance with equipment listing, if listing includes combustion air provisions.	

(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.

Register, August, 1985, No. 356

(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 outdoor openings is greater than 3% of the floor area in which the equipment is located, or where 150% of the air required for theoretical complete combustion is no greater than ¼ air change govern the design.

Note: See s. ILHR 64.22 for special conditions.

(2) **DAMPERS.** (a) Manually operated dampers are prohibited in combustion air intakes, except for manually fired solid-fuel fired equipment, where the combustion air is connected directly to the equipment.

(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) **NEGATIVE PRESSURE LOCATIONS.** Atmospheric combustion shall be prohibited in a space under negative pressure.

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

(7) **AIR-HANDLING EQUIPMENT LOCATED IN A BOILER OR FURNANCE ROOM.** If the fuel input rating of the fuel burning equipment exceeds 400,000 Btu per hour, the air-handling equipment and the fuel-burning equipment shall be interlocked to shut off the fuel-burning equipment and the air-handling equipment when any service door to the air-handling equipment is opened, unless an air barrier separation is provided between the fuel-burning equipment 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; am. (5), Register, December, 1978, No. 276, eff. 1-1-79; am. (1)(d), Register, January, 1980, No. 289, eff. 2-1-80; am. (1)(a) and (d) (2)(a), (5) and (7), Register, December, 1981, No. 312, eff. 1-1-82; am. (1) (d), Register, December, 1983, No. 336, eff. 1-1-84.

ILHR 64.10 Refrigerants. The rules covering the use of refrigerants for air conditioning systems shall conform with ch. ILHR 45, Mechanical Refrigeration.

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

Part III—Ventilation and Air Standards

ILHR 64.11 Ventilation and air standards. The quantity of air used to ventilate a given space during periods of occupancy shall always be suffi-

Register, August, 1985, No. 356

cient to maintain the standards of air distribution, air movement, recirculation, 64.12 to 64.19.

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

ILHR 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

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

ILHR 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.

ILHR 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, 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.

ILHR 64.15 Air movement and distribution. 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.

FP ILHR 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

Register, August, 1985, No. 356

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; or
- (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

ILHR 64.17 Controls. (1) **GENERAL.** Except as provided in sub. (2), 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 chapter, and to provide a continuous supply of outside air and exhaust determined by the provisions of s. ILHR 64.05, Table 1, during periods of occupancy.

(2) **EXCEPTION.** Manual control of solid-fuel fired equipment to maintain inside design temperature is permitted.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. Register, December, 1981, No. 312, eff. 1-1-82.

ILHR 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: For requirements pertaining to all places of 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 employees or frequenters, see Ch. Ind 1000-2000—Safety and Health Code.

(a) **Chlorinated hydrocarbons.** Areas where chlorinated hydrocarbons are introduced shall be arranged to satisfy the following conditions:

Note: Some of the chlorinated hydrocarbons commonly used are: trichloroethylene, perchloroethylene, carbon tetrachloride, methylene chloride, methyl chloroform, Freon F-11, Freon F-12, Freon F-21 and Freon F-114. For example, these materials are used in dry cleaning establishments, in degreasing operations, and where pressure can propellants are used. Pressure cans are used for such products as enamels, lacquers, paint removers, stencil inks, lubricants, pesticides, hair sprays, shaving 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.

Note: See chs. Ind 1000-2000, Wisconsin Safety and Health Code.

Register, August, 1985, No. 356

3. No fuel-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 Ch. Ind 1000-2000—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; am. (1)(a)3., Register, January, 1980, No. 289, eff. 2-1-80.

FP ILHR 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 are exempt from the provisions of this paragraph, except that power vents from gas-fired equipment shall be located at least 12 inches measured in any direction from any openable windows.

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 or lot line or both 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. A guardrail, as defined in s. ILHR 51.162, will be accepted in lieu of the grating.

(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.

Register, August, 1985, No. 366

(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

ILHR 64.20 Equipment ratings and safety controls. (1) **TEST AND INSTALLATION STANDARDS.** All oil- and gas-fired heating equipment, electric heating equipment, solid-fuel heating equipment and accessory equipment or devices shall be tested and installed in accordance with standards recognized by the department. Department review and approval of input or output ratings or both are required when ratings are needed to satisfy s. ILHR 64.03 or 64.09.

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 that satisfy the requirements of subs. (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 (AGA), Underwriters' Laboratories—(UL) and PFS corporation.

(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 sub. (5).

(5) **EQUIPMENT APPROVAL.** Equipment approval may be obtained from the department upon submission of a technical report, based on the test required in sub. (4) (b), together with the fee as specified in ch. Ind 69 for equipment approval.

Note: The purpose of the technical report is to show that the equipment is in complete compliance with the national standard by which the equipment is designed, constructed and tested.

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; am. (1), Register, December, 1981, No. 312, eff. 1-1-82.

Register, August, 1985, No. 356

FP ILHR 64.21 Location of equipment. The various types of heating equipment for the corresponding types of occupancies in which the equipment may be located shall be installed as specified in Table 64.21.

Note #1: The footnotes below the table designate special requirements for the listed equipment.

Note #2: 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.

TABLE 64.21 - LOCATION OF EQUIPMENT

Location and type of occupancy	VENTED UNITS							UNVENTED UNITS			ELECTRIC Furnaces, Unit Heaters, Baseboard Heaters, etc.	WATER OR STEAM Unit Ventilators, Heaters, Makeup Air Units, Baseboard Heaters, etc.	
	Gas or Oil or Solid Fuel Boilers	Gas or Oil or Solid Fuel Furnaces	Gas or Oil Unit Heater	Gas or Oil Infrared		Gas or Oil Space Heater	Solid Fuel Space Heater ^{1,2}	Gas Direct Vent Combustion Appliance ¹⁰	Gas Direct Fired Makeup Air ^{3,4}	Gas Infrared			
				Closed Combustion Indirect Equipment with Surface Temperatures not Exceeding 1500°F	Open Flame Infrared Equipment with Sur- face Temperatures Exceeding 1500°F								
Rated Enclosure	Rated Enclosure	Dependent ⁵	Dependent ⁵	Dependent ⁵		Rated Enclosure Not Required	Dependent ⁶	Dependent ⁶					
Type of Occupancy	Yes ⁵	Yes ⁵	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Factories	Yes ⁵	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Merchandise Buildings	Yes ⁵	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Office buildings	Yes ⁵	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Pieces of assembly, entertain- ment, recreation, worship or dining (500 persons or less)	Yes ⁵	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Tennis Facilities	Yes ⁵	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Tennis Facilities (court areas only)	Yes ⁵	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Tennis Facilities (all other areas)	Yes ⁵	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Theaters & pieces of assembly, concerts, recreation, worship or dining (more than 100 persons)	Yes	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Restaurants	Yes	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Tennis Facilities (court areas only)	Yes	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Tennis Facilities (all other areas)	Yes	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Schools & Other Pieces of Instruction	Yes	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Hospitals, Nursing Homes & Penal Institutions	Yes	Yes	N.P.	N.P.	N.P.	N.P.	N.P.	N.P.	N.P.	Yes	N.P.		
Residential Occupancies	Yes	Yes	N.P.	N.P.	N.P.	N.P.	N.P.	N.P.	N.P.	Yes	N.P.		
Hazardous Occupancies	Yes	Yes	N.P.	N.P.	N.P.	N.P.	N.P.	N.P.	N.P.	Yes	N.P.		
Garages	Yes	Yes	Yes ¹²	Yes ¹²	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Aircraft Hangars	Yes	Yes	Yes ¹³	Yes ¹³	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Day Care Centers	Yes ¹⁶	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	Yes	N.P.		
Community Based Residential Facilities ¹⁷	Yes	Yes	N.P.	N.P.	N.P.	N.P.	N.P.	N.P.	N.P.	Yes	N.P.		

N.P. = Not Permitted

Unlisted Occupancies - Use the listed occupancy in the table that is most similar to the subject occupancy.

Clearances - Equipment shall be installed in accordance with the clearance from combustibles indicated in the name plate of the unit.

- See s. ILHR 64.22 (7) (d) for fireplace requirements.
- All solid-fuel fired space heaters shall be located in occupied space or in a space provided with approved smoke detectors and located or guarded to maintain clearances to combustibles and prevent accidental damage or contact with hot surfaces. Solid-fuel burning stoves are limited to 150,000 Btu/hr output.
- Except as provided in Footnote 4, direct-fired makeup air units shall be mechanically exhausted in the range of 50% to 110% of the air supplied.
- See s. ILHR 64.22 (4) for other permitted uses of direct fired unvented natural gas heaters.
- Where permitted, such equipment other than infrared shall be located in an occupied space (see s. ILHR 64.22 (3)) and suspended at least 7 feet above the floor. Infrared equipment shall be located at least 9 feet above the floor. Suspension of solid-fuel fired equipment is not permitted. See s. ILHR 54.14 (3) for additional requirements.
- Permitted with combustion air ducted to unit in occupancies less than 2,000 square feet gross area and with occupant load less than 100 persons.
- Permitted in kitchens to provide makeup air for kitchen exhaust systems if located outside building or in a rated enclosure.
- Permitted only in shops with a 3-hour separation from other areas of the school building.
- Permitted only in shops with a 3-hour separation from other areas of the school building.
- Gas-fired, direct-vent wall furnaces are permitted in apartments and motels.
- Suspended heating units are allowed in garages if located at least 9 feet off the floor. Suspension of solid-fuel fired equipment is not permitted.
- Suspended heating units are allowed if located at least 10 feet above the upper surface of the wings or engine enclosure of the aircraft. Suspension of solid-fuel fired equipment is not permitted.
- Solid-fuel fired space heaters are permitted in rowhouse units only.
- Waste oil burners are permitted provided they are installed on mezzanines or service platforms located at least 8'-0" above the main floor, are visible from the main floor and are guarded as specified in this section.
- See s. ILHR 60.25 for smoke detector alternative.
- See s. ILHR 61.24 for requirements.
- See s. ILHR 51.01(2)(a), 54.14(1)(b), 55.29(1)(b), 56.15(1)(c), 57.14(1)(a), 59.21, 60.25(1), 62.32(1)(b) and 62.70(1)(b) for additional requirements.

PERMITTED IN ALL OCCUPANCIES

PERMITTED IN ALL OCCUPANCIES

ILHR 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 chs. ILHR 41-42.

(b) *Installation notification.* The installing contractor shall notify the department of boiler installation, in accordance with the requirements of s. ILHR 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 AND GUARDED EQUIPMENT.** Equipment suspended or guarded as specified in s. ILHR 64.21 shall be installed in an occupied space. Suspended or guarded equipment may be used in multiple tenant buildings providing the equipment is located in tenant spaces of an occupancy use where suspended or guarded equipment is permitted. The equipment shall be visible to persons within the room.

(4) **GAS OR OIL-FIRED RADIANT HEATERS AND DIRECT FIRED UNVENTED NATURAL GAS HEATERS.** Gas- or oil-fired radiant heaters and direct fired unvented natural gas 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 or direct fired unvented natural gas heaters are used, mechanical means shall be provided to supply at least 4 cfm of outside air per 1000 Btu per hour input of installed heaters;

(c) Gravity siphon-type roof ventilators or mechanical exhaust shall be provided to remove the amount of air supplied. Gravity siphon-type roof ventilators shall be sized to provide a free area so that the velocity of the air does not exceed 600 feet per minute;

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

(e) Direct fired unvented natural gas heaters shall comply with the provisions of American National Standards Institute (ANSI) standard Z83.4-1980, Direct Gas-Fired Make-Up Air Heaters.

(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; and

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

(c) The use of unvented space heaters fueled by natural gas, kerosene, alcohol or other fuel shall be prohibited based on the facts of oxygen depletion; contamination from carbon monoxide, carbon dioxide, nitrogen

dioxide, formaldehyde and other combustion-related contaminants; and water vapor development.

(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 as adopted by reference in ch. ILHR 16) are as follows:

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

(b) Listed electric units.

(7) **FIREPLACES AND FIREPLACE STOVES.** Masonry fireplaces, factory-built fireplaces and factory-built fireplace stoves shall be constructed and installed in accordance with the NFPA standard No. 211—Standard for Chimneys, Fireplaces and Vents. **FP**

(a) *Masonry fireplaces.* 1. Masonry fireplaces shall be constructed of solid masonry units, stone or reinforced portland or refractory cement concrete.

a. Where a lining of low-duty firebrick complying with the provisions of ASTM C64, or the equivalent, at least 2 inches thick laid-in fire-clay mortar complying with the provisions of ASTM C105, or the equivalent, or other approved lining is provided, the total thickness of back and sides, including the lining, shall be not less than 8 inches.

b. Where the lining described in subpar. a. is not provided, the thickness of back and sides shall be not less than 12 inches.

2. Steel fireplace units incorporating a firebox liner of not less than ¼ inch thick steel and an air chamber shall be installed with masonry to provide a total thickness at the back and sides of not less than 8 inches, not less than 4 inches of which shall be solid masonry.

3. Warm air ducts employed with steel fireplace units of the circulating air type shall be constructed of metal or masonry.

4. Fireplace hearth extensions of approved noncombustible material for all fireplaces shall be provided.

a. Where the fireplace opening is less than 6 square feet, the hearth extension shall extend at least 16 inches in front of, and at least 8 inches beyond each side of the fireplace opening.

b. Where the fireplace opening is 6 square feet or larger, the hearth extension shall extend at least 20 inches in front of, and at least 12 inches beyond each side of the fireplace opening.

c. Where a fireplace is elevated above or overhangs a floor, the hearth extension shall also extend over the area under the fireplace.

d. Fireplaces constructed of masonry or reinforced portland or refractory cement concrete shall have hearth extensions of brick, concrete, stone, tile or other approved noncombustible material properly supported and with no combustible material against the underside thereof. Wooden forms or centers used during the construction of hearth and hearth extension shall be removed when the construction is completed.

5. All wood beams, joists and studs shall be trimmed away from fireplaces. Headers supporting trimmer arches at fireplaces shall be not less than 20 inches from the face of the chimney breast. Trimmers shall be not less than 6 inches from the inside face of the nearest flue lining.

6. Woodwork shall not be placed within 4 inches of the back face of a fireplace.

7. Woodwork shall not be placed within 6 inches of a fireplace opening. Woodwork above and projecting more than 1½ inches from a fireplace opening shall not be placed less than 12 inches from the top of a fireplace opening.

(b) *Factory-built fireplaces and fireplace stoves.* Factory-built fireplaces and fireplace stoves shall be installed according to the requirements of the approval as specified in s. ILHR 64.20.

(c) *Hearth opening protection.* Fireplaces and fireplace stoves shall be equipped with safety screens or glass doors to prevent the escape of sparks and embers.

(d) *Permitted installations.* Fireplaces are permitted in the following applications.

1. In all occupancies within the scope of chs. ILHR 54 and 55;
2. In health care facilities as specified in s. ILHR 58.24 (3);
3. In common use areas and individual living units in all residential occupancies except hotels and motels; and
4. In lobbies and other common use areas of motels and hotels but not in individual sleeping rooms.

(8) **FLOOR-STANDING VENTED OR UNVENTED EQUIPMENT.** Floor-standing, vented or unvented unit heaters, furnaces and boilers in metal fabricating plants, foundries and machine shops are exempt from the requirements of s. ILHR 54.14.

(9) **HEAT EXCHANGER CORROSION PROTECTION.** 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.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; r. and rec. 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; am. (1) (b) and cr. (7), Register, December, 1978, No. 276, eff. 1-1-79; r. and rec. (2) and (7), Register, December, 1981, No. 312, eff. 1-1-82; r. and rec. (4), cr. (6) (c), (7) (d) and (8), Register, December, 1983, No. 336, eff. 1-1-84; am. (1), (3) (intro.), (4) (b) and (6) (intro.), r. (3) (a) and cr. (9), Register, August, 1985, No. 356, eff. 1-1-86.

ILHR 64.23 Piping. (1) **PIPE SIZES AND ARRANGEMENT.** All supply and return piping carrying steam, hot water or other fluids, 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.

Register, August, 1985, No. 356

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

(4) **PIPE PROTECTION.** No pipe carrying hot water, steam, or other fluid 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 all oil piping shall comply with the following standards: **FP**

1. National Fuel Gas Code, NFPA No. 54 [ILHR 51.27 (7a)]; or
2. Installation of Oil-Burning Equipment, NFPA No. 31 [ILHR 51.27 (7a)].

(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; am. (1), (3) and (4), Register, December, 1978, No. 276, eff. 1-1-79; am. (5)(a), Register, January, 1980, No. 289, eff. 2-1-80.

Part V—Air Delivery Systems

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

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

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

ILHR 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.

ILHR 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. The sealing material for fittings and joints shall be approved by the department.

1. Exception. Solid polyvinyl ducts and fittings and polyvinyl chloride (pvc)-clad metallic ducts and fittings need not be encased in concrete

Register, August, 1985, No. 356

provided the space around the ducts and fittings is backfilled with sand or similar fill material.

(2) **DUCT INSULATION.** All underground ducts shall be insulated as specified in s. ILHR 63.22 (1).

(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; am. (1)(b) and (2), Register, January, 1980, No. 289, eff. 2-1-80; am. (2), Register, December, 1983, No. 336, eff. 1-1-84.

ILHR 64.34 Duct construction. (1) METAL DUCTS. All sheet metal ducts, duct liners 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 Equipment Volume, published by the American Society of Heating, Refrigerating and Air Conditioning Engineers, or as illustrated in the Low Pressure or High Pressure 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.** Coated metal ducts or 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.

(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; am. (3) (intro.), Register, January, 1980, No. 289, eff. 2-1-80; reprinted to correct error in (3), Register, May, 1980, No. 293; am. (1) and r. (3) (e), Register, August, 1985, No. 356, eff. 1-1-86.

Register, August, 1985, No. 356

ILHR 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; and

(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; and

(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.

ILHR 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.

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

Note: Also see s. ILHR 63.22 for additional requirements.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. Register, December, 1983, No. 336, eff. 1-1-84.

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

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

(3) **PLENUMS.** Gravity ventilation ducts, used with mechanical ventilation supply systems, shall not terminate in an attic plenum unless the plenum is airtight, of noncombustible construction, and the attic floor is smooth. All collecting plenums shall be connected to an approved si-

Register, August, 1985, No. 356

phon-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.

ILHR 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 and parapet wall and shall be provided with an approved type of siphon roof ventilator.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am., Register, December, 1981, No. 312, eff. 1-1-82.

ILHR 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.

ILHR 64.41 Plenums. (1) **GENERAL.** Plenums used for the supply, return or transfer of air shall be of noncombustible construction.

(a) *Exception.* Combustible ceiling materials may be used provided they comply with the following:

1. The ceiling material is made from a base material of metal or mineral;
2. All surfaces of ceiling material possess a flame-spread rating of not over 25 without evidence of continued progressive combustion and with a smoke-developed rating of not higher than 50;
3. The ceiling material is supported by noncombustible material having a melting point above 1400° F. (760° C); and
4. The ceiling material is not subject to deterioration or deformation on long exposure to temperatures of 250° F. (121° C) or under conditions of high humidity, excessive moisture, or mildew.

Note #1: This section permits the use of steel, painted steel bar joists and metal decking, concrete, plaster, and other noncombustible materials and restricts the use of certain combustible materials within air-handling plenums.

Note #2: The requirements for ceiling materials are based upon the National Fire Protection Association (NFPA) standard 90A, section 2-2.1.3.

(2) **DUCTWORK WITHIN THE PLENUM.** Ducts within the plenum shall be constructed of metal in accordance with s. ILHR 64.34 (1) or approved nonmetallic materials in accordance with s. ILHR 64.34 (3).

Register, August, 1985, No. 356

(3) **DUCT CONNECTORS.** Duct connectors shall comply with the requirements of s. ILHR 64.35.

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

(4) **INSULATING MATERIALS WITHIN THE PLENUM.** (a) *Duct and pipe insulation.* Duct and pipe insulation, including coverings, linings, tapes and core materials, shall have a flame-spread rating of not over 25 without evidence of continued progressive combustion, and a smoke-developed rating no higher than 50 when tested according to ASTM E-84 standard tests. If coverings and linings are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame-spread rating not over 25 and a smoke-developed rating no higher than 50 when in the final dry state.

(b) *Building envelope insulation.* Building envelope insulation within the plenum space shall have a flame-spread rating of 25 or less and a smoke-developed rating of 50 or less when tested according to ASTM E-84 test standards. The use of foam plastics, satisfying the requirements of s. ILHR 51.06, for envelope insulation is permitted provided the foam plastic is protected by a thermal barrier as specified in s. ILHR 51.06 (3).

(5) **HAZARDOUS PIPING.** The installation of hazardous piping as defined in s. ILHR 51.01 (102) is prohibited in the plenum space.

(6) **OPENINGS.** Openings into the plenum that would affect the fire-resistive rating of the structural component or system are prohibited.

(7) **WIRING AND CABLES.** Electric wiring, including low-voltage wiring, and telephone cables within the plenum space shall be installed according to the Wisconsin State Electrical Code, Vol. 2, ch. ILHR 16.

(8) **PLUMBING.** Plumbing within the plenum shall be of noncombustible material.

(a) *Exception.* Plastic plumbing pipe and fittings may be used provided the plastic material is of the self-extinguishing type with an average extent of burn not greater than 10 mm and an average time of burn not greater than 20 seconds when tested according to ASTM D-635. The plastic material shall be wrapped with at least one inch of inorganic insulation or enclosed with ½ inch type X gypsum wallboard.

(9) **CONTROL TUBING.** Plastic control tubing shall have an average extent of burn not greater than 10 mm and an average time of burn not greater than 20 seconds when tested according to ASTM D-635.

(10) **SMOKE DETECTION.** (a) *New construction.* Air-handling plenums which contain ductwork, duct connectors, insulation, plumbing or control tubing which do not meet the requirements of subs. (2) to (4), (8) and (9), respectively, shall be provided with an approved smoke detection system capable of stopping the air flow in and from the plenum and giving an audible alarm in the occupied area when activated.

(b) *Existing construction.* When existing plenum construction contains combustible insulation, wiring, plumbing or control tubing, and is altered or added to according to s. ILHR 50.03 (1) or (2), the entire plenum space, new and existing, shall be provided with a smoke detection system according to sub. (10) (a).

1. Exception. Building additions separated from existing construction by one-hour noncombustible construction need not be provided with a smoke detection system provided the plenum is constructed according to subs. (1) to (8).

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. Register, December, 1976, No. 252, eff. 1-1-77; r. and recr. Register, December, 1978, No. 276, eff. 1-1-79; r. and recr. Register, January, 1980, No. 289, eff. 2-1-80; am. (1) (intro.), (6) and (10), Register, December, 1981, No. 312, eff. 1-1-82; am. (4) (b), Register, August, 1985, No. 356, eff. 1-1-86.

FP ILHR 64.42 Fire dampers and fire curtain doors. (1) REQUIRED FIRE DAMPERS AND FIRE CURTAIN DOORS. All heating and ventilating ducts, except underground ducts used with counterflow or downflow heating equipment, which terminate at or pierce code-required, hourly rated wall, floor or floor-ceiling assemblies as specified in Table 51.03-A and rated enclosures shall be protected as follows:

(a) One-hour rated assemblies and enclosures shall be protected with 1½ hour rated fire dampers where continuous steel ductwork to the air handling device is not provided for at least 6 feet on either side of the assembly or enclosure;

(b) Two-hour rated assemblies and enclosures shall be protected with 1½ hour rated fire dampers; or

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

(2) EXCEPTIONS. Exceptions to sub. (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; or

(c) Interior bearing walls and partitions if unrated openings are permitted by other sections of chs. ILHR 50-64.

(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 s. ILHR 64.67 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; cr. (2) (d), Register, December, 1978, No. 276, eff. 1-1-79; am. (1) and (2), Register, December, 1981, No. 312, eff. 1-1-82; am. (1) (intro.) and (a), Register, December, 1983, No. 336, eff. 1-1-84.

ILHR 64.43 Dampers and damper controls. (1) VOLUME DAMPERS AND DEFLECTORS. Volume dampers, splitters and deflectors shall be provided Register, August, 1985, No. 356

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.

ILHR 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

ILHR 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, except as permitted in s. ILHR 64.21. A natural draft chimney or other venting device shall have the height and area to remove the products of combustion. Chimneys, smoke stacks, gas vents, mechanical draft and venting devices shall comply with the requirements of NFPA No. 211 [s. ILHR 51.27 (7a)], Chimneys, Fireplaces and Vents. **FP**

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

(3) **TERMINATION.** (a) *Gravity type.* 1. All chimneys or smokestacks 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 or smokestacks 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 or smokestack.

2. Type "B", "BW" and "L" vents and single wall vent pipes depending on a gravity principle for the removal of the products of combustion shall extend at least 2 feet above the highest point where the vents or pipes pass through the roof of the building, and at least 2 feet higher than any ridge, peak or wall within 10 feet of the vent or pipe.

(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; am. (1) and (3)(a), Register, January, 1980, No. 289, eff. 2-1-80.

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

Register, August, 1985, No. 356

(1) **MATERIALS.** The walls shall be built of brick or other approved fire-resistant 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 6 inches from the wall and in every case the corbeling shall consist of at least 5 courses of brick.

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

(3) **FLUE LININGS.** All flue linings shall be capable of withstanding reasonably high temperatures and flue gases and shall have a softening point not lower than 1800° F. Flue linings shall be not less than 5/8 inch in thickness and shall be built in as outer walls of the chimney are constructed. Flue linings shall start from a point not less than 8 inches below the bottom of the smoke pipe intake and shall be continuous to a point not less than 4 inches above the enclosing walls.

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

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

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

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (1), Register, January, 1980, No. 289, eff. 2-1-80.

FP ILHR 64.47 Metal smokestacks. (1) **SMOKESTACKS IN EXCESS OF 30 FEET.** The thickness of the metal walls shall be at least 3/16 inch for smokestack heights up to 40 feet and 1/4 inch for greater heights. Stacks used for manufacturing, high-pressure boilers, furnaces or other similar heating or manufacturing appliances shall be lined with firebrick, or equivalent, 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 1 or 2 construction.

Register, August, 1985, No. 356

(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; am. (1) (intro.), Register, December, 1978, No. 276, eff. 1-1-79.

ILHR 64.48 Factory-built chimneys and gas vents. (1) GENERAL. Factory-built chimneys and gas vents shall be of an approved type. FP

(2) **TYPES OF APPROVED CHIMNEYS AND GAS VENTS.** (a) *Residential type and building heating appliance.* An approved "residential type and building heating appliance" chimney or "building heating appliance" 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.

(b) *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.

(c) *Type "BW".* An approved type "BW" gas vent may be used with a vented recessed wall heater.

(d) *Single wall vent pipe.* An approved single wall vent pipe 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, No. 24 Brown and Sharpe gauge sheet copper, or other approved corrosion-resistant material. The installation shall conform to the requirements of s. ILHR 64.50.

(e) *Type "L".* An approved type "L" vent may be used with oil-fired appliances listed as suitable by a recognized agency and with gas-fired appliances approved for type "B" vents.

(f) *Equipment listed with venting system.* Venting systems included with the listing of the heating appliance may be used subject to the requirements and limitations of the listing.

Note: The department recognizes, as approved, chimneys designated as "residential type", "building heating appliance", "B", "BW" and "L" types listed by Underwriters' Laboratories, Inc.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; r. and recr., Register, December, 1978, No. 276, eff. 1-1-79; am. (2)(a) and (d), Register, December, 1981, No. 312, eff. 1-1-82; cr. (2) (f), Register, December, 1983, No. 336, eff. 1-1-84.

ILHR 64.49 Gas vents. All gas ranges (except those designed as unvented), water heaters and other gas-fired equipment shall be provided with vent pipes conforming to the requirements for gas vents as specified in s. ILHR 64.48 and for connectors as specified in s. ILHR 64.50. Commercial kitchen appliances including but not limited to ranges, ovens, FP

Register, August, 1985, No. 366

booster heaters and similar equipment may be vented into the kitchen hood exhaust system.

History: Cr. Register, December, 1976, No. 240, eff. 1-1-76; am. Register, December, 1978, No. 276, eff. 1-1-79; am. Register, January, 1980, No. 289, eff. 2-1-80; renum. from ILHR 64.50 and am., Register, December, 1981, No. 312, eff. 1-1-82.

FP ILHR 64.50 Chimney and vent connectors. (1) **CONSTRUCTION AND INSTALLATION.** The construction and installation of chimney connectors shall conform with the following requirements:

(a) *Concealed space.* No chimney connector shall pass through any outside window, door or combustible outside wall, nor be concealed in any closet, attic or similar space;

(b) *Combustible partitions and walls.* Connectors for appliances shall not pass through interior walls or partitions constructed of combustible material unless they are guarded at the point of passage by:

1. Metal ventilated thimbles not less than 12 inches larger in diameter than the connector, or

2. Metal or burned fireclay thimbles built in brickwork or other approved fireproofing materials extending not less than 8 inches beyond all sides of the thimble;

(c) *Distance from materials.* Connectors shall be installed with clearance to combustibles specified in par. (b) or NFPA Standard 211;

(d) *Multiple appliance venting.* Two or more appliances using the same type of fuel may be connected to a common gravity-type chimney or vent, provided the appliances are equipped with primary safety controls and listed shutoff devices and comply with the following requirements:

1. The appliances shall be located in the same story, except for engineered venting systems,

2. The appliances shall be joined at a manifold or Y-type fitting as close to the chimney or vent as possible, unless the connector from each appliance enters a separate chimney or vent inlet and the inlets are offset at least 12 inches vertically or are at right angles to each other,

3. The connector and chimney or vent shall be sized to accommodate the total volume of flue gases. For gas-burning appliances, the venting area shall be at least equal to the size of the largest vent connector plus at least 50% of the area of the other vent connectors, or

4. A chimney serving a fireplace or other piece of solid-fuel equipment shall not be used to vent any other appliance;

(e) *Pitch and length.* Chimney or vent connectors shall have no more than two 45° offsets with the vertical. The horizontal length shall not exceed 75% of the total vertical height of the total venting system measured from the appliance outlet. Chimney or vent connectors shall be pitched up at least ¼ inch per foot from the appliance outlet collar to the chimney or vent inlet;

(f) *Dampers.* A manual cast iron or equivalent damper to control the draft shall be provided in the chimney connector next to solid-fuel fired equipment. Manually operated dampers shall be prohibited in chimney or vent connectors of all other appliances. When used, listed automati-

cally operated dampers interlocked with the heating appliance shall be installed in accordance with the approved listing; and

(g) *Materials and thickness.* 1. Except as specified in subd. 2., chimney or vent connectors shall be listed or conform to the type of material and thickness indicated in Table 64.50 or equivalent.

2. 'Exception'. Connectors serving listed residential-type gas appliances shall be not less than .016 inch galvanized steel.

TABLE 64.50

MINIMUM CHIMNEY CONNECTOR METAL THICKNESS

Galvanized Steel		
Diameter of Connector	Min. thickness (inch)	Gauge
Less than 6 inches	.019	26
6 inches to less than 10 inches	.024	24
10 inches to 13 inches	.030	22
14 inches to 16 inches	.036	20
Greater than 16 inches	.058	16

History: Cr. Register, December, 1981, No. 312, eff. 1-1-82; am. (1) (c) and (g) 2., Register, August, 1985, No. 356, eff. 1-1-86.

Part VII—Equipment Location, Protection, Maintenance and Operation

ILHR 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 surfaces that are likely to cause lacerations.

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

(4) FIRE PROTECTION. (a) 1. Heat-producing appliances and their chimney or vent connectors shall be installed with clearances to combustible material as specified in NFPA Manual No. 211 unless listed for installation at other clearances. FP

2. Clearance to combustible materials shall be as specified in NFPA Standard No. 211 or as specified by a nationally recommended testing laboratory, whichever is greater.

(b) Clearances shall be measured from the outer surface of the appliance or connector to the combustible material, disregarding any intervening protection applied to the combustible material.

(c) Appliances shall not be installed in alcoves or closets unless approved for such installations.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (2), Register, December, 1976, No. 252, eff. 1-1-77; am. (2), Register, January, 1980, No. 289, eff. 2-1-80; am. (4), Register, December, 1981, No. 312, eff. 1-1-82; am. (4) and r. tables 64.51 A to D, Register, August, 1985, No. 356, eff. 1-1-86.

FP ILHR 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. Chimneys or vents and connectors serving solid-fuel burning appliances shall be cleaned and inspected for damage annually. Chimneys and vents, which have been subjected to a chimney fire, shall not be reused until inspected and approved by the department or authorized deputy.

(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; am. (1), Register, December, 1981, No. 312, eff. 1-1-82.

ILHR 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

ILHR 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.

Note: For mall corridors of enclosed mall shopping centers, see s. ILHR 64.05, Table 1.

(2) **VENTILATION.** The air movement, supply and distribution for all occupancies in this class shall conform to the requirements of s. ILHR 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 chs. Ind 1000-2000—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.

Register, August, 1985, No. 356

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

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

ILHR 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 s. ILHR 64.54.

(2) **VENTILATION.** The air movement, supply and distribution for all occupancies under this classification shall conform to the requirements of s. ILHR 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.

ILHR 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 s. ILHR 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) **EXHAUST SYSTEMS AND HEAT RECOVERY.** (a) An exhaust system, as specified in s. ILHR 64.54 (3), shall be provided for all equipment and processes that create dust, fumes, vapors and gases injurious to health.

(b) Exhaust systems whose operation is more than 3600 hours per year shall be equipped with heat recovery devices to reduce the energy consumption in the building.

Register, August, 1985, No. 356

1. Exception. a. Systems exhausting explosive materials, such as perchloric acid need not be so equipped.

b. Fan systems exhausting 250 CFM or less need not be so equipped.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (3), Register, December, 1976, No. 252, eff. 1-1-77; am. (3), Register, December, 1981, No. 312, eff. 1-1-82.

ILHR 64.57 Health care facilities. (1) **SCOPE.** The rules of this section apply to hospitals, nursing homes and outpatient surgical facilities where medical services are provided.

(2) **GENERAL.** (a) The heating, ventilating and air conditioning systems of all occupancies within the scope of this section shall be designed, operated and maintained as specified in sections 2, 7.29 A. to D., 8.12 A. to C., 9.2 L., 9.4 I., 9.5 M. and 9.6 J., depending upon the occupancy, of the Guidelines for Construction and Equipment for Hospitals and Medical Facilities, DHHS Publication No. (HRS-M-HF) 84-1.

(b) The heating, ventilating and air conditioning systems shall also be designed, operated and maintained as specified in the applicable sections of the following standards as referenced in DHHS Publication No. (HRS-M-HF) 84-1.:

1. Installation of Air Conditioning and Ventilating Systems, NFPA No. 90A;

2. ASHRAE Handbook of Fundamentals; and

3. Methods of Testing Air Cleaning Devices Used in General Ventilation for Removing Particulate Matter, ASHRAE Standard No. 52.

(3) **APPLICATION OF RULES.** Where other sections of ch. ILHR 64 specify different requirements than those contained in this section, the requirements specified in this section shall govern.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; r. (2) (d), Register, January, 1980, No. 269, eff. 2-1-80; r. and recr., Register, February, 1982, No. 314, eff. 3-1-82; r. and recr. (2), r. (3), renum. (4) to be (3), Register, August, 1985, No. 356, eff. 1-1-86.

ILHR 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 conform to the requirements of s. ILHR 64.05, Table 1.

(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; am. (2), Register, December, 1981, No. 312, eff. 1-1-82.

ILHR 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 s. ILHR 51.01 (102a) for definition of "place of abode."
Register, August, 1985, No. 356

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

(a) *Exception.* For motel or hotel sleeping rooms without openable outside windows and facing naturally lighted pool or recreation areas, see ss. ILHR 52.02 (1) (b) and 57.13 (2).

(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; cr. (2) (a), Register, May, 1980, No. 293, eff. 6-1-80.

ILHR 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 s. ILHR 64.05, Table 1.

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

ILHR 64.61 Repair areas. (1) **SCOPE.** This classification includes all areas where motor-driven vehicles are repaired involving the fuel system components or requiring the operation of the internal combustion engine.

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

(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 par. (a).

Note: The requirements stated in sub. (2) need not be increased when satisfying requirements of either sub. (3) (a) or (b). Also see chs. Ind 1000-2000—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, and similiar types of engines, and battery charging areas, shall be provided with at least 3/4 cubic foot per minute of outside air per square foot of enclosed service floor area and an

Register, August, 1985, No. 356

equivalent exhaust. Exhaust from battery charging 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 chs. Ind 1000-2000—Safety and Health Code, the additional exhaust requirements with an equivalent volume of outside air shall be provided to satisfy the requirements found in chs. Ind 1000-2000.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (4), Register, December, 1978, No. 276, eff. 1-1-79; am. (1), Register, December, 1983, No. 336, eff. 1-1-84.

ILHR 64.62 Vehicle service buildings. (1) **APPLICATION.** (a) This section applies to liquid fuel dispensing stations and facilities where vehicles can be driven into the building for washing, greasing, oil change, tire replacement, body repair, and similar operations.

(b) The exhaust air shall be drawn from not more than 18 inches above the floor.

FP (2) VENTILATION. (a) Air movement, supply, distribution and exhaust shall be provided as specified in s. ILHR 64.05, Table 1.

(b) Buildings or portions of buildings having a capacity of and used exclusively for washing 2 or more vehicles simultaneously shall be exhausted at not less than $\frac{1}{2}$ cubic foot per minute per square foot of floor area based on that portion of the floor located between the termination of the conveyor system and the vehicle exit door. A supply of makeup air is not required for this exhaust.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (2)(b) (Intro.), Register, January, 1980, No. 289, eff. 2-1-80; r. and recr. Register, August, 1985, No. 356, eff. 1-1-86.

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

FP (2) VENTILATION. The air movement, supply and distribution shall be provided in accordance with the requirements of s. ILHR 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; and

(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: 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 chs. Ind 1000-2000—Safety and Health Code, the additional exhaust requirements with an equivalent volume of outside air shall be provided to satisfy the requirements found in chs. Ind 1000-2000.

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

ILHR 64.64 Vehicle showrooms. (1) **SCOPE.** This classification includes all vehicle showrooms with offices and occupancies unless designed as part of the vehicle garage adjacent to repair or vehicle storage areas Register, August, 1985, No. 356

where all vehicles displayed in the showroom are without batteries and fuel tanks are empty and free of fumes.

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 s. ILHR 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 s. ILHR 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 chs. Ind 1000-2000—Safety and Health Code, the additional exhaust requirements with an equivalent volume of outside air shall be provided to satisfy the requirements found in chs. Ind 1000-2000.

History: Cr. Register, December, 1975, No. 240, eff. 1-1-76; am. (1), Register, December, 1983, No. 336, eff. 1-1-84.

ILHR 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 s. ILHR 64.57.

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

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

Note #5: The rules of this section are not intended to preclude the use of energy recovery wheels, plate type heat exchangers or similar energy recovery equipment.

(2) **EXHAUST VENTILATING SYSTEMS.** Exhaust ventilating systems serving this class of occupancy may not be combined with other exhaust services provided the combined system:

(a) Does not allow recirculation; and

(b) Does not include grease hood exhaust, radioactive exhaust, fume hood exhaust, exhaust required by chs. Ind 1000-2000, exhaust that requires electrical grounding, or exhaust that requires spark resistant fan construction.

(3) **VENTILATION.** The air movement, supply and distribution shall be provided in accordance with the requirements of s. ILHR 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.* 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 except in taverns and restaurants, or from janitor closets having one service sink or receptor, where an approved ductless air circulating and treatment device is provided.

(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 s. ILHR 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; am. (3) (b) 1, Register, December, 1981, No. 312, eff. 1-1-82; am. (3) (b) 1, Register, December, 1983, No. 336, eff. 1-1-84; r. and recr. (2), Register, August, 1985, No. 356, eff. 1-1-86.

ILHR 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.

ILHR 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.* When cooking equipment is being operated, 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. When cooking equipment is not being operated, a minimum supply of outside air and exhaust at the rate of 5 CFM per person or natural ventilation as specified in s. ILHR 64.07 shall be provided during periods of occupancy.

Register, August, 1985, No. 356

(b) *Required exhaust hood.* Exhaust hoods shall be required where frying, including deep-fat frying and surface frying, or broiling or both is conducted as part of a regular commercial operation involving 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) **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 and shall extend around the open sides of the hood.
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 being ventilated, and measured parallel to the front edge of the appliance.

(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.

(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 as specified in sub. (5) (f).

(g) *Concealed hood surfaces.* Hood surfaces that are concealed by or recessed into adjoining construction shall be protected as specified in sub. (5) (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.

(5) **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.

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

FP (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. above the normal ambient temperature of 68° 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 subd. 1., 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.

FP (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 par. (f).

(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.

FP (6) **AUTOMATIC SUPPRESSION SYSTEMS.** Exhaust hoods and ducts in kitchens used for commercial purposes shall be protected by an approved automatic fire suppression system. The suppression system shall comply with the following:

(a) When the fire suppression system is activated, all gas and electrical sources serving cooking appliances, grease consuming appliances or fume

incinerators and equipment associated with the hoods shall be automatically deactivated. Such gas and electrical sources shall not be capable of reactivation except by manual means after the fire suppression system has been serviced and is again ready for action;

(b) 1. Except as provided in subd. 2., hood and duct suppression systems shall provide for both automatic and manual actuation of the system;

2. Automatic fire sprinkler systems using water need not be provided with means for manual actuation.

(c) A manual station for actuation of the suppression system shall be located at or near one of the means of egress from the area but not nearer than 10 feet to the range hood unless otherwise specifically approved, and shall be securely mounted not less than 4½ feet nor more than 5 feet above the floor;

(d) The system shall be maintained at full operating capacity by the owner and shall be serviced every 6 months; and

(e) All nozzles shall be accessible for cleaning and replacement.

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; am. (4) and (6) (f) 1., Register, December, 1978, No. 276, eff. 1-1-79; am. (2)(a), r. (4), renum. (5) and (6) to be (4) and (5), Register, January, 1980, No. 289, eff. 2-1-80; am. (2) (a), (4) (f) and (g), Register, December, 1981, No. 312, eff. 1-1-82; cr. (6), Register, June, 1983, No. 330, eff. 7-1-83; r. and recr. (2) (b), am. (4) (b) 3., Register, December, 1983, No. 336, eff. 1-1-84.

ILHR 64.68 Seasonal occupancies. When approved in writing by the department, heating requirements may be waived but not ventilation required by s. ILHR 64.05, Table 1 during the period of May 15 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.

Note: Rules on migrant labor can be found in ch. 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; am., Register, December, 1981, No. 312, eff. 1-1-82.

APPENDIX A

The material contained in the 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-50.21 CERTIFIED MUNICIPALITIES. The following municipalities have been certified by the department to review plans and conduct inspections under this section:

COUNTIES			
Eau Claire			
CITIES			
Antigo	Greenfield	Middleton	Superior
Appleton	Janesville	Muskego	Two Rivers
Beloit	Kaukauna	New Berlin	Waukesha
Brookfield	Kenosha	Oak Creek	Wausau
Burlington	La Crosse	Oshkosh	Wauwatosa
Cudahy	Lake Geneva	Racine	West Allis
Eau Claire	Madison	Sheboygan	West Bend
Fond du Lac	Manitowoc	Sparta	Wisconsin
Glendale	Marshfield	Stevens Point	Rapids
Green Bay	Mequon	Sun Prairie	
VILLAGES			
Dousman			
Elm Grove			
Grafton			
Johnson Creek			
Plover			
Waterford			
TOWNS			
Grand Rapids			
Waukesha			

A-50.10-50.25 FORMS. The following forms (SB2, 8, 8A, 8B, 118, 198, 224B, SBD-4927 and SBD-5686) are referred to in ss. ILHR 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 7969, Madison, Wisconsin 53707.

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 395
Appendix A

SB 2
REV. 8-79

Department of Industry, Labor and Human Relations

Building

Inspection Report and Orders

INSPECTION DATE		FILE NO.	
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	<input type="checkbox"/> Done	<input type="checkbox"/> Not Done
SAMPLE					

IMPORTANT

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

* Failure of an employer to comply with such orders or to comply with such statute or order of the Department shall constitute a felony by the employer to remedy with such statute is under 101.15 Sec. 102.52 Wis. State

COMPLIANCE DATE	VIOLATIONS EXPLAINED TO	TITLE
By	DEPUTY	DEPUTY ASST.
		SAFETY & BUILDINGS DIVISION

Approved: Chief Building Safety and Buildings Division, Department of Industry, Labor and Human Relations, P.O. Box 7999, Madison, Wisconsin 53707

PETITION FOR VARIANCE
OF A RULE IN THE
WISCONSIN ADMINISTRATIVE CODE

WISCONSIN DEPARTMENT OF
INDUSTRY, LABOR AND HUMAN RELATIONS
DIVISION OF SAFETY & BUILDINGS
P.O. BOX 7269, MADISON, WI 53707

OFFICE USE ONLY	
Petition No.	
File Number	

Name of Owner	Building Occupancy or the	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
Phone	Plan Number(s) (IF KNOWN)	Name of Contact Person

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

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

3. Supporting arguments are:

VERIFICATION BY OWNER - PETITION IS VALID ONLY IF NOTARIZED

For Fee Information See ILHR 69.15 or Contact The Department at (608) 267-7843

NOTE: Petitioners must be building owner. Tenants, agents, designers, contractors, attorneys, etc. may not sign petition unless a Power of Attorney is submitted with the Petition.

_____, being duly sworn, I state as petitioner that I have read the foregoing petition, that I believe it to be true and I have significant ownership rights in the subject building.

Signature of owner
Subscribed and sworn to me this date: _____

County, Wisconsin.

Notary Public
My commission expires: _____

OFFICE USE ONLY		
Date Received	Amount Paid	Receipt No.
Department Action		
Office of The Secretary	Date	

SA 8 (R) 12 83

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 397
 Appendix A

POSITION STATEMENT:
 To be completed by
 Chief of Fire Department

WISCONSIN DEPARTMENT OF
 INDUSTRY, LABOR AND HUMAN RELATIONS
 DIVISION OF SAFETY & BUILDINGS
 P.O. BOX 7969 MADISON WI 53707

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

1. I have read the petition for variance of rules.

2. I recommend (Check appropriate box)

Denial	Approval	Conditional Approval	No Comment*
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3. Explanation for Recommendation:

SAMPLE

* If desired, Fire Departments may indicate "No Comment" on non-fire safety issues such as sanitary, energy conservation, structural, beam or fire 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.
 SS BA (R) 12 (24)

Wisconsin Department of Industry, Labor and Human Relations
DIVISION OF SAFETY & BUILDINGS
 P.O. Box 7969, Madison, WI 53707

POSITION STATEMENT
 To Be Completed By:
 Dept. of H&S
 Division of Health
 SS&SB (R) (10/84)

Name of Owner of Building		Title			
Street	City	State	Zip	Phone No.	
Building Identification	Street & No. (if any location)		City & County		
Architect or Engineer	Street & No.		City & State		
1. I have read the Plans for Modification of Rule 110.0.					
2. I recommend (check appropriate box)		Denial	Approval	Conditional Approval	No Comment
3. Our Plan of Inspection indicates that this Building is not <input type="checkbox"/> is relative type 1 or 2 (see Ind. S1.03(1) or (2)).					
4. Explanation for Recommendation: NOTE: If the answer to item 3 is NO, and your recommendation is approval, an explanation is required.					
SAMPLE					
5. <input type="checkbox"/> If find no conflict with H & SS Rules and Regulations <input type="checkbox"/> If find that the petition is in conflict with H & SS Rules and Regulations as set forth below EXPLANATION:					
Signature and Title				Date	

Please complete and submit PROMPTLY to
 DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS
 at the address shown above.

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 399
Appendix A

Safety & Building Division
201 E. Washington Ave
P.O. Box 7909
Madison, WI 53707

PLANS APPROVAL APPLICATION
Department of
INDUSTRY, LABOR AND HUMAN RELATIONS

E: _____
PLAN NO. _____

INSTRUCTIONS: Fill in all applicable data. Submittal of Plan Approval Application form is required with each plan submittal. Examinations and inspection fees, as indicated on back of form, are required to be submitted with a minimum of four 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, 2925, Thorstein Ave., Madison, 53709

Name of Owner	Building Occupancy or Use	Designer or Design Firm of	<input type="checkbox"/> BLDG	<input type="checkbox"/> HVAC
Company	Tenant Name, if any	Street & No.		
Street & No.	Building location, Street & No.	City	State & Zip	
City	State & Zip	City	County	Phone
<input type="checkbox"/> New Building <input type="checkbox"/> Addition <input type="checkbox"/> Alteration <input type="checkbox"/> Revision to previously approved plans <input type="checkbox"/> Structural <input type="checkbox"/> Roofing & Foundation <input type="checkbox"/> Other	<input type="checkbox"/> Free Reserve-Type A #1 <input type="checkbox"/> Free Reserve-Type B #2 <input type="checkbox"/> Metal Frame Protected #3 <input type="checkbox"/> Heavy Timber #4 <input type="checkbox"/> Exterior Masonry #5A <input type="checkbox"/> Exterior Masonry #5B <input type="checkbox"/> Metal Frame Unprotected #6 <input type="checkbox"/> Wood Frame Protected #7 <input type="checkbox"/> Wood Frame Unprotected #8	<input type="checkbox"/> Sprinkler System Provided <input type="checkbox"/> Fire Alarm Provided <input type="checkbox"/> Other Detection System Provided <input type="checkbox"/> Emergency Power Provided Mechanical Information: Type of Heating: _____	FOR OFFICE USE ONLY App. Rec'd _____ Rec'd No. _____	
Revised Dates, if any	Return Plans to	<input type="checkbox"/> Owner	<input type="checkbox"/> Designer	<input type="checkbox"/> Other

Area	Height	Volume	cu. ft.
X			
X			
Total Volume of			
Total Area of Assemblies			
Year Vol./1000 (Building)			
X	1.00		Minimum Fee \$65.00
Total Volume (HVAC)			
X	.75		Minimum Fee \$65.00
At Area			
X	.02		Minimum Fee \$65.00

COMPONENTS INCLUDED WITH THIS SUBMITTAL	Designer Name	Reg. No.	Supplier	Reg. No.	Fee
METAL BUILD-UP					
BRUSSES					
PRECAST CONCRETE					
LAMINATED WOOD					
OTHER SPECIFY					

NOTE: Must be authorized by building designer.

Structural
Fire & Sound
Elevation
Revisions

PRIORITY PLAN REVIEW
FEE IS EQUAL TO THE TOTAL PLAN EXAMINATION FEES ABOVE.
 Fee not to exceed \$65.00

PUBLIC RECORDS:
This plan, and related documents, may be subject to public inspection and copying. See Ind. 63.02(8) for additional information regarding public records.

DESIGN AND SUPERVISION (Ind. 63.07-63.10) Wisconsin Registered Professional required for buildings containing more than 50,000 cu ft. total volume. This project has been prepared under my supervision. Individual components, submitted herein, may have been designed and sealed by others. I have reviewed those component documents for conformity with the general design concept. I have relied on the seal of the component designers for compliance with codes as they apply to their design.

If this submittal includes building or building components, the designer and supervising professional below must be that of the building. If submittal is for HVAC, only, blocks below may be completed by HVAC designer and supervisor.

Name of <input type="checkbox"/> BLDG <input type="checkbox"/> HVAC Designer/Type or Firm	Reg. No.	Signature of <input type="checkbox"/> BLDG <input type="checkbox"/> HVAC Designer	Date
Plans for buildings over 50,000 cu. ft. will not be approved until the name of the supervising professional is known and the signature provided below.			
Name of Supervising Professional (Type or Firm)	Reg. No.	Address	
Signature of Supervising Professional	Date		

SI-1181N (2/78)

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 401
Appendix A



DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS
SAFETY & BUILDINGS DIVISION
P.O. BOX 7969
MADISON, WISCONSIN 53707

PERMISSION TO START CONSTRUCTION
111 REQUIRED IN ADDITION TO EXAMINATION/INSPECTION 111'S

Location of Project:

Street: _____ E. _____
City: _____ Plan File Number: _____
County: _____ Date Plans Rec'd: _____
Occupancy: _____

We, the undersigned, request to begin testing and foundation work prior to approval of the plans in accordance with Ind. 50.14

Plans have been submitted to the Department of Industry, Labor & Human Relations, Safety and Buildings Division, and all information required by Code Ind. 50.12 or Ind. 50.13 has been included with the submittal.

We have reviewed the specific code requirements for the building or structure and its use, as set forth in Ind. 50.04, and, where applicable, have shown compliance on the drawings.

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

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

We understand that, prior to the start of construction, a building permit must be obtained from the local authorities having jurisdiction in accordance with their laws and ordinances.

SAMPLE

Owner's Signature _____	Date _____	Accepted by _____	Date _____
Name _____		Dept. of Ind., Labor & Human Relations	
Address _____		Safety & Buildings Division	
		Not Accepted Because _____	
Designer's Signature _____	Date _____	Plans will be examined within the next _____	days.
Name _____		NOTE: This permission is applicable to projects listing below-grade foundation work only.	
Address _____			

SK1510103-01

FILE COPY

Wisconsin Department of Industry, Labor & Human Relations
 SAFETY AND BUILDINGS DIVISION
 P.O. Box 7969 Madison, Wisconsin 53707

INSPECTION PROGRESS REPORT

RE:	FILE NUMBER	
	DATE OF INSPECTION	PERSON CONTACTED
TO:	No. 1	
	2	
	3	
	4	
	BLDG FINAL	
	H & V FINAL	
	OTHER FINAL	
	COMPLIANCE DATE	
	OFFICE INSTRUCTION (Check one)	Supervisor Review
	<input type="checkbox"/> Voluntary compliance	
	<input type="checkbox"/> Process SS-2	
	<input type="checkbox"/> Code violation explained to owner	

INSP.	Y Order Corrected X Order Not Corrected				ORDER NUMBER	FINDINGS OF INSPECTION <small>Items listed must be corrected before the next inspection or final inspection. If corrections are not made, prosecution by the Attorney General's Office is a possibility.</small>
	1	2	3	4		
						SAMPLE

NAME AND ADDRESS OF CONTRACTOR		OWNER'S NAME (if different from above)		DEPUTY SIGNATURE	REG NO
ADDRESS		CITY		STATE	
STATE		ZIP		TELEPHONE	

IF YOU HAVE ANY QUESTIONS WILL BE IN MY OFFICE ON _____

DILHR 58 2249 IR 4 80

WORK COPY

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 403
Appendix A

Wisconsin Department
of Industry, Labor
and Human Relations

COMPLETION STATEMENT

E-331/686
E-

Receipt Component
98

Return to:

Safety and Buildings Division
P.O. Box 7959
Madison, Wisconsin 53707

Administrative Rules require that a Completion Statement be filed
by the Supervising Professional or Designer for all buildings having
a volume of over 50,000 cubic feet. (Reference Ind 50.10 (3))

Owner		Plan Number
Occupancy	Building Street Address	
Municipality	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)

SAMPLE

This Certificate Covers:

Building Heating & Ventilation

Other
specify: _____

Supervising Professional Name (Print Printer Type)	Signature	Registration Number
Street Address	City, State, Zip	Date
		MO Day Year

Office Use Only
Safety Specialist

DI/LHR 58D-4927 (R. 7/83)

FILE

DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS
SAFETY & BUILDINGS DIVISION
201 E. WASHINGTON AVE.
P.O. Box 7969
MADISON, WISCONSIN 53707

FILE NO. E-_____
PLAN NO. _____
VOL. _____
INSP. FEES PAID _____

PLAN EXAMINATION LETTER

DATE _____

Note: This Expedited Plan Review letter is being used at the discretion of the plan examiner to expedite the plan review. This form serves as the review correspondence.

Occupancy
Tenant
Owner
Location
Municipality
County

Specialty Professionals

Plans have been reviewed by the Department of Industry, Labor and Human Relations for compliance with applicable code requirements.

The _____ plan is

<input type="checkbox"/> COND. APPROVED	<input type="checkbox"/> WITHHELD	<input type="checkbox"/> NOT APPROVED
---	-----------------------------------	---------------------------------------

If the plans are stamped "CONDITIONALLY APPROVED" construction may proceed, but all items that are required to be changed by this letter must be corrected before commencing that part of the work.

You are hereby advised that the owner as defined in Chapter 101.01(2)(b) of the Wisconsin State Statutes is responsible for all code requirements not specifically cited herein. Code requirements are set forth in Chapters 50 through 60 of the Wisconsin State Statutes of the Department.

The building will be inspected during and after construction by a designated inspector from the Department to insure complete compliance with Wisconsin Codes. The owner may not for the state building inspector listed below or a final inspector before taking possession of the building.

INS. 50 IS EVIDENCE OF APPROVAL. The architect, professional engineer, designer, builder or owner shall keep at the building site, one set of plans bearing the stamp of approval.

THIS BUILDING HAS BEEN CLASSIFIED AS A _____ CONSTRUCTION _____ SPRINKLERED _____ UNLIMITED AREA

COMMENTS _____

Plans for the following shall be submitted to this office and approved prior to construction of that component.

Trusses _____ Precast Concrete _____ Heat & Vent Systems _____ Elevators _____ Area Code _____

State Inspector City _____ P.O. _____

BY _____
PLANE EXAMINER
Print _____

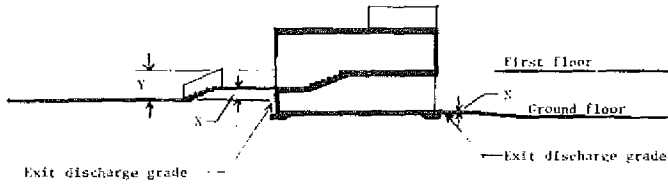
DICHR 52D 5666 IR 05 831

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 405
Appendix A

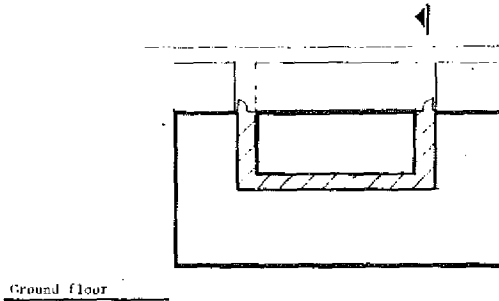
- A-51.01 (12) BUILDING. The intent was to consider permanent awnings as part of a building.
- A-51.01 (42) FAMILY. The intent of this definition is to clarify the use of the word "family" in reference to s. ILHR 51.01 (102a); it is not intended as a variance to the definition stated under s. ILHR 51.01 (102a) (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 ss. ILHR 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

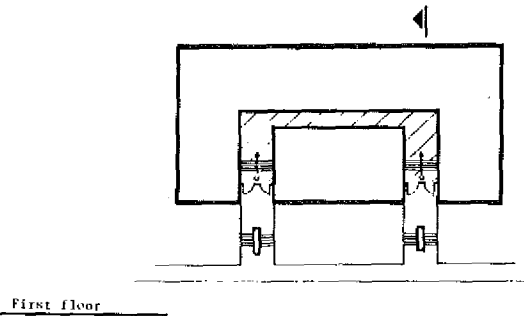
A-51.02 (14) DETERMINATION OF NUMBER OF STORIES. The following illustrations are provided to give visual aid to this rule and the definition of s. ILHR 51.01 (121) Stories, Number of.



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



Ground floor



First floor

A-51.03 (5) (a) EXTERIOR MASONRY CONSTRUCTION. The following Figures 1, 2, 3, 4, 5A and 5B illustrate typical details for various wall construction alternatives, which satisfy the intent of this rule for Type 5--Exterior Masonry Construction.

This Figure illustrates Typical Details for an Exterior Wall. The Same Details also are Applicable to Interior Walls.

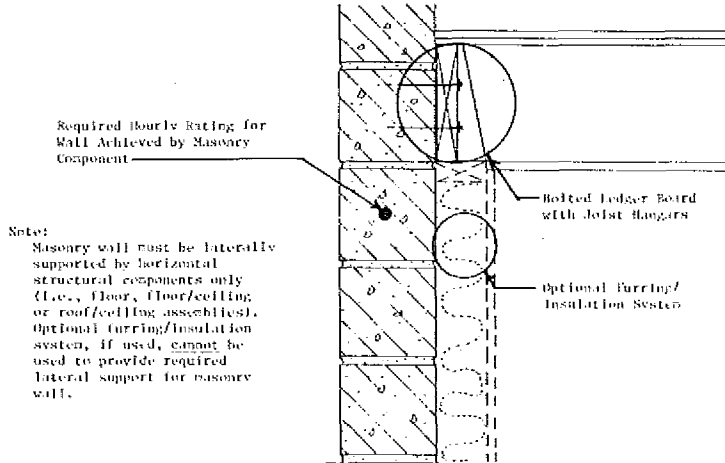


FIGURE 1
Single Wythe Masonry Wall
(Bearing Condition)

This Figure Illustrates Typical Details for an Exterior Wall. The Same Details also are Applicable to Interior Walls.

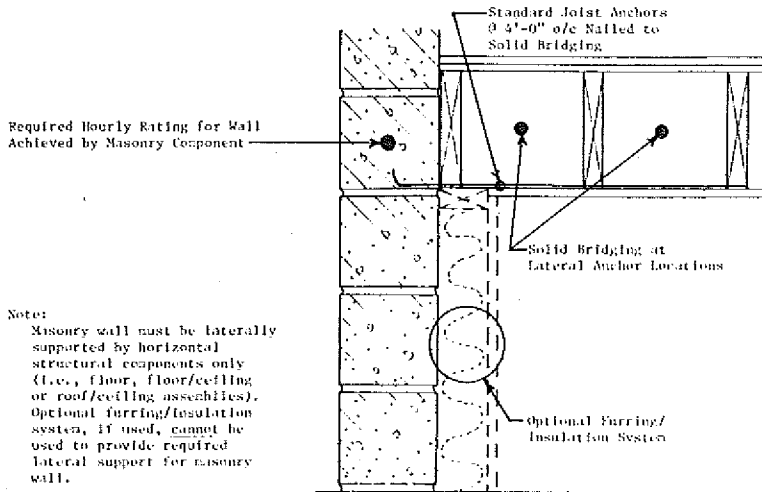


FIGURE 2
Single Wythe Masonry Wall
(Non-Bearing Condition)

This Figure Illustrates Typical Details for an Exterior Wall. The Same Details also are Applicable to Interior Walls.

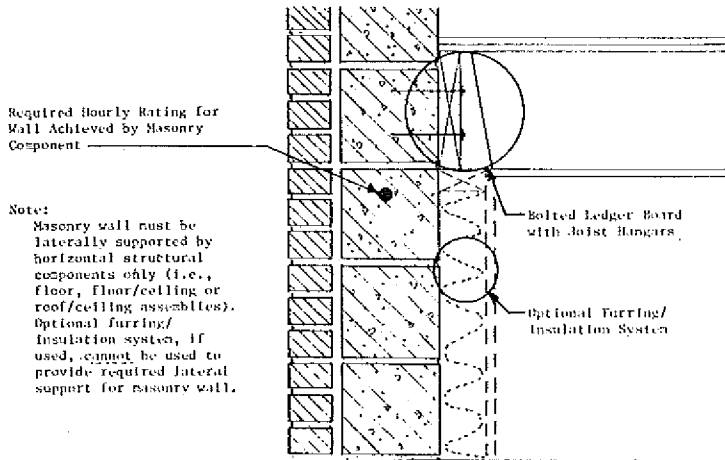


FIGURE 3
Multi-Wythe Masonry Wall
(Bearing Condition)

This Figure illustrates typical details for an Exterior Wall. The same details also are applicable to interior walls.

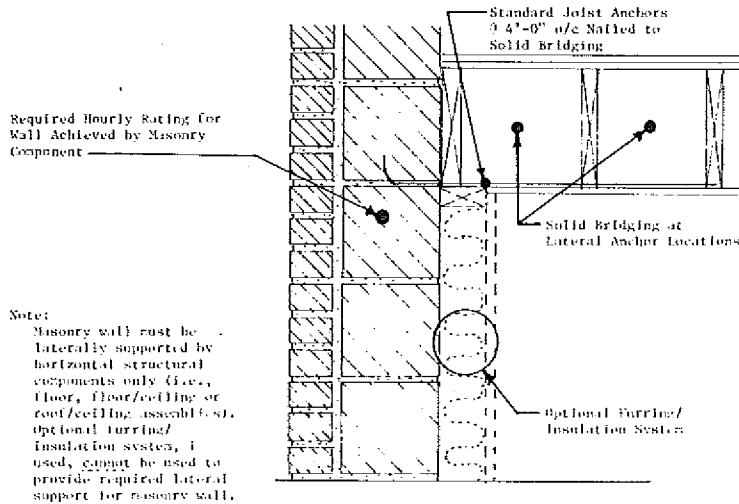


FIGURE 4
Multi-Wythe Masonry Wall
(Non-Bearing Condition)

This Figure Illustrates Typical Details for an Exterior Wall. The Same Details are also Applicable to Interior Walls.

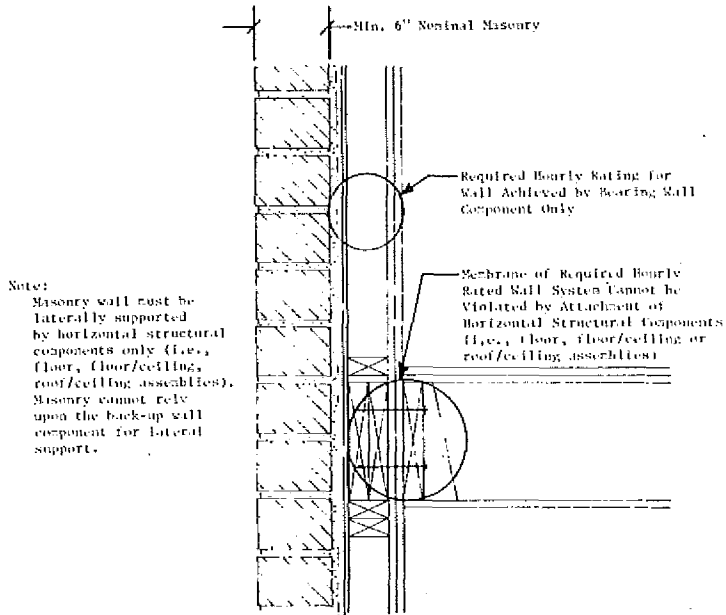


FIGURE 5A
Combination Masonry/Frame Wall
(Bearing and Non-Bearing Condition)

This Figure illustrates typical details for an Exterior Wall. The same details also are applicable to Interior Walls.

Note:

Masonry wall must be laterally supported by horizontal structural components only (i.e., floor, floor/ceiling or roof/ceiling assemblies). Masonry cannot rely upon the back-up wall component for lateral support.

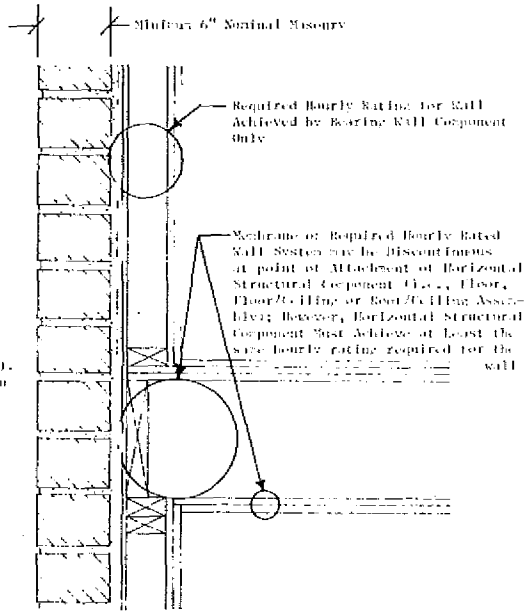


FIGURE 5B
Combination Masonry/Frame Wall
(Bearing and Non-Bearing Condition)

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

5	300
4	400
3	500
2	200
1	600
B ₁	100
B ₂	300
B ₃	400

Type No. 1 sprinklered construction.
Aggregate exit width required from a floor into the stairwell is 30 inches per 100 people on that floor; i.e.,
5th floor to stairwell = 3 x 30 = 90"
4th floor to stairwell = 4 x 30 = 120"
3rd floor to stairwell = 5 x 30 = 150"
etc.

Total stair width required:

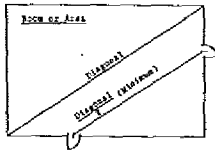
- 5th to 4th - 300 persons (100%) x 30"/100 persons = 90"
- 4th to 3rd - [400 persons (100%) + 300 persons (50%)] 30"/100 persons = 165"
- 3rd to 2nd - [500 persons (100%) + 400 persons (50%) + 300 persons (25%)] 30"/100 persons = 232.5"
- 2nd to 1st - [200 persons (100%) + 500 persons (50%) + 400 persons (25%)] 30"/100 persons = 165" (Use 232.5")
- 1st to exterior - [600 persons (100%) + (200 persons + 100 persons) (50%) + (500 persons + 300 persons) (25%)] 30"/100 persons = 265"
- B₁ to 1st - [100 persons (100%) + 100 persons (50%) + 400 persons (25%)] 30"/100 persons = 165" (Use 150")
- B₂ to B₁ - [300 persons (100%) + 400 persons (50%)] 30"/100 persons = 150"
- B₃ to B₂ - 400 persons (100%) x 30"/100 persons = 120"

Stair width required from B₁ to 1 is 150" as stair cannot decrease in width along path to exit [Ind 51.16 (2) (c)].

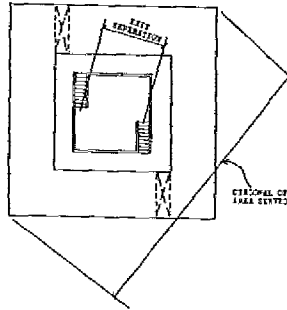
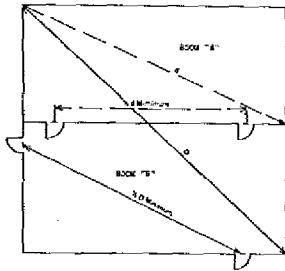
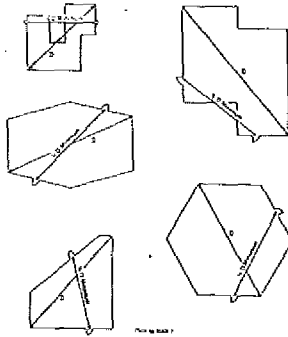
A-51.151 EXIT DISTRIBUTION. The following diagrams are provided to aid building designers in determining proper exit distribution:

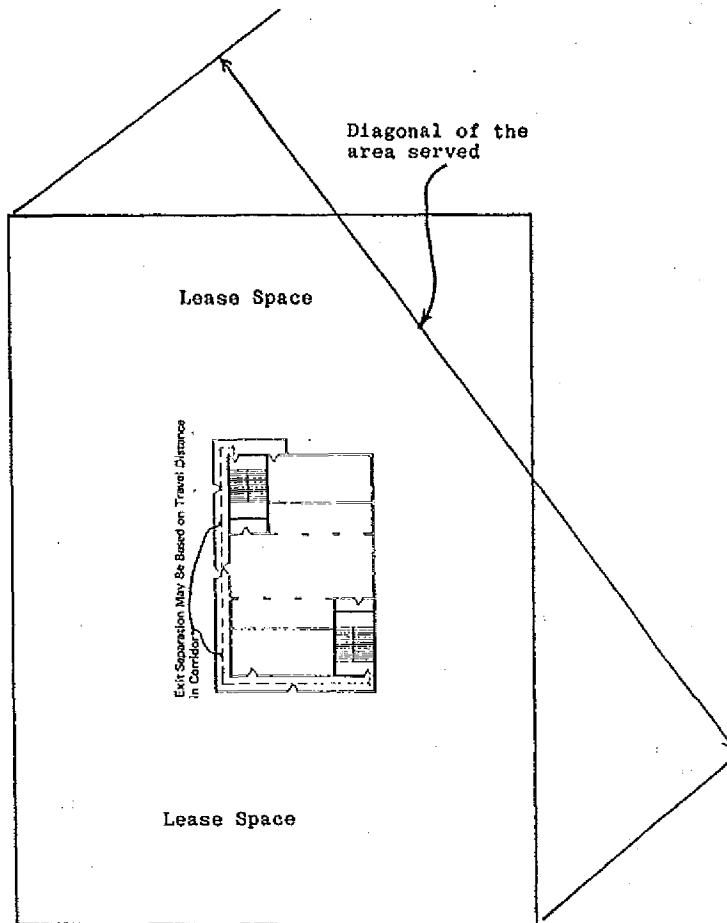
Appendix A

ARRANGEMENT OF SLITS



Minimum Distance = One-half of Slit-length





Appendix A

A-51.22 FIRE EXTINGUISHERS. The following information is taken from the National Fire Protection Association Standard #10-1984 - Portable Fire Extinguishers. The information is provided to assist building designers in determining the number, type and location of fire extinguishers needed to comply with the provisions of the standard.

1-4 Classification and ratings of fire extinguishers.

1-4.1 Portable fire extinguishers are classified for use on certain classes of fires and rated for relative extinguishing effectiveness at a temperature of plus 70°F by testing laboratories. This is based upon the preceding classification of fires and the fire-extinguishment potentials as determined by fire tests.

1-4.2 The classification and rating system described in this standard is that used by Underwriters Laboratories, Inc., and Underwriters Laboratories of Canada and is based on extinguishing preplanned fires of determined size and description as follows:

Class A Rating — Wood and excelsior.

Class B Rating — Two-inch depth n-heptane fires in square pans.

Class C Rating — No fire test. Agent must be a nonconductor of electricity.

Class D Rating — Special tests on specific combustible metal fires.

1-5 CLASSIFICATION OF HAZARDS.

1-5.1 Light (low) hazard. Locations where the total amount of Class A combustible materials, including furnishings, decorations and contents, is of minor quantity. These may include buildings or rooms occupied as offices, classrooms, churches, assembly halls, etc. This classification anticipates that the majority of contents items are either noncombustible or so arranged that a fire is not likely to spread rapidly. Small amounts of Class B flammables used for duplicating machines, art departments, etc., are included provided that they are kept in closed containers and safely stored.

1-5.2 Ordinary (moderate) hazard. Locations where the total amount of Class A combustibles and Class B flammables are present in greater amounts than expected under light (low) hazard occupancies. These occupancies could consist of offices, classrooms, mercantile shops and allied storage, light manufacturing, research operations, auto showrooms, parking garages, workshop or support service areas of light (low) hazard occupancies and warehouses containing Class I or Class II commodities as defined by NFPA 231, Standard for Indoor General Storage.

1-5.3 Extra (high) hazard. Locations where the total amount of Class A combustibles and Class B flammables are present, in storage, production use and/or finished product over and above those expected and classed as ordinary (moderate) hazards. These occupancies could consist of woodworking, vehicle repair, aircraft and boat servicing, individual product display showrooms, product convention center displays, storage and manufacturing processes such as painting, dipping, coating, including flammable liquid handling. Also included is warehousing of, or in-process storage of other than Class I and Class II commodities.

3-2 FIRE EXTINGUISHER SIZE AND PLACEMENT FOR CLASS A HAZARDS.

3-2.1 Minimal sizes of fire extinguishers for the listed grades of hazards shall be provided on the basis of Table 3-2.1 except as modified by 3-2.3. Extinguishers shall be located so that the maximum travel distances shall not exceed those specified in Table 3-2.1, except as modified by 3-2.3.

3-2.1.1 Certain smaller extinguishers which are charged with multipurpose dry chemical or Halon 1211 are rated on Class B and Class C fires, but have insufficient effectiveness to earn the minimum 1-A rating even though they have value in extinguishing smaller Class A fires. They shall not be used to meet the requirements of 3-2.1.

3-2.2 Up to one-half of the complement of extinguishers as specified in Table 3-2.1 may be replaced by uniformly spaced 1½ inch hose stations for use by the occupants of the building. When hose stations are so provided they shall conform to NFPA 14, Installation of Standpipe and Hose Systems. The location of hose stations and the placement of fire extinguishers shall be in such a manner that the hose stations do not replace more than every other extinguisher.

3-2.3 Where the floor area of a building is less than that specified in Table 3-2.1, at least one extinguisher of the minimum size recommended shall be provided.

3-2.4 The protection requirements may be fulfilled with extinguishers of higher rating provided the travel distance to such larger extinguishers shall not exceed 75 feet.

Table 3-2.1

	Light (Low) Hazard Occupancy	Ordinary (Moderate) Hazard Occupancy	Extra (High) Hazard Occupancy
Minimum rated single extinguisher	2-A	2-A	4-A
Maximum floor area per unit of A	3,000 sq. ft.	1,500 sq. ft.	1,000 sq. ft.
Maximum floor area for extinguisher	11,250 sq. ft.	11,250 sq. ft.	11,250 sq. ft.
Maximum travel distance to extinguisher	75 ft.	75 ft.	75 ft.

*Two 2½ gal water type extinguishers can be used to fulfill the requirements of one 4-A rated extinguisher.

A 52.07 (11) ACCEPTANCE OF THE ATRIUM SMOKE CONTROL SYSTEM. The following is a re-print of an approved test procedure:

Acceptance test procedure for the atrium smoke management system.

1. All testing shall be in the presence of a representative from the department.
2. All exhaust and supply-air systems shall be operationally balanced and tested. Complete air-balance reports shall be recorded on each piece of equipment, all exhaust inlets, and all supply outlets.
3. Each automatic initiating device shall be tripped to observe proper function. This test shall be performed on both normal and emergency power.
4. Each manual switch and override shall be tripped to observe proper function. This test shall be performed on both normal and emergency power.
5. All indicator lights shall display the appropriate detection and operating status.
6. Select a location on the first floor approximately 5 ft. outside the perimeter of the atrium opening. The location shall be acceptable to the department's representative.
7. Prepare three two-minute smoke bombs.
8. Ignite all three smoke bombs. When they become fully active, manually activate the atrium smoke-management system.
9. Observe and record the results.
10. After all smoke has been cleared, select an additional location on an upper level acceptable to the department's representative.
11. Prepare three more two-minute smoke bombs.
12. Ignite all three smoke bombs. When they become fully activated, again manually activate the atrium smoke-management system.
13. Observe and record the results.
14. Acceptable performance shall be movement of the smoke from the source into the atrium and out through exhaust at the top of the atrium. Smoke migration down the corridors shall be limited to no more than a light haze at a point 25 ft from the source. Furthermore, the balconies around the perimeter of the atrium shall maintain a smoke-free zone.
15. Upon the successful completion of these tests, a signed and dated copy of the department's acceptance shall be filed with the test records and a copy shall be maintained with the quarterly test log.
16. A copy of this acceptance test procedure and all plans, specifications, and calculations for the building shall be maintained with the quarterly test log.

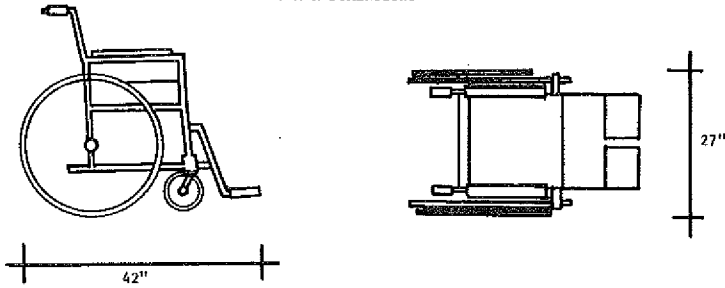
Appendix A

A52.015 FIRE CLASSIFICATIONS. The following information is provided to assist building owners and designers in determining the fire classifications of typical building usage or occupancy:

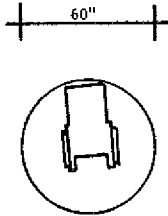
FIRE CLASSIFICATION	DESCRIPTION OF FUEL LOAD	TYPICAL EXAMPLES
Low Hazard	Buildings or structures used for the manufacture or storage of noncombustible or low hazard materials, that do not ordinarily burn rapidly, such as but not limited to asbestos, chalk, non-alcoholic beverages, brick and masonry, ceramic products, gypsum, food products, glass and metals.	Metal fabricating and assembly; offices; foundries; water pumping and waste water treatment plants; schoolrooms; churches; assembly halls; telephone exchanges; and similar occupancies with slight combustibles.
Moderate Hazard	Buildings and structures used for the manufacture or storage of moderate hazard materials, which are likely to burn with moderate rapidity, but which do not produce either poisonous gases, fumes or explosives, such as but not limited to: cloth, burlap and paper bags; bamboo and rattan; canvas and leather belting; baskets; books and paper in rolls or packs; boots and shoes; buttons; cardboard and cardboard boxes; clothing; cordage; furniture; furs; glue, mucilage, paste and size; linoleum; silk; soap; sugar; tobacco, cigars, cigarettes and snuff; and wax candles.	Mercantile storage and display; auto showrooms; aircraft storage; light manufacturing; warehouses not classified as low or high hazard; school shop areas; leather enameling or japanning operations; livestock shelters; lumber yards; motor vehicle repair shops; petroleum warehouses for storage of lubricating oils with a flash point of 200°F. or higher; photo engraving operations; public garages; stables; and upholstering and mattress manufacturing.
High Hazard	Buildings and structures used for the storage, manufacture or processing of; highly combustible or explosive products or materials, which are likely to burn with extreme rapidity or which may produce poisonous fumes or explosions; highly corrosive, toxic or noxious alkalies, acids or other liquids or chemicals producing flame, fumes, poisonous, irritant or corrosive gases; materials producing explosive mixtures or dusts or which result in the division of matter into fine particles subject to spontaneous ignition.	Woodworking; aircraft servicing; warehouses with material piled 15 feet or higher in solid piles or 12 feet or higher in piles with horizontal channels; ammunition, explosive and firework manufacture; artificial flowers and synthetic leather manufacture; acetylene gas and gases under pressure of 15 pounds or more and in quantities of greater than 2500 cubic feet; celluloid and celluloid products; cereal; feed, flour and grist mills; cotton baiting and waste processes; cotton apparel making; dry cleaning establishments using or storing more than 3 gallons of gasoline or flammable liquids with a flash point under 100°F. or more than 60 gallons of flammable liquids with a flash point between 100°F. and 140°F.; feather renovating; fruit ripening processes; grain elevators; hydrogenation processes; industries employing solids or substances which ignite or produce flammable gases on contact with water; storage of kerosene, fuel, lubricating oils and combustible liquids with a flash point under 200°F.; match manufacture and storage; metal enameling and japanning; nitrocellulose film exchanges and laboratories; paint and varnish manufacture; petroleum manufacture; processing of paper or cardboard in loose form; pyroxylin product storage and manufacture; and smoke houses.

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

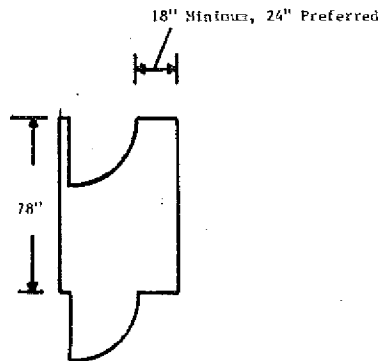


TURNING SPACE



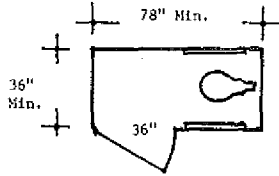
180-360° Turn

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 78 inches.

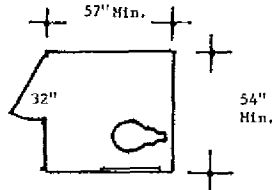
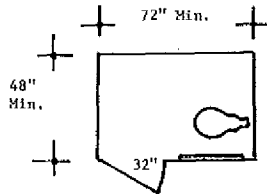
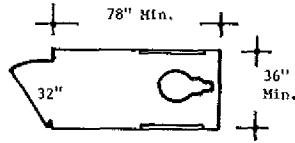
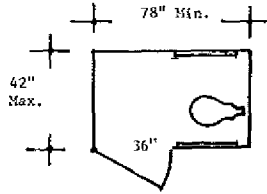
EXAMPLES OF ACCESSIBLE TOILET COMPARTMENTS
AS SPECIFIED IN TABLE 62.04-A



Recommended Fixtures:

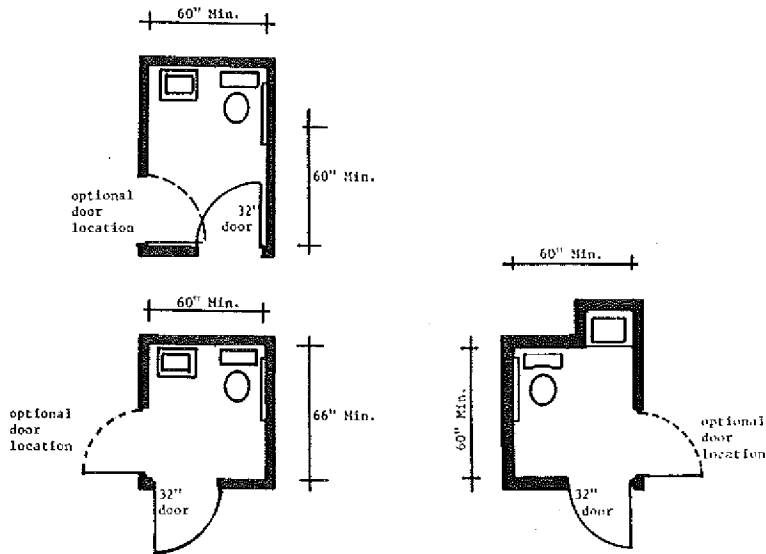
1. Elongated bowl;
2. Wall mounted.

Note: These are examples of toilet room compartments which are located within accessible toilet rooms.



The door of the 54" 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



Note #1: These examples of accessible toilet rooms may be used in health care facilities in that sufficient room for the attendant is provided.

Note #2: These examples may be modified by substituting pocket sliding doors for the swing doors shown in the examples. Surface-mounted hardware is recommended for pocket sliding doors.

Appendix A

A-52.04 (3) (a) **SITE REQUIREMENTS — PARKING SPACE IDENTIFICATION.** The following is a reprint of Wisconsin Department of Transportation's administrative rule, s. Trans 200.07, dealing with the signage for parking spaces designated for the physically disabled:

Trans 200.07 Handicapped parking signs. (1) **PURPOSE.** The purpose of this section is to define and illustrate the design, size and installation requirements of the official traffic signs required under s. 348.503 (1), Stats., related to reserved parking spaces for handicapped persons.

(2) **SIGN DESCRIPTION.** (a) The sign shall consist of a white rectangle with longer dimension vertical, having green message, a green arrow, if required under this section, and a blue and white international symbol for the barrier-free environments. The sign may be reflective or nonreflective.

(b) The sign shall include the words "reserved parking" and the words "vehicles with VET or DIS plates or state disabled card" or other words with a similar meaning.

(c) The size of the sign shall be not less than 12 inches by 18 inches. When used on a highway with a speed limit of more than 35 miles per hour, it shall be not less than 18 inches by 24 inches.

(d) A right arrow, left arrow or the words "This Stall" or similar wording shall be included near the bottom of the sign.

(3) **SIGN PLACEMENT.** Each sign shall be erected on an adequate support. On highways, the vertical distance from roadway to the bottom of a sign shall be not less than 7 feet, except when overhead obstructions necessitate a lower height. In off-highway parking lots, the vertical distance from the parking lot surface, or top of curb if any, to the bottom of a sign shall be not less than 4 feet. A single sign with the message "This Space" or similar wording shall be used to designate a single reserved space. At least 2 signs are required for multiple reserved spaces. When 2 signs are used they shall be located at the outermost limits of the spaces reserved and, by arrow, designate the location of the reserved spaces.

(a) A sign shall be located at the end of an angled or right-angled space and shall be set to face a motorist entering the space.

(b) When the reserved space is parallel to the edge of a roadway, a sign shall be set at an angle of approximately 30° degrees with the line of traffic.

(4) Signs which are in place prior to the effective date of this section may remain in place and have the same effect as the signs described herein for 5 years after the effective date of this chapter provided that they include the international symbol for barrier-free environments and the wording required under (2) (b) either as part of the original sign or on a supplementary placque or placques. The requirements under (3) do not apply to these signs.

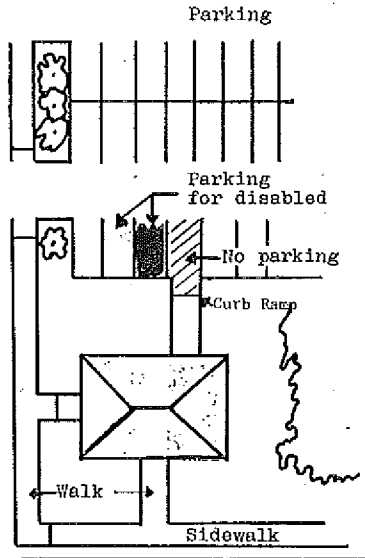
(5) **ENFORCEMENT.** The provisions of this rule shall be enforced by order of the department. District transportation directors shall be responsible for the issuance of all orders regarding noncompliance.

A-52.04 (3) (b) **SITE REQUIREMENTS — CURB RAMPS.** The following is a reprint of s. 66.616 (3) (a), Stats., dealing with the design and construction of curb ramps:

(a) Curb ramping shall be of permanent construction. The ramp shall be at least 40 inches wide. The sides of the ramp shall slope from the sidewalk or apron elevations to the ramp elevation with the widest portion of the side slope not less than 18 inches nor more than 24 inches wide at the curb. The ramp slope may not exceed one inch vertical to 12 inches horizontal from the flow line elevation of the curb. The curb opening shall be not less than 40 inches nor more than 80 inches wide at the flow line of the curb. The taper of the curb from the top of the curb to the flow line of the curb at the curb opening shall be not less than 18 inches nor more than 24 inches wide. The ramp shall be bordered on both sides and on the curb line with a 4-inch-wide yellow stripe or with brick of a contrasting color.

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 422-1
Appendix A

A-52.04 (3) (a) Parking spaces. Where parking spaces are provided, accessible parking spaces, at least 12 feet wide, shall be provided and designated as specified in Table 52.04-A. Access ramps or curb ramps shall not be located in the accessible parking space or any other parking space.

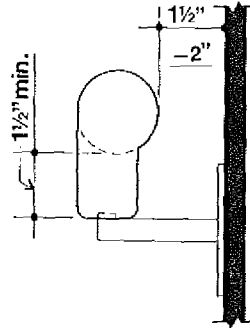


EXAMPLES OF GRASPABLE HANDRAILS

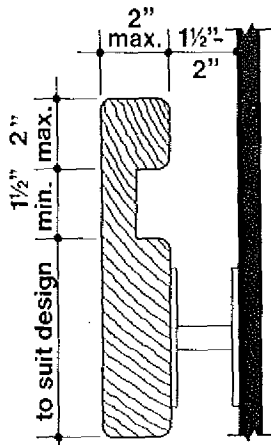
A-52.04 (3) (d) 3, and
(7) (c)

The handgrip portion of the handrail, if round, shall be not less than 1-1/4 in. nor more than 2 in. in diameter. If the shape of the handrail is not round, then the larger dimension shall be not more than 2 in.

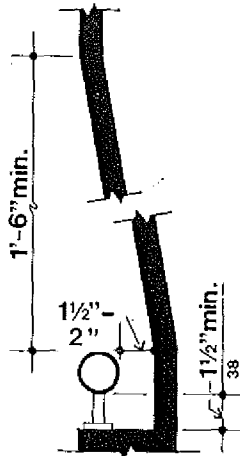
If handrails are mounted adjacent to walls or other surfaces, provide a 1-1/2 in. - 2 in. clear space between the surface and the handrail. The handrail and the surfaces adjacent to the handrail shall be free of any sharp or abrasive elements.



handrail



handrail



handrail

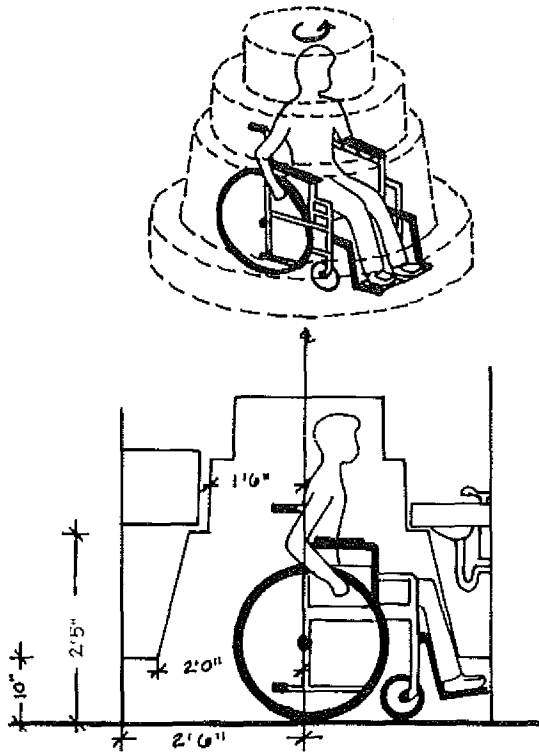
DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 423
Appendix A

A-52.04 (4) (b) LIFTS FOR THE PHYSICALLY DISABLED. Information for lifting devices for the physically disabled and procedures for approval may be obtained from the Division of Safety and Buildings, Bureau of Technical Services, Elevator Section, P.O. Box 7969, Madison, Wisconsin 53707.

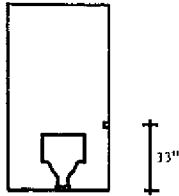
Appendix A

ILHR 52.04 (8) TOILET FACILITY DETAILS. (a) *Accessible toilet rooms and compartments.* Accessible toilet rooms and toilet compartments shall be sized to provide ease of access, usability and uninterrupted mobility. Fixtures, doors and other obstructions shall be arranged to insure accessibility.

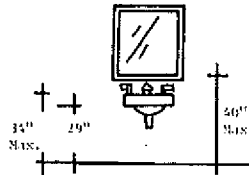
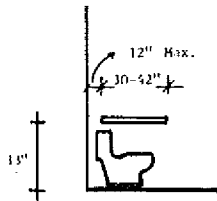
The space underneath lavatories can be utilized in sizing a toilet room for accessibility.



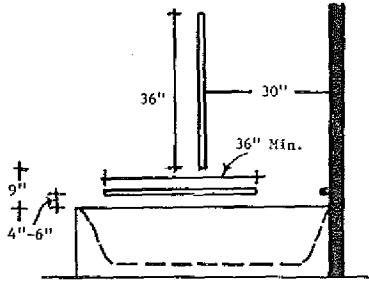
ACCESSIBLE TOILET ROOMS



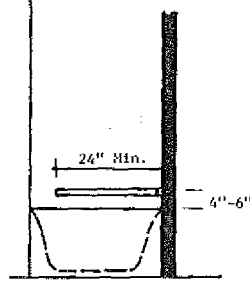
It is recommended that grab bars be from 30 to 42 inches in length and located no more than 12 inches from the back wall.



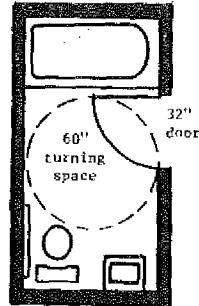
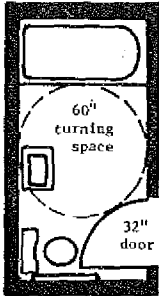
ACCESSIBLE BATHING FACILITIES



Side Elevation - Bathtub

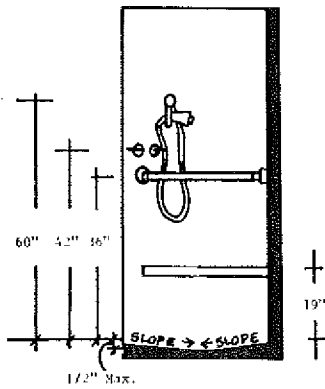


End Elevation - Bathtub

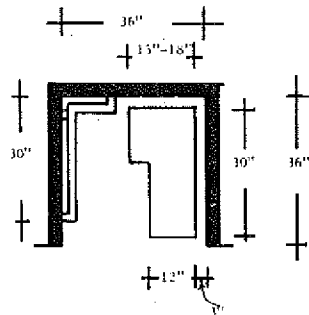


These diagrams are examples of accessible bathrooms which may be used for motels, hotels, hospitals and nursing homes.

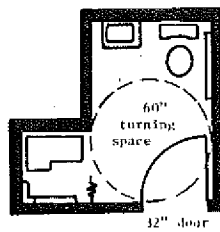
ACCESSIBLE BATHING FACILITIES



Section View - Shower

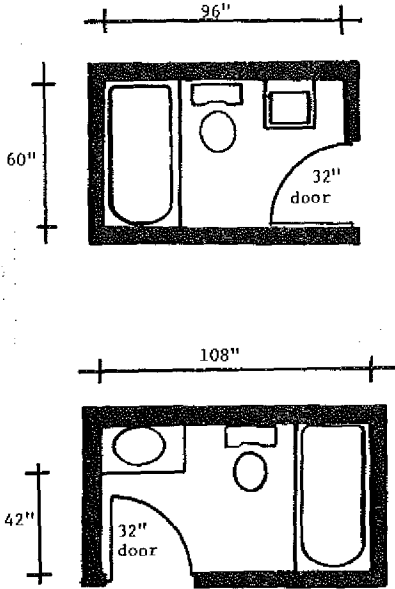


Plan View - Shower



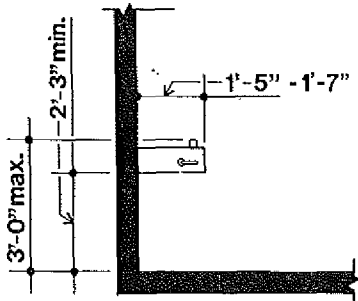
Appendix A

EXAMPLES OF ADAPTABLE BATHROOM LAYOUTS
FOR RESIDENTIAL LIVING UNITS
(not including hotels and motels)



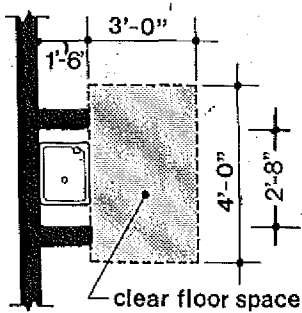
These examples may be modified for accessibility by using outward swinging doors or pocket sliding doors.

EXAMPLES OF ACCESSIBLE WATER COOLERS



A-52.04 (11) (a) 4.a.
Wall and postmounted cantilevered units shall have a clear knee space between the bottom of the apron and the floor or ground at least 27 inches high, 32 inches wide, and 17 inches to 19 inches deep.

cantilevered
drinking fountain



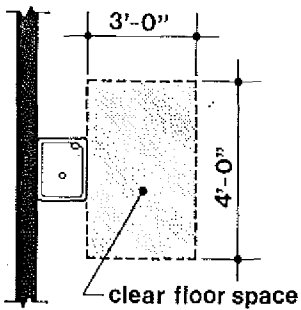
A-52.04 (11) (a) 5.
'Alcoves'. Water fountains and water coolers shall be located completely within alcoves, or positioned so as not to encroach into pedestrian walkways. Alcoves shall be not less than 32 inches in width and 18 inches in depth.

built in
drinking fountain

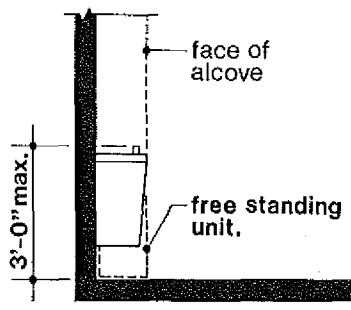
EXAMPLES OF ACCESSIBLE WATER COOLERS

A-52.04 (11) (a) 4.b.

Free-standing or built-in units not having a clear space under them shall have a clear floor space at least 36 inches by 48 inches that allows a person in a wheelchair to make a parallel.



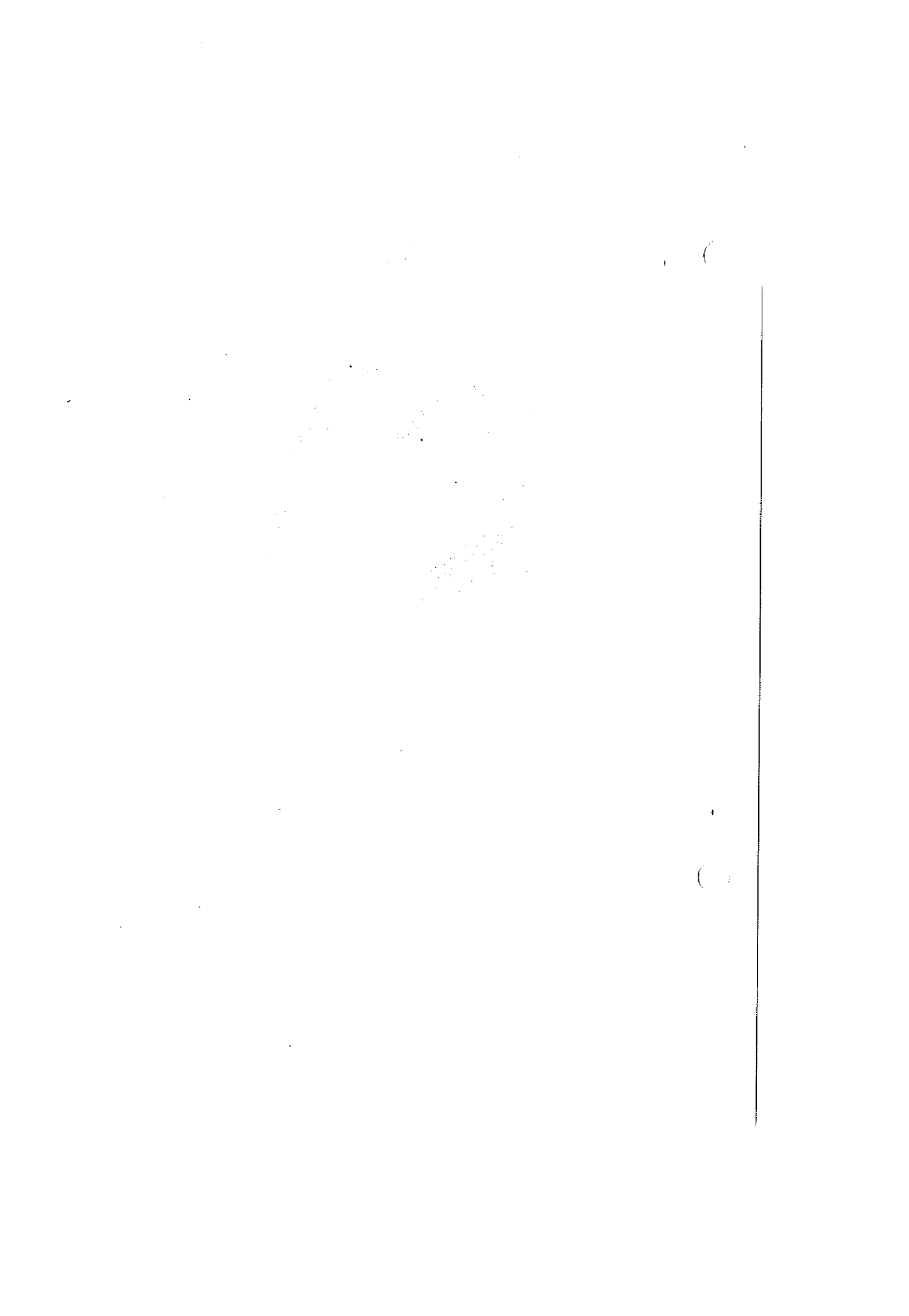
**free standing
or wall hung**
drinking fountain



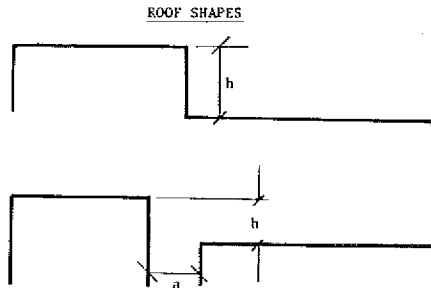
**free standing
or wall hung**
drinking fountain



INTERNATIONAL SYMBOL FOR BARRIER-FREE ENVIRONMENTS

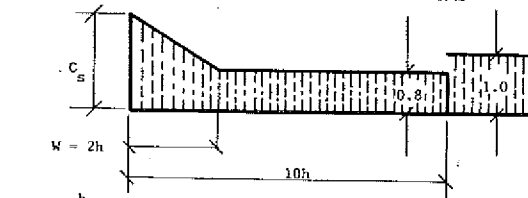


A-53.11 (4) (c) *Increase in roof loads.* The following design provisions may be used to determine the increase in roof loads as required by this section.



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

SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS, LIMITATIONS



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

when $15 \frac{h}{g} < 1.0$ use $C_s = 1.0$

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

$$W = 2h$$

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

h = difference of roof heights in ft.

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

w = width of drift from higher building in ft.

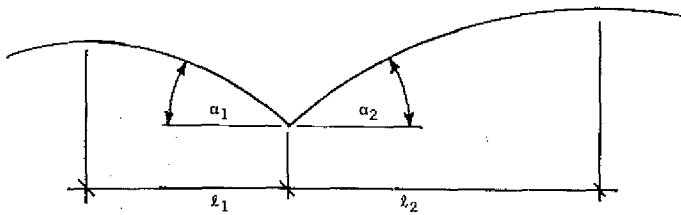
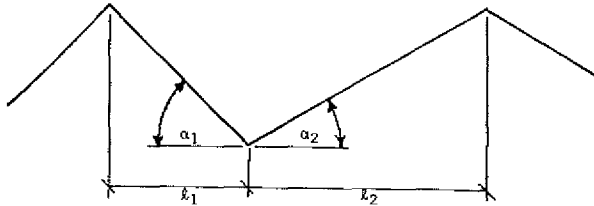
a = distance between buildings < 15 ft.

Design upper roof for loads applicable to single-level roofs.

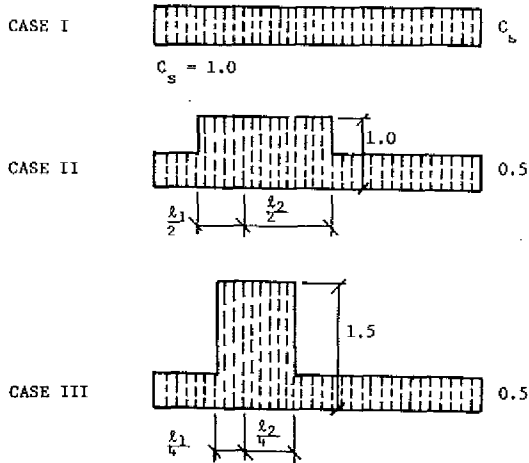
*An upper limit of 3 times the basic roof load has been suggested. It should be noted, however, that higher loads have been observed where an upper roof was very long (measured perpendicularly to the step between the upper and lower roofs). On the other hand, for relatively short upper roofs (say less than 50 ft), a reduction below the calculated C_s value may be judged adequate by the designer.

ROOF SHAPES

Valley areas of two-span and multi-span sloped or curved roofs

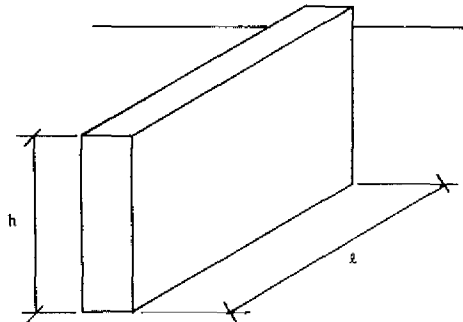


SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS, LIMITATIONS



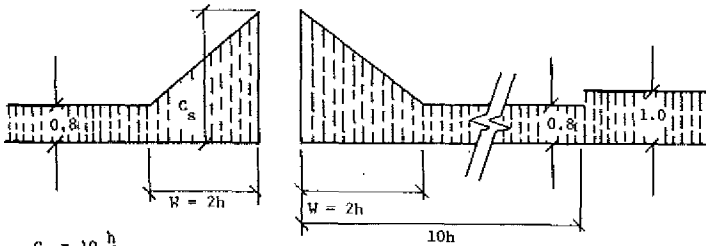
For both α_1 and $\alpha_2 \leq 10^\circ$ use Case I only; otherwise use Case I, II and III

ROOF SHAPES



Roof areas adjacent to projections and obstructions on roofs

SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS, LIMITATIONS



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

when $10 \frac{h}{g} < 1.0$ use $C_s = 1.0$

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

when $l < \frac{g}{6}$ use $C_s = 1.0$

$$W = 2 h$$

when $h < 5$ ft use $W = 10$

when $h > 15$ ft use $W = 30$

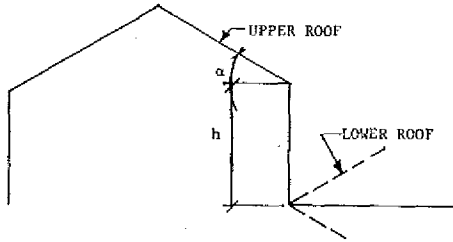
h = height of projection in ft.

g = roof live load in psf

w = width of snow drift in ft.

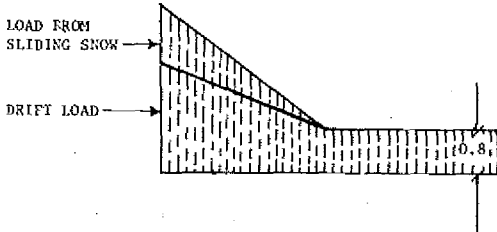
l = length of projection in ft.

ROOF SHAPES



Lower of multi-level roofs with upper roof sloped towards lower roof, where α exceeds 10° .

SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS, LIMITATIONS



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

Design upper roof for loads applicable to single-level roofs.

*Where snow is likely to slide onto a lower roof from an upper roof, the lower roof should be designed for the load as provided for multi-level roofs plus an additional load produced by the snow that may slide from the upper roof. It is not possible to provide coefficients for this situation, but the following guide is recommended. Because of the remote probability that both upper and lower roofs will have their full load over the full areas simultaneously when sliding occurs, it may be assumed that the lower roof would be carrying its full load and that sliding of 50% of the total weight of the applicable uniformly distributed snow load from the upper roof would occur.

A-53.11 (4) (d) *Roof Designed for Control Flow Drainage.* This section refers to the requirements of the Plumbing Code (ch. ILHR 82) for storm drain sizes where control flow drainage roof design is used. The following information from the plumbing code is provided for use by the building designer:

Partial Reprint of s. ILHR 82.36 (4) and (5)

(4) **LOAD ON DRAIN PIPING.** (a) *Storm water drainage.* The load factor on storm water drain piping shall be computed in terms of gallons per minute or on the square footage of the horizontal projection of roofs, paved areas, yards and other tributary areas.

(b) *Continuous flow devices.* Where there is a continuous or semicontinuous discharge into the storm building drain or storm building sewer, as from a pump, air conditioning unit, or similar device, each gallon per minute of such discharge shall be computed as being equivalent to 26 square feet of roof area.

(5) **SELECTING SIZE OF STORM AND CLEAR WATER DRAIN PIPING.** (a) *Horizontal storm water drain piping.* The pipe size for horizontal drain piping for storm water shall be determined from Tables 82.36-1 to 82.36-4.

Table 82.36-1

MINIMUM SIZE OF STORM WATER HORIZONTAL DRAIN PIPING SERVING ROOF AREAS

Pipe Diameters (in inches)	Maximum Roof Areas (in square feet)			
	Pitch of Piping Per Foot			
	1/16 inch	1/8 inch	1/4 inch	1/2 inch
3	650	910	1,300	1,820
4	1,300	1,950	2,990	3,770
5	2,470	3,640	5,070	7,020
6	4,160	5,980	8,320	11,700
8	9,320	13,000	18,200	26,000
10	17,680	24,700	33,800	50,440
12	27,300	41,080	57,200	81,900
15	52,000	72,800	105,300	146,640
18	85,800	121,550	174,200	247,000
21	156,520	179,660	256,880	374,400
24	187,200	261,560	382,200	546,000

Note: Divide square footage by 26 to obtain flow in gpm.

Table 82.36-4

**MAXIMUM CAPACITY OF STORM WATER
HORIZONTAL DRAIN PIPING FLOWING FULL**

Pipe Diameters (in inches)	Maximum Capacities in Gallons Per Minute			
	Pitch of Piping Per Foot			
	1/16 inch	1/8 inch	1/4 inch	1/2 inch
3	25	35	50	70
4	50	75	115	145
5	97	140	195	270
6	160	230	320	450
8	355	500	700	1,000
10	680	950	1,300	1,940
12	1,050	1,580	2,200	3,150
15	2,000	2,800	4,050	5,640
18	3,300	4,675	6,700	9,500
21	6,020	8,910	12,800	18,400
24	7,200	10,060	14,700	21,000

(b) *Vertical conductors for storm water.* 1. A vertical conductor for storm water shall not be smaller than the largest horizontal branch connected thereto.

2. Vertical conductors shall be sized in accordance with Table 82.36-5 or the diameter D, where

$$D = 1.128 \sqrt{\frac{A}{X}}$$

Where,

A = the area of the roof in square feet

X = 300 square feet per square inch for a roof covered with gravel or slag and with a pitch not exceeding 1/4 inch per foot; or

= 250 square feet per square inch for a roof covered with gravel or slag and with a pitch of greater than 1/4 inch per foot; or

= 200 square feet per square inch for a roof with a metal, tile, brick or slate covering and of any pitch.

Table 82.30-5

MINIMUM DIAMETER OF VERTICAL CONDUCTORS

Type of Roof	Maximum Roof Areas (in square feet)					
	Pipe Diameters (in inches)					
	2½	3	4	5	6	8
Roofs covered with gravel, slag, or similar material and with a pitch of ¼" per foot or less.	1,645	2,120	3,780	5,885	8,490	15,125
Roofs covered with gravel, slag or similar material and with a pitch greater than ¼" per foot.	1,220	1,770	3,150	4,905	7,075	12,600
Roofs covered with metal, tile, brick, slate or similar material and of any pitch.	975	1,415	2,520	3,925	5,660	10,080

Note: Divide square footage by 26 to obtain flow in gpm.

A-53.15 LOAD COMBINATIONS. It is the intent of this section that the loads specified in ss. ILHR 53.10 through 53.14 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.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that this is essential for ensuring transparency and accountability in the organization's operations.

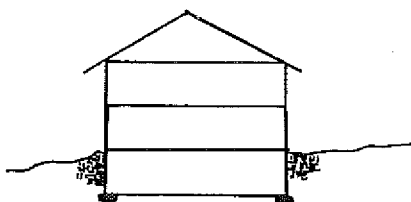
2. The second part of the document outlines the various methods and tools used to collect and analyze data. It highlights the need for consistent data collection procedures and the use of advanced analytical techniques to derive meaningful insights from the data.

3. The third part of the document focuses on the role of technology in data management and analysis. It discusses how modern software solutions can streamline data collection, storage, and processing, thereby improving efficiency and accuracy.

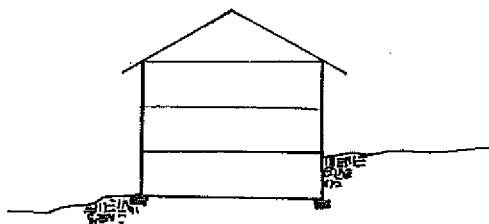
4. The fourth part of the document addresses the challenges associated with data management, such as data quality, security, and privacy. It provides strategies to mitigate these risks and ensure that the data remains reliable and secure throughout its lifecycle.

5. The fifth part of the document concludes by summarizing the key findings and recommendations. It stresses the importance of a data-driven approach in decision-making and the need for continuous monitoring and improvement of data management practices.

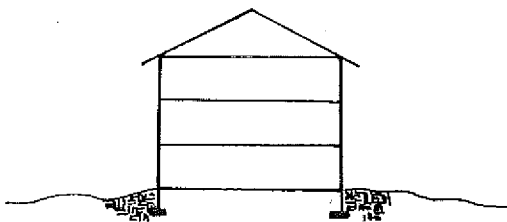
A-53.64 WOOD FOUNDATIONS. The following illustrations are provided to give visual aid to the limitations specified in this rule and to indicate the three typical designs permitted by the rule.



Two-story with full basement



Two-story with ground floor



Three-story with wood foundation
(No basement or crawl space)

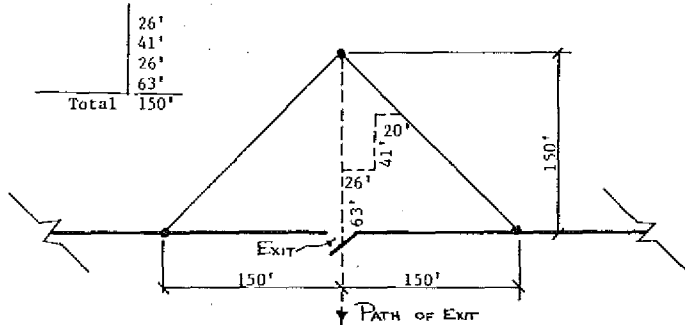
Appendix A

A-54.02 (4). EXIT DISTANCE. The following illustrations and text are provided to explain the procedure and intent of using the triangulation method of exit distance determination.

Exit travel must terminate at one of the following types of exits:

1. Standard exit to grade (Ind 51.15)
2. Enclosed stairways (Ind 51.17 and 51.18)
3. Horizontal exits (Ind 51.19)
4. Fire escapes (Ind 51.20)

Therefore, exit distance must be measured from one of these exit types. All exits must lead to a street, alley or open court which is connected to a street or alley.



Procedure:

1. Beginning at designated exit type, measure required exit distance (100 feet, for example) at right angles to and parallel with (on both sides) the exit.
2. Connect end points to form the "exit triangle."
3. All areas within the triangle are within the required exit distance when traveling toward or at right angles to the exit.
4. All the interior space of a building must fall within the "exit triangles" formed by using the required exits for the building.
5. When measuring exit distance in stairways, only the horizontal travel distance is included in the determination.

A-57.02 (2) (b) VERTICAL DIVISION WALLS. See drawings and illustrations in s. A 51.03 (5) (a) for typical floor/ceiling-wall connection details for vertical division walls. Disregard masonry components shown in drawings when masonry is not used in the construction of the vertical division wall.

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 439

Appendix A

A-57.07 (3) CHANGES OF ELEVATION WITHIN INDIVIDUAL LIVING UNITS. Section ILHR 57.07 (3) permits the steps, stairs and ramps within individual living units to conform with s. ILHR 21.04 of the Uniform Dwelling Code. The following is a reprint of the applicable portions of that section:

ILHR 21.04 Stairs. Every exterior or interior stairs shall conform to the requirements of this section.

(1) **LANDINGS.** (a) *Intermediate landings.* Intermediate landings located in a flight of stairs shall be at least as wide as the stairs and shall measure at least 3 feet in the direction of travel. Trim and handrails may project no more than 3/4 inches into the required width.

(b) *Landings at the top and base of stairs.* A level landing shall be provided at the top and at the foot of every stairs. The landing shall be at least as wide as the stairs and shall measure at least 3 feet in the direction of travel.

(c) *Doors at landings.* Where a door is provided at the head or foot of a stairs, a level landing on each side of the door shall be provided between the door and the stairs, regardless of the door swing.

1. **Exception.** A landing shall not be required between the door and the head of interior stairs within a dwelling unit, provided the door does not swing over the stairs.

2. **Exception.** A storm door or screen door shall be permitted to swing over an exterior platform or sidewalk provided the platform or sidewalk is located not more than 8 1/4 inches below the door sill and provided the platform has a length at least equal to the width of the door.

(2) **HANDRAILS AND GUARDRAILS.** (a) *Handrails.* Every stairs of more than 3 risers shall be provided with at least one handrail. Handrails shall be provided on all open sides of stairways.

(b) *Guardrails.* All openings between floors, open sides of landings, platforms, balconies or porches which are more than 24 inches above grade or a floor, shall be protected with guardrails.

(c) *Handrail and guardrail details.* 1. **Height.** Handrails shall be located at least 30 inches, but not more than 34 inches, above the nosing of the treads. Guardrails shall be located at least 36 inches above the upper surface of the floor.

2. **Open railings.** Open guardrails or handrails shall be provided with intermediate rails or an ornamental pattern to prevent the passage of a sphere with a diameter larger than 9 inches.

3. **Clearance.** The clearance between the handrail and the wall surface shall be at least 1 1/2 inches.

4. **Loading.** Handrails and guardrails shall be designed and constructed to withstand a 200 pound load applied in any direction.

5. **Exterior rails.** Exterior handrails and guardrails shall be constructed of metal, decay resistant or pressure treated wood or shall be protected from the weather.

(3) **STAIR DETAILS.** Stairs shall meet the following requirements:

(a) *Minimum width.* Every stairs shall measure at least 3 feet in width.

(b) *Headroom.* Every stairs shall be provided with a minimum headroom clearance of 6 feet 4 inches. The minimum clearance shall be measured vertically from a line parallel to the nosing of the treads to the ceiling or soffit directly above that line.

(3) **TREADS AND RISERS.** Risers shall not exceed 8 inches in height, measured vertically from tread to tread. Treads shall be at least 9 inches wide, measured horizontally from nosing to nosing. There shall be no variation in uniformity exceeding 3/16 inch in the width of tread or in the height of risers. No flight of stairs shall exceed 12 feet in height unless landings are provided.

(d) *Winders.* Winder steps may be used in stairs where the length of the tread is at least 3 feet and the winder tread measures at least 7 inches in width from nosing to nosing at a point one foot from the narrow end of the tread.

(e) *Spiral stairs.* Spiral stairs may be used as an exit stairs. The tread shall measure at least 26 inches from the outer edge of the supporting column to the inner edge of the handrail and at least 7 inches in width from nosing to nosing at a point one foot from the narrow end of the tread.

A-57.11 The intent of this section is to apply to floor levels not more than one story below grade (at building).

Appendix A

A-57.11 (1) (f) 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-59.14 (2) (c) *Exit distance.* See the information and illustration contained in A-54.02 (4).

A-60.19 (4) The standard is available from the National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269.

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 from and return to their vehicles.

A-62.50 **FIRE EXTINGUISHERS.** See A-51.22 for related information

A-63.41 **FORM.** Copies of the following form (SBD 5315) are available from the Division of Safety and Buildings, P.O. Box 7969, Madison, Wisconsin 53707. This form may be used to verify compliance with the illumination requirements of this section.

NOTES AND INSTRUCTIONS

1. Fixture schedules must accompany this form, or be shown on the plans, or in the specifications. If this form is used in lieu of illumination plans, four copies of the form shall be submitted.
2. A completed SR-118, *Plans Approval Application Form*, must accompany these calculations if they are submitted separately from the building plans.
3. The first sheet of this form must be signed and sealed by a Wisconsin registered architect, engineer or electrical designer if the total building volume is greater than 60,000 cubic feet.
4. All electric discharge lighting must meet the minimum power factor requirements of Ind 63.40.
5. Use of form:
 - A. Calculations are on an individual room or area basis.
 - B. Enter room or area designation in column (1). This shall correspond to the designations shown on the building plans.
 - C. Calculate the floor area, in Sq. Ft., of the room. Enter area in column (2).
 - D. Determine the allowable Watts per Sq. Ft. from Ind 63.41. Enter this value in column (3).
 - E. Multiply value in column (2) by value in column (3). Enter product in column (4).
 - F. Enter fixture type(s) from fixture schedule in column (5).
 - G. Enter number of fixtures of each type, located in the room or area, in column (6).
 - H. Enter the wattage for one fixture of that type in column (7).
 - I. Multiply value in column (6) by value in column (7). Enter product in column (8).
 - J. Total columns (4) and (8), entering sheet totals at the bottom of each sheet, and the total of all sheets at the bottom of the final sheet.
 - K. Column (8) building total must be less than, or equal to, the building total in column (4).

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

- (1) 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; and
 - (v) GAS-FIRED INFRARED HEATERS, ANSI Z83.6.
- (2) Canadian Standards Association, Certification Division, Rexdale, Ontario Canada, M9W 1R3;
 - (a) Solid-Fuel Fired Appliances for Residential Use, CSAB 866M.
- (3) Energy Testing Laboratory of Maine, South Maine Vocational Technical Institute, South Portland, Maine 04106.
 - (a) Testing for Safety—Requirements and Test Procedures for Solid-Fuel Burning Central Heating Appliances and Combination Oil- and Solid-Fuel Burning Central Heating Appliances, EFLM Standard #78-1.
- (4) International Conference of Building Officials, Inc., 5360 South Workman Mill Road, Whittier, California 90601:
 - (a) Research Committee Acceptance Criteria for Fireplace Heat Exchangers.
- (5) Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago, Illinois 60611:
 - (a) CHIMNEYS, FACTORY-BUILT, RESIDENTIAL TYPE AND BUILDING HEATING APPLIANCES, UL 103;
 - (b) FACTORY BUILT FIREPLACES, UL 127;
 - (c) OIL BURNERS, UL 296;
 - (d) CONTROLS, PRIMARY SAFETY FOR GAS- AND OIL-FIRED APPLIANCES, UL 372;
 - (e) SOLID-FUEL FIRED CENTRAL FURNACES, UL 391;
 - (f) GAS VENTS, UL 441;
 - (g) HEATING APPLIANCES, ELECTRIC, UL 499;
 - (h) HEAT PUMPS, UL 559;
 - (i) TYPE L LOW-TEMPERATURE VENTING SYSTEMS, UL 641;
 - (j) OIL-FIRED BOILER ASSEMBLIES, UL 726;
 - (k) OIL-FIRED CENTRAL FURNACES, UL 727;
 - (l) OIL-FIRED FLOOR FURNACES, UL 729;
 - (m) OIL-FIRED WALL FURNACES, UL 730;
 - (n) OIL-FIRED UNIT HEATERS, UL 731;
 - (o) HEATERS, AIR AND DIRECT-FIRED HEATERS, OIL-FIRED, UL 733;
 - (p) FIREPLACE STOVES, UL 737;

Appendix A

- (q) COMMERCIAL-INDUSTRIAL GAS HEATING EQUIPMENT (Inputs over 400,000 Btu/hour), UL 795;
- (r) 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;
- (s) ELECTRIC BOILERS, UL 834;
- (t) HEATERS, ELECTRIC DRY BATH, UL 875;
- (u) FAN COIL UNITS AND ROOM FAN HEATER UNITS, UL 883;
- (v) OIL-BURNING STOVES, UL 896;
- (w) HEATERS, ELECTRIC AIR, UL 1025;
- (x) HEATING EQUIPMENT, ELECTRIC BASEBOARD, UL 1042;
- (y) HEATING EQUIPMENT, ELECTRIC CENTRAL AIR, UL 1096; and
- (z) ROOM HEATERS, SOLID-FUEL TYPE, UL 1482.

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				ATM Draft
	3 GPH	7 GPH	20 GPH	Over 20 GPH	Mechanical Draft Burners				
	400,000 Btu or less	1 million Btu or less	3 million Btu or less	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	
Purge timing	--	--	--	--	4	4	4	4	90 sec ³
Air changes	--	--	--	--	4	4	4	4	--
Interlock Controls (Recycle)	Yes ⁸	Yes ⁸	Yes ⁸	Yes ⁸	Yes	Yes	Yes	Yes	Yes
Proven combustion air	--	--	--	--	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 ¹⁹	Optional ¹⁹	Optional ¹⁹	--	Optional	Optional	Optional	Optional	12
Pilot - Interrupted	--	--	--	Yes ⁵	Optional	Optional ²	Optional ²	Optional ²	2, 10
Direct spark ignition	Yes	Yes	Yes	--	--	--	--	--	--
System & sequence approved safety control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Approved safety shutoff valves (SSOV)	IN	BURNER	DESIGN	--	Yes ¹⁴	Yes ¹⁴	Yes ¹⁴	Yes ¹⁴	Yes ^{13, 14}
No vent valve	--	--	--	--	--	--	--	--	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 ^{15, 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.

Register, August, 1985, No. 356

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

SSOV = Safety shutoff valve.

- ¹May relight if ignition is re-energized within 0.8 sec. See 15 and 16.
- ²Where 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.
- ³Without shutters, no prepurge required.
- ⁴Options (whichever is chosen, a minimum of 4 air changes must be provided): 30 sec at high fire rate; OR
60 sec at $\frac{1}{2}$ high fire rate; OR
90 sec at $\frac{1}{3}$ high fire rate.
- ⁵With 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.
- ⁶Lockout on interrupted pilot applications; recycle on intermittent pilot applications.
- ⁷10 sec for distillate fuel (No. 1 or No. 2); 30 sec for residual fuel (No. 4, 5, 6).
- ⁸Conventional type pressure burner—none needed. Needed for applications with combustion air supply separate from oil supply.
- ⁹Valve seal overtravel switch can be wired into either the start circuit or pre-ignition interlock circuit (if provided).
- ¹⁰Interrupted pilot over 2.5 million Btuh if modulating or high/low firing rate. Otherwise over 5 million Btuh.
- ¹¹If low fire start is not proved, UL will test for smooth lightoff at high fire.
- ¹²Intermittent up to 5 million Btuh unless firing rate control is over 2,500,000 Btuh.
- ¹³Requirements same as mechanical draft burners.
- ¹⁴See Table 1 at end of footnotes for main gas valves.
- ¹⁵Up 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.
- ¹⁶Up 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.
- ¹⁷If proved pilot igniter is used, timings for over 20 gal flame safeguard control may be applied.
- ¹⁸Required for electrically ignited, gas-piloted systems.
- ¹⁹Interrupted pilot may be required if using flame safeguard control with a proved pilot. Otherwise, interrupted pilot is optional.
- ²⁰Safety shutdown by this limit can be accomplished either by manual reset limits or in the programmer limit circuit.
- ²¹Required on boilers fired by oil burners—not a requirement of UL 296.
- ²²If intermittent pilot is used, no main burner flame-establishing period is required.
- ²³If a separate oil valve is used, it must close within 5 sec max when de-energized.

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 447
Appendix A

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. ¼ inch or larger electrically operated valve in a vent line between the two SSOV's.

APPENDIX B

The material contained in this appendix is for clarification purposes only. The information is for the benefit of fire department inspectors making inspections pursuant to s. 101.14 (2) (b), Stats. (See s. ILHR 50.02 Special Note #2)

Rule Number	Topic of Rule	Subject of Investigation
Ch. ILHR 50—Administration and Enforcement		
50.25	Petition for Variance	1. Fire Department Position Statement (form SB-8A)
Ch. ILHR 51—Definitions and Standards		
51.047	Fire Rated Door Assemblies in Fire Rated Construction	1. Maintenance 2. Operation 3. Unobstructed
51.047 (6)	Door Closing Devices (Fire Doors)	1. Maintenance 2. Use of Fusible Link
51.06 (3)	Foam Plastics (Thermal Barrier)	1. Proper Type and Correct Installation 2. Maintenance
51.15 (2)	Exit Doors	1. Maintenance 2. Unobstructed
51.15 (3)	Exit Hardware	1. Proper Type 2. Signage 3. Security Locks and Key Locks Open During Occupied Periods
51.15 (4)	Exit Doorway	1. Proper Size and Type 2. Maintenance
51.16 (5) (c)	Stairways and Ramps	1. Area Beneath Stairways and Ramps
51.161	Handrails	1. Maintenance 2. Replacement, when Needed
51.162	Guardrails	1. Maintenance 2. Replacement, when Needed
51.165	Stairway Identification	1. Proper Posting 2. Proper Signage on Buildings Constructed After January 1, 1982
51.166	Stairway Discharge	1. Proper Type 2. Maintenance
51.167	Exiting Through Areas of Hazard	1. Proper Type
51.20	Fire Escapes	1. Maintenance
51.21	Standpipe & Hose Systems	1. Correct Installation 2. Maintenance
51.22	Fire Extinguishers	1. Proper Type 2. Location 3. Maintenance 4. Operational

Rule Number	Topic of Rule	Subject of Investigation
51.23	Automatic Sprinklers	1. Water Supply 2. Obstruction of Sprinkler Heads 3. Location of Fire Department Connection 4. Accessibility of Fire Department Connection
51.24 (5)	Fire Alarm Systems	1. Operation & Testing 2. Location of Pull Stations
51.245	Smoke Detectors	1. Correct Installation 2. Maintenance of Detectors 3. Operational
Ch. ILHR 52—General Requirements		
52.01	Fire Prevention, Detection and Suppression (High Rise Construction)	1. Proper Installation 2. Maintenance 3. Operation and Testing
52.015	Automatic Fire Sprinkler Systems for Low Rise Buildings	1. Proper Installation 2. Maintenance 3. Operation and Testing
52.02 (2)	Fire Department Access Openings	1. Proper Type, Size and Location 2. Maintenance
52.07	Atriums	1. Proper Type 2. Smoke Control System 3. Maintenance 4. Test Reports
52.19	Gas and Oil Lamps	1. Proper Type and Clearance 2. Maintenance
52.20	Electrical Work	1. Electrical Check List
52.21	Location and Maintenance of Exits	1. Maintenance
52.22	Repairs	1. Conformance
52.23	Cleanliness	1. Conformance
Ch. ILHR 53—Structural Requirements		
53.63 (1) (a)-(c)	Firestops	1. Maintenance
Ch. ILHR 54—Factory, Office, Mercantile		
54.01(3)	Fire Door Closing Devices	1. Maintenance 2. Operational
54.02	Number and Location of Exits	1. Maintenance 2. Proper Exit Hardware
54.06	Exit Doors, Exit Lights	1. Maintenance of Illumination
54.07	Passageways	1. Maintain in Clear, Unobstructed Condition
54.08	Stairway Enclosure	1. Maintenance
54.11	Lighting	1. Maintenance of Illumination
54.14	Isolation of Hazards	1. Maintenance

Rule Number	Topic of Rule	Subject of Investigation
54.145	Fire Extinguishers	1. For Buildings Constructed After January 1, 1982: A. Proper Type B. Location C. Maintenance D. Operational
54.15	Standpipes	1. Maintenance
54.17	Fire Alarm	1. Maintenance 2. Location of Pull Stations
54.20	No Smoking Signs	1. Proper Posting
	Ch. ILHR 55—Theaters and Assembly Halls	
55.07	Number and Location of Exits	1. Maintenance of Illumination
55.08	Type of Exits	1. Maintenance 2. To be Clear and Unobstructed
55.09	Stairways	1. Maintenance 2. To be Clear and Unobstructed
55.10	Exit Doorways and Doors	1. See 51.15
55.11	Exit Lights	1. Maintenance of Illumination
55.12	Required Exit Width	1. To be Unobstructed
55.14	Width of Aisles	1. To be Unobstructed
55.15	Lobbies and Foyers	1. To be Clear and Unobstructed
55.17	Obstructions	1. Maintenance
55.22 (3)	Proscenium Wall (Openings)	1. Proper Type 2. Maintenance
55.24	Automatic Smoke Outlets	1. Operation
55.29	Isolation of Hazards	1. Maintenance of Enclosures
55.33	Standpipes	1. Correct Installation 2. Maintenance
55.34	Fire Extinguishers	1. For Buildings Constructed After January 1, 1982: A. Proper Type B. Location C. Maintenance D. Operational
55.43	Openings	1. Operational 2. Maintenance
55.45	Relief Outlets	1. Maintenance
55.46	Electric Wiring	1. Electrical Check List
55.50	Maintenance	1. Elimination of Fire Hazard

Rule Number	Topic of Rule	Subject of Investigation
Ch. ILHR 56—Schools and Places of Instruction		
56.03	Smoke Detection	1. For Existing Buildings with Basements not Protected by Automatic Sprinklers or Smoke Detectors as of January 1, 1982, Automatic Smoke Detector System in Basement Corridors by January 1, 1983. A. Correct Installation B. Maintenance of Detectors
56.06	Exit	1. Maintenance
56.06 (6)	Exit Lights	1. Maintenance of Illumination
56.07	Required Exit Width	1. To be Unobstructed
56.09	Passageways	1. To be Unobstructed 2. Maintenance of Exit Doors
56.15	Isolation of Hazards	1. Maintenance of Enclosure
56.18	Fire Extinguishers	1. Proper Type 2. Location 3. Maintenance 4. Operational
56.19	Fire Alarms	1. Operation of System 2. Location of Pull Stations
56.20	Standpipes	1. Correct Installation 2. Maintenance
56.34	Exit Doors and Lights	1. Maintenance of Doors 2. To be Clear and Unobstructed
56.38	Fire Alarms	1. Operational 2. Testing 3. Location of Pull Stations
56.43	Exit Doors and Exit Lights	1. Maintenance of Doors 2. To Be Clear and Unobstructed
56.46	Fire Alarms	1. Operational 2. Testing 3. Location of Pull Stations
Ch. ILHR 57—Residential Occupancies		
57.01 (3)	Basement and Ground Floor Protection	1. Proper Installation 2. Maintenance
57.02	Allowable Height and Area (Corridor Door Hold-Open Device, Access Roadways)	1. Maintenance 2. Operational 3. Clear and Unobstructed
57.03	Number and Location of Exits	1. Maintenance 2. Proper Exit Hardware
57.05	Type of Exits	1. Maintenance 2. To be Clear and Unobstructed 3. Proper Illumination
57.08	Enclosure of Interior Stairways and Shafts	1. Maintenance of Enclosure

Rule Number	Topic of Rule	Subject of Investigation
57.09	Passageways	1. To Be Clear and Unobstructed 2. Maintenance of Exit Doors
57.10	Illumination of Exits and Exit Signs	1. Maintenance of Illumination and Signs
57.14	Isolation of Hazards	1. Maintenance of Enclosure
57.15	Standpipes	1. Correction Installation 2. Maintenance
57.16	Smoke Detectors - All Buildings Except CBRF	1. For Existing Buildings Constructed Before May 23, 1978, Specified Smoke Detectors by January 1, 1983. A. Correct Installation B. Maintenance of Detectors 2. For Buildings Constructed After January 1, 1983: A. Correction Installation B. Maintenance of Detectors C. Interconnection of Corridor/Stairway Detectors to Required Manual Fire Alarm System D. Corridor/Stairway Smoke Detectors Provided with Emergency Power, if Required for the Building
57.165	Smoke Detectors — CBRF	1. Correct Installation 2. Maintenance of Detectors 3. Interconnection of Stairway, Complete Corridor and Common Use Room Detectors 4. Interconnection of Sleeping Room Detectors if Smoking is Permitted
57.17	Fire Alarms	1. Operation of Systems 2. Location of Pull Stations
57.18	Fire Extinguishers	1. For Buildings Constructed After January 1, 1982: A. Proper Type B. Location C. Maintenance D. Operational
57.19	Rowhouse (Living Unit Separation)	1. Proper Installation 2. Maintenance
Ch. ILHR 58—Health Care Facilities		
58.04-58.05	Number, Type and Location of Exits	1. Maintenance 2. Proper Exit Hardware
58.06	Stairs	1. Maintenance 2. To Be Clear and Unobstructed 3. Proper Illumination.
58.18	Marking of Means of Egress	1. Correct Signage 2. Proper Illumination

Rule Number	Topic of Rule	Subject of Investigation
58.20	Key Locking Hardware	1. Correct Hardware Type and Installation 2. Building Satisfies Rules for Detention and Correctional Facilities 3. Maintenance
58.21-58.23	Protection of Openings	1. Maintenance
58.24	Isolation of Hazards	1. Maintenance of Enclosure and Required Automatic Sprinkler System
58.25	Rubbish Chutes and Laundry Chutes	1. Protection of Enclosure 2. Sprinkler System Maintenance
58.27	Detection, Alarm and Communication Systems	1. Operational 2. Testing 3. Location of Pull Stations 4. Correct Installation 5. Maintenance
58.28	Standpipes	1. Correct Installation 2. Maintenance
58.29	Automatic Sprinkler and Other Suppression Systems	1. Water Supply 2. Obstruction of Sprinkler Heads 3. Location and Accessibility of Fire Department Connection
58.30-58.31	Smoke Barriers, Corridor Walls	1. Correct Installation 2. Maintenance
Ch. ILHR 58—Places of Detention		
58.48-58.49	Number, Type and Location of Exits	1. Maintenance 2. Proper Exit Hardware
58.50-58.51	Stairways and Smokeproof Towers	1. Maintenance 2. To Be Clear and Unobstructed 3. Proper Illumination
58.575	Emergency Lighting	1. Proper Type 2. Maintenance
58.58	Marking of Means of Egress	1. Correct Signage 2. Proper Illumination
58.59	Door Locks	1. Correct Type and Installation 2. Maintenance
58.60-58.61	Protection of Openings	1. Maintenance
58.62	Isolation of Hazards	1. Maintenance of Enclosure
58.63	Standpipes	1. Correct Installation 2. Maintenance
58.635	Fire Extinguishers	1. Proper Type 2. Location 3. Maintenance 4. Operational
58.64	Fire Alarms	1. Operation of System 2. Location of Pull Stations

Rule Number	Topic of Rule	Subject of Investigation
58.65	Automatic Smoke Detection Systems	1. Correct Installation 2. Maintenance of Detectors
58.67	Smoke Barrier	1. Correct Installation 2. Maintenance
Ch. ILHR 59—Hazardous Occupancies		
59.13	Type of Exits	1. Maintenance 2. Proper Exit Hardware
59.14	Number and Type of Exits	1. Maintenance 2. To Be Clear and Unobstructed
59.17	Enclosure of Stairways and Shafts	1. Maintenance of Enclosures
59.19	Illumination Levels	1. Proper Illumination
59.21	Isolation of Hazards	1. Maintenance of Enclosures
59.23	Fire Protection	1. Operation of System 2. Proper Type of Extinguisher 3. Location of Extinguisher 4. Extinguisher Operational 5. Water Supply 6. Obstruction of Sprinkler Heads 7. Location and Accessibility of Fire Department Connection 8. Maintenance of Systems
59.24	Fire Alarms	1. Operation and Testing 2. Location of Pull Stations
Ch. ILHR 60—Child Day Care Facilities		
60.12	Doors	1. Joint Inspection Made
60.16	Electrical Work	1. Electrical Check List
60.19	Operating Features	1. Owner Responsibility
60.21	Exiting	1. Joint Inspection Made
60.22	Passageways	1. To be Cleared and Unobstructed 2. Maintenance
60.23	Stair & Shaft Enclosure	1. Joint Inspection Made
60.24	Fire Extinguisher	1. Proper Type 2. Location 3. Maintenance 4. Operational
60.25	Hazardous Areas	1. Joint Inspection Made
60.31	Exiting	1. Joint Inspection Made
60.32	Required Exit Width	1. Width to be Unobstructed
60.33	Passageways	1. Joint Inspection Made
60.34	Stair and Shaft Enclosure	1. Joint Inspection Made
60.35	Fire Extinguisher	1. Proper Type 2. Location 3. Maintenance 4. Operational

Rule Number	Topic of Rule	Subject of Investigation
60.36	Fire Alarm System	1. Operation and Testing 2. Location of Pull Station
60.37	Hazardous Areas	1. Joint Inspection Made
60.38	Exit and Emergency Lighting	1. Joint Inspection Made
Ch. ILHR 61—Community-Based Residential Facilities		
61.10 (1) (h)	Construction, Building and Site	1. Maintenance
61.10 (3)	Smoke Separation	1. Maintenance
61.12	Exiting and Doors	1. To be Clear and Unobstructed 2. Maintenance
61.14	Smoke Detection	1. Correct Installation 2. Maintenance of Detectors
61.18 (4)	Ramp Requirements	1. Maintenance
61.20	Fire Extinguisher	1. Proper Type 2. Location 3. Maintenance 4. Operational
61.24	Heating and Ventilating	1. Maintenance
61.25	Electrical	1. Electrical Check List
Ch. ILHR 62-Subch. I—Open Parking Structures		
62.26	Number, Location and Type of Pedestrian Exits	1. Maintenance
62.29	Illumination and Exit Lights	1. Maintenance of Illumination and Exit Lights
62.30	Fire Protection	1. Correct Installation of Standpipes
62.32	Isolation of Hazards	1. Maintenance
Ch. ILHR 62-Subch. III—Tents		
62.46	Fire Hazards	1. Elimination of Fire Hazard
62.47	Exits	1. Maintenance
62.49	Electrical Installation	1. Proper Installation
62.50	Fire Extinguishing Equipment	1. Proper Type 2. Location 3. Maintenance 4. Operational
62.51	Illumination, Exit Lights and Signs	1. Maintenance of Illumination
Ch. ILHR 62-Subch. V—Assembly Seating Facilities		
62.72	Inspection and Maintenance	1. Proper Maintenance 2. Conformance With Rules
62.75	Means of Egress	1. Maintenance 2. To Be Clear and Unobstructed
62.78	Isolation of Hazards	1. Maintenance of Enclosure
62.80	Illumination and Emergency Lighting	1. Proper Illumination

Rule Number	Topic of Rule	Subject of Investigation
62.81	Fire Prevention	1. Maintenance
Ch. ILHR 62—Subch. VII—Pedestrian Access Structures Connecting Buildings		
62.98	General Requirements Construction	1. Protection of Openings 2. Maintenance
62.99	Exiting	1. Maintenance 2. To Be Clear and Unobstructed
Ch. ILHR 64—HVAC		
64.08	Exhaust Ventilation System	1. Maintenance
64.09	Combustion Air Intakes	1. Maintenance
64.16	Air Cleansing Devices	1. Maintenance
64.19	Location of Outside Air Intakes and Exhausts for Mechanical Ventilating Systems	1. Maintenance
64.21	Location of Equipment	1. Proper Equipment 2. Maintenance
64.22(5)	Unvented Space Heaters	1. Use Prohibited
64.22 (7)	Fireplaces and Fireplace Stoves	1. Proper Installation 2. Maintenance 3. Operation and Testing
64.23 (5) (a) and (b)	Piping	1. Installation 2. Maintenance
64.42	Fire Dampers and Fire Curtains	1. Maintenance
64.45	Chimneys, Smoke Stacks, Gas Vents, Mechanical Draft and Venting Devices	1. Maintenance
64.46	Masonry Chimneys	1. Maintenance
64.47	Metal Smokestacks	1. Maintenance
64.48	Factory-Built Chimneys and Gas Vents	1. Maintenance
64.49	Gas Vent	1. Maintenance
64.50	Chimney and Vent Connectors	1. Maintenance
64.51 (4)	Fire Protection	1. Correct Equipment 2. Proper Installation 3. Proper Clearances and Protection
64.52(1)	Maintenance	1. Inspection of Chimney After Fire Before Reuse
64.61(2)	Repair Areas	1. Maintenance
64.62 (2)	Vehicle Service Buildings	1. Maintenance
64.63 (2)	Garages	1. Maintenance
64.67 (5) (e), (f) and (g)	Kitchens	1. Maintenance

Register, August, 1986, No. 356

Rule Number	Topic of Rule	Subject of Investigation
64.67 (6)	Automatic Suppression Systems	1. Correct System 2. Proper Installation 3. Maintenance and Operational

See s. ILHR 50.02—Special Note #2