Chapter Comm 64

HEATING, VENTILATING AND AIR CONDITIONING

Note: Chapter ILHR 64 was revised in December, 1995 effective April 1, 1996. On April 6, 1996 the department of industry, labor and human relations published an emergency rule stating that the effective date of the December, 1995 rule version was delayed. A permanent rule was adopted in December, 1996 stating that the revised text of ch. ILHR 64, as published, would be effective April 1, 1997.

Note: Chapter Ind 59 as it existed on December 31, 1975 was repealed and a new chapter Ind 64 was created effective January 1, 1976.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 Comm 64 effective January 1, 1984. Chapter ILHR 64 as it existed on March 31, 1997 was repealed and a new chapter ILHR 64 was created effective April 1, 1997. Corrections made under s. 13.93 (2m) (b) 1. and 7., Stats., Register, March, 1997, No. 495.

Note: Chapter ILHR 64 was renumbered to be Chapter Comm 64 under s. 13.93 (2m) (b) 1., Stats., and corrections made under s. 13.93 (2m) (b) 7., Stats., Register, September, 1998, No. 513.

Note: Chapter Comm 64 is repealed and a new chapter Comm 64 is created effective July 1, 2002

Comm 64.01 Scope. (1) GENERAL. 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.

(2) ADDITIONS. The provisions of this chapter shall apply to additions to existing buildings and structures as specified in s. Comm 50.03. When an existing HVAC system is extended to serve an addition, existing system components are not required to be replaced if the requirements of this chapter are met within the addition.

(3) ALTERATIONS. (a) The provisions of this chapter shall apply to remodeling or alterations in any building or structure which affect the replacement of major equipment as specified in s. Comm 50.03.

(b) When an existing HVAC system serves a remodeled or altered space that has not undergone a change in occupancy or use, the existing system components are not required to be replaced if the requirements of this chapter that applied to the original construction of the space are met.

Note: "Occupancy or use" refers to the entries in Table 64.05.

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, March, 1997, No. 495, eff. 4–1–97.

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

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 64.025 Definitions. In this chapter:

(1) "Air Change" means the introduction of new, cleansed, or recirculated air to a space.

(1m) "Air change rate" means airflow in volume units per hour divided by the building space volume in identical volume units.

(2) "Air conditioning" means the process of treating air to control temperature or humidity and distributing to meet the requirements of the conditioned space.

(3) "Exhaust vent" means a vent, including a relief vent, through which air is exhausted from a space to the atmosphere.

(4) "Exhaust ventilating system" means any combination of building construction, machinery, devices or equipment, designed

and operated to remove gases, dusts, fumes or vitiated air from the breathing zone of employees and frequenters.

(5) "Gravity exhaust ventilation" means 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.

(6) "Mechanical ventilation" means 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.

(7) "Outside air" means 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 general population exposed to it.

(8) "Recirculated air" means the transfer of air from a space through the air–handling equipment and back to the space.

(9) "Spot heating" means to provide heat to raise the air temperature to the required minimum in the immediate area of the occupants.

(10) "Tempered air" means air transferred from a heated or cooled area of a building.

(11) "Tempered outside air" means outside air heated or cooled before distribution.

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

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Subchapter II — Design and Operation Requirements

Comm 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 the building transmission losses and ventilation losses, whichever sum is greater.

(2) HEATING SYSTEM DESIGN. The primary heating system intended to maintain the inside design temperature of s. Comm 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, March, 1997, No. 495, eff. 4–1–97.

Comm 64.04 Outside temperature design conditions. Outside design temperatures shall be taken from either Figure 63.23 or ASHRAE 90.1.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 64.05 Inside design temperatures and ventilation requirements. (1) INSIDE DESIGN TEMPERATURES. (a) *Heating system design.* The heating system shall be designed to maintain a temperature of not less than that shown in Table 64.05 and must be operated at not less than that temperature during occupied periods.

(b) *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 par. (a), 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 minimum ventilation indicated in Table 64.05. The required ventilation for areas of each occupancy or use is specified by the ventilation classification assigned to each occupancy or use in Table 64.05. Areas of different ventilation classification shall be provided with a complete solid separation or the most stringent ventilation requirement shall apply to all unseparated areas.

(a) Areas assigned ventilation classification (a) shall be provided with a supply of outside air and an equal amount of exhaust ventilation at a rate of 7.5 cubic feet per minute per person within the area served by the system and with a minimum air change rate as specified in s. Comm 64.06 (2).

(b) Areas assigned ventilation classification (b) shall be provided with a supply of outside air and an equal amount of exhaust ventilation at a rate of 7.5 cubic feet per minute per person within the area served by the system and with a minimum air change rate as specified in s. Comm 64.06 (2), or shall be provided with a percentage of openings in accordance with sub. (3).

(c) Areas assigned ventilation classification (c) shall be provided with a supply of outside air and exhaust ventilation determined using the cfm per square foot of net floor area specified in Table 64.05.

(d) Areas assigned ventilation classification (d) shall be provided with an amount of exhaust ventilation determined using the cfm per square foot of net floor area specified in Table 64.05. The area shall be provided with negative pressure relative to adjacent areas. An equal supply of outside air is required when the exhaust exceeds 1/2 air change per hour in the area served by the exhaust unless otherwise exempted under sub. (4).

(e) Areas assigned ventilation classification (e) shall be provided with a percentage of outside openings in accordance with sub. (3).

(f) Corridor areas in shopping malls assigned ventilation classification (f) do not require a separate supply of outside air provided the outside air introduced in the store areas adjacent to the mall is circulated through and exhausted from the shopping mall corridor area.

(3) PERCENT OF OPENINGS. Where the required ventilation is provided with a percent of openings, the net openable area of exterior windows and doors in each room shall be at least equal to the specified percent of the floor area of that room. Separate mechanical ventilation systems shall be provided for rooms with less than the required percent of openings.

(4) EXCEPTIONS. (a) *Outside air requirement waived.* If a mechanical air supply system is provided and the requirement for outdoor air determined in accordance with Table 64.05 is less than 5% of the minimum required air changes per hour determined in accordance with s. Comm 64.06 (2), the requirement for outside air may be eliminated.

(b) *Outside air requirement and percent of openings waived.* The requirement for outside air or percent of openings specified in Table 64.05 may be omitted for (a) or (b) ventilation classifications in large volume spaces containing 5,000 or more cubic feet per occupant.

(5) DETERMINATION OF NUMBER OF PERSONS. The number of persons in a given space shall be calculated using the net square feet per person given in Table 64.05 unless justification acceptable to the department is provided to show that a different number of occupants is reasonable. When the number of persons is not derived from Table 64.05, the number of occupants shall be documented. Where there is no value indicated for the net square feet per person in Table 64.05, the actual number of occupants shall be used to determine the required amount of outside air.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

TABLE 64.05
TEMPERATURE AND VENTILATION TABLE

Use or Occupancy[6]	Minimum Inside Temperature (Degrees F)	Ventilation Requirements Basis of Capacity: Ventilation Classification	O.A. – Mech. Net Sq. Ft. Per Person	O.A. – Nat. Percent of Openings[21.2]	Exhaust CFM/Net Square Feet Floor Area	Air Change Rate[9] Minimum Air Change Per Hour With A/C	Applicable Occupancy Code Section (Comm Number)
Factories, office and mercantile buildings							
Animal kennels	NMR	(d)	___	___	Note 3	___	64.54
Barber and beauty salons	67	(d)	___	___	0.50	___	64.54, 64.18
Canning factories	60	(b)	75	3	___	___	64.54, 64.68
Conference rooms	67	(a)	7	___	___	3	64.54
Court and jury rooms	67	(b)	6	3	___	3	64.54
Factories and machine shops	60	(b)	75	3	___	___	64.54
Flammable liquids storage	NMR	(d)	___	___	___	___	64.18, Comm 10
Foundries and boiler shops	50	(b)	75	3	___	___	64.13, 64.54
Funeral homes:							
Chapel	67	(b)	6	3	___	___	64.54
Embalming room	67	(d)	___	___	2.00	___	64.54
Offices	67	(a)	75	___	___	1.5	64.54
Places of worship, entertainment and recreation which accommodates less than 100 persons	†	(b)	____	3	†	____	64.54
Printing establishments	60	(a) or (d)	75	___	Note 8	3	64.18, 64.54
Retail establishments	67	(b)	60	3	___	1.0	64.54
Shopping mall corridor areas (except mercantile areas)	NMR	(f)	Aggregate capacity of stores served by mall	___	___	___	64.54
Security vaults (occupied)	67	(a)	300	___	___	___	64.54
Warehouses	NMR	____	___	___	___	___	64.18, 64.54
Dark room	67	(d)	___	___	2.00	___	64.54, 64.18
Smoking lounge	67	(d)	___	___	2.00	___	64.54, 64.18
Dry cleaners	67	(d)	___	___	2.00	___	64.54, 64.18
Theaters and places of assembly (which accommodate more than 100 persons)							ch. Comm15
Arenas and field houses (use seated area)	60	(a)	6	___	___	2	64.55

TABLE 64.05 – Continued

Use or Occupancy[6]	Minimum Inside Temperature (Degrees F)	Ventilation Classification	Ventilation Requirements: Basis of Capacity: O.A. – Mech. Net Sq. Ft. Per Person	Ventilation Requirements: Basis of Capacity: O.A. – Nat. Percent of Openings[21.2]	Ventilation Requirements: Basis of Capacity: Exhaust CFM/Net Square Feet Floor Area	Ventilation Requirements: Basis of Capacity: Air Change Rate[9] Minimum Air Change Per Hour With A/C	Applicable Occupancy Code Section (Comm Number)
Armory drill floors	55	(a)	30	–––	–––	–––	64.55
Assembly halls (other than church)	67	(a)	6	–––	–––	2	64.55
Bowling alleys	67	(a)	15	–––	–––	2	Based on occupied areas
Cafeterias, dining areas, restaurants, billiard rooms	67	(a)	15	–––	–––	2	64.55
Places of worship:							
Chapels	67	(b)	6	3	–––	–––	64.55 (3)
Dining and social rooms	67	(b)	15	3	–––	–––	64.55 (3)
Nave or auditorium	67	(b)	6	3	–––	–––	64.55 (3)
Class rooms	67	(b)	20	3	–––	–––	64.55 (3)
Dance halls	67	(a)	15	–––	–––	2	64.55
Ice skating rinks (indoor)	NMR	(a)	15	–––	–––	–––	64.55
Ice resurfacing (indoor)	NMR	(d)	–––	–––	–––	–––	64.18, 64.55
Lodge halls, club rooms	67	(a)	15	–––	–––	2	64.55
Roller skating rinks (indoor)	50	(a)	15	–––	–––	2	64.55
Bars and cocktail lounges	67	(d)	–––	–––	0.50	–––	64.55
Tennis courts (indoor)	60	(a)	–––	–––	–––	–––	64.55
Theaters (seated area)	67	(a)	6	–––	–––	2	64.55
Lobbies	67	(a)	15	–––	–––	–––	64.55
Lounge rooms	67	(a)	15	–––	–––	–––	64.55
Motion picture booths	60	(a) or (c)	–––	–––	2.00	–––	64.55
Smoking lounge	67	(d)	–––	–––	2.00	–––	64.55, 64.18
Game rooms	67	(a)	15	–––	–––	2	64.55
Gambling casinos	67	(a)	15	–––	–––	2	64.55
Health care facilities				See Comm 64.57			
Schools or other places of instruction							
Administrative office space	67	(a)	75	–––	–––	1.5	64.56
Arts, crafts	67	(a)	30	–––	–––	2	64.56
Classrooms	67	(a)	20	–––	–––	2	64.56

TABLE 64.05 – Continued

Use or Occupancy[6]	Minimum Inside Temperature (Degrees F)	Ventilation Classification	Ventilation Requirements Basis of Capacity				Applicable Occupancy Code Section (Comm Number)
			O.A. – Mech. Net Sq. Ft. Per Person	O.A. – Nat. Percent of Openings[21.2]	Exhaust CFM/Net Square Feet Floor Area	Air Change Rate[9] Minimum Air Change Per Hour With A/C	
Ventilation Requirements							
Gymnasiums, field houses, auditoriums, theaters (fixed seats)	67	(a)	6	---	---	2	64.56
Bleachers	---	(a)	2.75 or 18"/person	---	---	2	64.56
Locker and shower rooms	70	(d)	---	---	2 or 35 cfm per locker	---	64.56
Gymnasiums, field houses, auditoriums, theaters (nonseated areas)	67	(a)	75	---	---	2	64.56
Home economics (cooking)	67	(a)	30	---	---	2	64.56
Laboratories (science)	67	(d)	---	---	Note 5	---	64.67
Lecture halls	67	(a)	30	---	---	2	64.18
Corridors with lockers	67	(a)	6	---	---	2	64.56
Library and resource centers	67	---	---	---	---	10 cfm/lineal ft. of length	64.56
Reading rooms	67	(a)	20	---	---	2	64.56
Stack areas	67	(a)	20	---	---	2	64.56
Lunchrooms	67	(d)	---	---	0.25	---	64.56
Museums and art galleries	67	(a)	10	---	---	1	64.56
Music rooms (instrumental)	67	(a)	40	---	---	2	64.56
(vocal)	67	(a)	20	---	---	2	64.56
Special education	67	(a)	10	---	---	2	64.56
Study halls, common areas with non-fixed seating	67	(a)	35	---	---	2	64.56
Toilet rooms	67	(d)	---	---	Greatest of 2 or 75 cfm/TF	---	64.54
Vocational shops:							
With vehicle service and repair	60	(d)	---	---	0.75	---	64.18
Without vehicle service and repair	60	(a)	50	---	---	2	64.18
Wardrobes, coat rooms	NMR	(d)	---	---	2.00	---	64.65
Detention facilities							
Sleeping rooms (Note 7)	67	(b)	35	4	---	---	64.58

TABLE 64.05 – Continued

Use or Occupancy[6]	Minimum Inside Temperature (Degrees F)	Ventilation Classification	Ventilation Requirements				Applicable Occupancy Code Section (Comm Number)
			Basis of Capacity				
			O.A. – Mech. Net Sq. Ft. Per Person	O.A. – Nat. Percent of Openings[21.2]	Exhaust CFM/Net Square Feet Floor Area	Air Change Rate[9] Minimum Air Change Per Hour With A/C	
	Ventilation Requirements						
Residential occupancies							
Living and sleeping areas	67	(b)	Note 4	4	–––	–––	64.59
Day care facilities	67	(a)	35	–––	–––	2	64.60
Garages and service stations[10]							
Automobile showrooms:							
Less than 6 vehicles	60	(b)	75	3	–––	–––	64.64
6 or more vehicles	60	(d)	–––	–––	0.50	–––	64.64
New vehicles only	60	(a)	75	–––	–––	1	64.64
Garages: less than 6 vehicles	NMR	(b)	–––	3	–––	–––	64.63
Garages: 6 or more vehicles	NMR	(d)	–––	–––	0.50	–––	64.63
Repair areas	60	(d)	–––	–––	0.75	–––	64.61
Vehicle service buildings	60	(d)	–––	–––	0.50	–––	64.62, 59.17
General sanitation and service areas							
Chlorine storage rooms	NMR	(d)	–––	–––	2.00	–––	64.65
Janitor closets	NMR	(d)	–––	–––	2 or 50/sink	–––	64.65
Locker rooms and shower rooms	70	(d)	–––	–––	2 or 35/locker	–––	64.65
Toilet rooms	67	(d)	–––	–––	2 or 75/TF	–––	64.65
Toilet rooms (with outdoor stadium)	50	(d)	–––	–––	2 or 75/TF	–––	64.65
Coat rooms (walk in)	60	(d)	–––	–––	2.00	–––	64.65
Locker and changing rooms with toxic contamination	70	(c)	–––	–––	2 or 35/locker	–––	64.65, 64.54 & 54.13
Changing rooms without toxic contamination	70	(b)	15	3	0.50	1	64.65

TABLE 64.05 – Continued

Use or Occupancy[6]	Minimum Inside Temperature (Degrees F)	Ventilation Classification	Ventilation Requirements Basis of Capacity: O.A. – Mech. Net Sq. Ft. Per Person	O.A. – Nat. Percent of Openings[21.2]	Exhaust CFM/Net Square Feet Floor Area	Air Change Rate[9] Minimum Air Change Per Hour With A/C	Applicable Occupancy Code Section (Comm Number)
			Ventilation Requirements				
Laundries (commercial)	60	(d)	–––	–––	2.00	–––	64.65
Natatoriums	76	(d)	–––	–––	2/pool sf	–––	64.66
Kitchens	60	(d)	–––	–––	2.00	–––	64.67
Seasonal occupancies							
Camps and lodges:							
Dining and recreational areas	NMR	(b)	15	3	–––	–––	64.68
Living and sleeping areas	NMR	(e)	–––	4	–––	–––	64.68
Club houses	NMR	(b)	15	3	–––	–––	64.68
Drive–ins	NMR	(b)	15	3	–––	–––	64.68
Kitchens	NMR	(c) or (d)	–––	–––	2.00	–––	64.67
Outdoor toilets	NMR	(d)	–––	–––	2.00	–––	52.53 & 64.65

CFM = Cubic feet per minute
LF = Lineal foot
NMR = No minimum requirement
TF = Toilet fixtures (water closets and urinals)
A/C = Air conditioning

†See theaters and places of assembly for inside design temperature and cfm per net square feet floor area.

[1] See ss. Comm 64.06, 64.07 and 64.08 for mechanical, natural and exhaust ventilation systems; and ss. Comm 64.11 to 64.18 for ventilation air standards.

[2] See s. Comm 64.07 for special considerations on natural ventilation.

[3] Temperature, humidity and air flow for animal kennels will depend on animal type.

[4] 30 cfm of outside air shall be provided for each room. All other requirements for the (b) ventilation classification remain the same.

[5] 200 cfm of exhaust ventilation per cooking appliance shall be provided. All other requirements for the (d) ventilation classification remain the same.

[6] This Table is intended as a reference guide with generic Use types listed under those Occupancy types most often associated with the Use. When Use types are mixed between Occupancy types and the Use type is unlisted within the specific Occupancy Type, the use shall be ventilated as required by the same Use type listed in the other Occupancy type. Unlisted occupancies or uses shall be ventilated as required for the most similar listed occupancy or use acceptable to the department. Rooms that are used for different purposes at different times shall be designed for the greatest amount of ventilation required for any of the uses.

[7] See ss. Comm 58.45(2) & 58.46(2) for more stringent requirements which may exist. When unseparated toilet fixtures are included in sleeping areas (such as cells), the room shall be ventilated as required for Toilet rooms.

[8] In instances where the printing process involve inks or solvents which are volatile or otherwise toxic to humans, the (d) ventilation classification shall be used the exhaust rate shall not be less than 2 cfm/square foot of floor area.

[9] See s. Comm 64.06 for specific requirements and exceptions which may exist. The minimum air change rate is 6 air changes per hour. The air change rates shown in the table are the rates permitted when air conditioning is provided in accordance with s. Comm 63.23 and the heat gain requirement for the space has been satisfied.

[10] See ch. Comm 18, ASME A17.1 101.5b and s. Comm 64.18 (1) for machine room ventilation requirements.

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Comm 64.06 Mechanical ventilation systems. **(1)** OUTSIDE AIR. Mechanical ventilation systems shall be operated to provide a continuous source of outside air to all areas while people are present. The minimum amount of outside air supplied to the system shall be determined in accordance with s. Comm 64.05. Exhaust ventilation in equal volume shall be maintained simultaneously.

Note: When less than one occupant per 5000 cubic feet is present, operation of the ventilation system may be modified as specified in s. Comm 64.05 (4).

(2) AIR CHANGE. Air change shall be provided while people are present. The air-change rate 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. Where more than one room is served by a common supply system, the required minimum air change volume shall be transferred through the air handling equipment where it is diluted or replaced with outside air, and supplied back to the space. Where a supply system serves only one room, the required minimum air change may be achieved by circulation within the room at the required rate.

(a) *Six air changes per hour.* When required for (a) and (b) ventilation classifications, as specified in s. Comm 64.05, the total air change rate shall be at least 6 air changes per hour.

(b) *Less than 6 air changes per hour.* An air change rate of less than 6 air changes per hour will be permitted where mechanical cooling (air conditioning) is provided in accordance with s. Comm 63.23 (2), and the heat gain requirement for the space has been satisfied. The air-change rate may not be less than the minimum air changes per hour if specified in Table 64.05.

Note: The amount of outside air required by s. Comm 64.05 must be maintained even if the air change rate is reduced.

(c) *Air change requirement waived.* The air change 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. Comm 64.05 (4) (b).

3. Buildings utilizing percentage of openings as specified in s. Comm 64.05.

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

(4) RECIRCULATION AND TRANSFER OF AIR. (a) *Recirculation.* No air contaminated by any source other than human occupancy shall be recirculated, except within the same ventilation classification as assigned in s. Comm 64.05.

(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.

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

Note: The outdoor air amounts specified in this section assume that the dominant source of indoor air contamination is human occupancy. Where other indoor contaminants or sources are present, source control or other control or removal strategies may be needed.

Note: See ch. Comm 32, Safety & Health Standards for Public Employees, for requirements for dust, fumes, vapors and gases.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

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

(a) *Outdoor openings located below grade.* Outdoor openings below grade will not be accepted unless there is a clear space outside of the opening having a width not less than 1 1/2 times the distance below grade at the bottom of the opening.

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

(b) *Outdoor openings located from a property line.* Outdoor openings shall be at least 5 feet from a property line 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. Comm 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 and which are not separated from the vestibule by an additional door.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 64.08 Exhaust ventilation system. **(1)** DEFINITIONS. (a) *Exhaust ventilating system.* Any combination of building construction, machinery, devices or equipment, designed and operated to remove harmful gases, dusts, fumes or vitiated air from the breathing zone of employees and frequenters.

(b) *Gravity exhaust ventilation.* A process of removing air by natural means, the effectiveness depending on atmospheric condition, such as difference in relative density, difference in temperature or wind motion.

(2) DESIGN. (a) Exhaust ventilating systems shall be designed to reasonably prevent contaminated air from reentering the building.

(b) Mechanical exhaust ventilation shall be used when exhaust ventilation is required for toilet rooms, repair areas and garages except that gravity exhaust ventilation may be used for unoccupied, detached garages for long–term storage only.

(3) OPERATION. The required building exhaust ventilating systems shall operate continuously when people are in the building to provide the amount of exhaust specified in Table 64.05.

Note: Continuous operation of some exhaust systems, such as purging systems, chloride storage exhaust, or industrial exhaust, may be necessary. See ch. Comm 32, Safety & Health Standards for Public Employees.

(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, March, 1997, No. 495, eff. 4–1–97.

Comm 64.09 Combustion air intakes. Any room in which fuel–burning equipment, including water heaters, fireplaces and process equipment, is located shall be supplied with combustion air for safe operation. When new heating equipment is installed in existing buildings, combustion air shall be provided in accordance with this section unless another method is shown to be adequate.

(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
Combustion Air Intake Areas

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. 1/2 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 free area for combustion ir intakes for power burners, including forced draft and induced draft systems, shall be at least 0.5 square feet per 1,000,000 Btu per hour fuel input, with a minimum free area of 10 square inches.

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

(d) *Combustion air by infiltration.* If the heating equipment is not required to be located in a fire–resistive room, combustion air may be provided by means of infiltration where the total area of outdoor openings is greater than 3% of the floor area in which the equipment is located, and where 150% of the air required for theoretical complete combustion is no greater than 1/4 air change per hour.

Note: See s. Comm 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) A motorized damper or fire damper shall be permitted in combustion air intake if a means is provided to ensure that the damper is open before the burner is in operation.

(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. Comm 64.19 (1) (c).

(7) AIR–HANDLING EQUIPMENT LOCATED IN A BOILER OR FURNACE 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 of 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, March, 1997, No. 495, eff. 4–1–97.

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

Subchapter III — Ventilation and Air Standards

Comm 64.11 Ventilation and air standards. The quantity of air used to ventilate a given space during periods of occupancy shall always be sufficient to maintain the standards of air distribution, air movement, recirculation, ss. Comm 64.13 to 64.19.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 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, March, 1997, No. 495, eff. 4–1–97.

Comm 64.14 Tempered outside air requirements. (1) MAKE–UP AIR. A supply of tempered outside air shall be provided when the total volume of exhaust exceeds 1/2 air change per hour in the area served by the exhaust.

Note: See ch. Comm 32, Safety and Health Standards for Public Employees, 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, March, 1997, No. 495, eff. 4–1–97.

Comm 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, March, 1997, No. 495, eff. 4–1–97.

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

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

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

(b) Filters are not required for use with unit heaters designed for heating and recirculation; 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, March, 1997, No. 495, eff. 4–1–97.

Comm 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, make–up air and exhaust determined by the provisions of s. Comm 64.05, when occupied.

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

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 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 employment or occupancy where smoke, gas, dust, fumes, steam, vapor, industrial poisons, or other detrimental materials are used, stored, handled, or are present in the air in sufficient quantities to obstruct the vision, or to be injurious to the health, safety or welfare of the employees or frequenters, see ch. Comm 32, Safety and Health Standards for Public Employees.

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

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

1. The area shall have an exhaust system capable of maintaining a negative pressure within the enclosed area.

2. The volume and distribution of air movement within the area shall be such that the average threshold limit values of specific airborne contaminants are not exceeded.

Note: See ch. Comm 32, Safety and Health Standards for Public Employees.

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. Comm 32, Safety and Health Standards for Public Employees.

(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.

(c) *Transfer of air between dwelling units.* Air shall not be transferred from one dwelling unit to another, except in buildings where tobacco smoking is controlled and restricted to designated areas and not allowed in dwelling units, and air is not transferred from designated smoking areas to dwelling units.

(2) BATTERY CHARGING AREAS. Battery charging areas shall be provided with 3/4 cfm per square foot of outside air and equivalent exhaust unless calculations are submitted to verify that the concentration of hydrogen generated during battery charging will be maintained below 1.5% by volume by other means. Exhaust air shall be drawn from the battery charging area at ceiling height.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 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 for ventilation, doors, and openable windows shall be located to minimize contamination of outdoor air and shall be at least 10 feet, measured in any direction, from outlets that emit products of combustion and exhaust vents. Exceptions to this paragraph are given in subds. 1. to 4.

1. Exhaust vents of 100 cfm or less shall be located at least 12 inches, measured in any direction, from doors or openable windows.

2. Paragraph (a) does not apply to intakes for combustion air or short–cycle hoods.

3. The 10–foot minimum separation of par. (a) does not apply to the intake and exhaust of a factory–packaged rooftop unit provided nothing restricts air flow around the unit. The exhaust and intake of the unit shall be located to minimize contamination of outside air.

4. Product of combustion outlets of direct vent sealed combustion chamber appliance vents shall be located at least 12 inches, measured in any direction, from doors or openable windows.

Note: See s. Comm 82.31 (16) for plumbing vent setbacks. That rule requires plumbing vents to be 10 feet from air intakes and 10 feet horizontally from or 2 feet above roof scuttles, doors or openable windows.

Note: See NFPA 45, Standard on Fire Protection for Laboratories using Chemicals, for chemical fume hood exhaust location. Health care facilities may have additional requirements, see s. Comm 64.57.

(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. Comm 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 1/2 inch size or larger.

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

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

(5) DAMPERS. (a) *Intake.* All required outside air intakes serving tempered or heated spaces 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. Barometric controls shall not be used for the damper.

(b) *Exhaust.* Exhaust openings serving tempered or heated spaces 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. Commercial kitchen hood systems are exempt from this paragraph.

Note: See s. Comm 64.57 for additional requirements for the location of intakes and exhausts for hospitals and nursing homes. See the Administrative Plumbing Code, chs. Comm 82–86 for additional clearance requirements for plumbing vents.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Subchapter IV — Heating Equipment Requirements

Comm 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. Comm 64.03 or 64.09.

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

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

Note: The department recognizes UL 296/Oil Burners, and UL 795/Commercial–Industrial Gas–Heating Equipment, as acceptable standards that satisfy the requirements of 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 the American Gas Association (AGA), Underwriters Laboratories (UL), ETL Testing Laboratories, Inchupe Testing Services NA, Inc., Warnock Hersey International, Inc., Braun Intertec Corp. (formerly Northwest Testing Laboratories, Inc.) 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. Comm 2 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, March, 1997, No. 495, eff. 4–1–97.

Comm 64.21 Location of equipment. (1) GENERAL. Heating equipment shall be installed in accordance with the limitations specified in Table 64.21.

Note: The footnotes after the table designate special requirements for the listed equipment.

Note: The department will accept net ratings as listed by the Mechanical Contractors Association of America, Inc., or the Institute of Boiler and Radiator Manufacturers.

(2) CENTRAL FURNACES. For the purpose of this section, a central furnace shall be considered as a direct vent sealed combustion chamber appliance if the furnace conforms to the requirements of ANSI standard Z21.47 for direct vent central furnaces.

(3) BOILERS AND WATER HEATERS. For the purpose of this section, a low–pressure boiler or a water heater shall be considered as a direct vent sealed combustion chamber appliance if the boiler or water heater conforms to those parts of ANSI standard Z21.13, Z21.10.1, or Z21.10.3, whichever is applicable, relating to direct vent appliances.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97; **r. and recr. Register, September, 2000, No. 537, eff. 10–1–00**.

Table 64.21 – LOCATION OF EQUIPMENT[19]

	Vented Units								Unvented Units		Electric	Water or Steam
	Gas or Oil or Solid Fuel Boilers	Gas or Oil or Solid Fuel Furnaces and Water Heaters		Gas or Oil Unit Heaters	Gas or Oil Infrared		Gas or Oil Space Heater[1]	Solid Fuel Space Heater[1,2]	Gas Direct Fired Make–up Air[3,4]	Gas Infrared	Furnaces, Unit Heaters, Heat Pumps, Baseboard Heaters, etc.	Unit Ventilators, Heaters, Make–Up Air Units, Baseboard Heaters, etc.
Location and Type of Occupancy					Closed Combustion Infrared Equipment with Surface Temperatures not Exceeding 1500°F	Open Flame Infrared Equipment with Surface Temperatures Exceeding 1500°F						
			Suspended[5]	Suspended[5]	Suspended[5]				Suspended[5]	Suspended[5]		
Factories	Yes[5]	Yes[5]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Permitted in all Occupancies	Permitted in all Occupancies
Mercantile Buildings	Yes[5]	Yes	Yes	Yes	Yes	Yes	N.P.[5,6]	N.P.[6]	N.P.	N.P.		
Office Buildings	Yes[5]	Yes	Yes	Yes	Yes	N.P.	N.P.[5,6]	N.P.[6]	N.P.	N.P.		
Places of assembly, entertainment, recreation, worship or dining (100 persons or less)	Yes[5]	Yes	Yes	Yes	Yes	Yes	N.P.[5,6]	N.P.[6]	N.P.[7]	N.P.		
Tennis Facilities (court areas only)	Yes[5]	Yes	Yes	Yes	Yes	Yes	N.P.[5,6]	N.P.[6]	N.P.	N.P.		
Tennis Facilities (all other areas)	Yes[5]	Yes	Yes	Yes	Yes	N.P.	N.P.[5,6]	N.P.[6]	N.P.	N.P.		
Theaters and places of assembly, entertainment, recreation, worship or dining (more than 100 persons)	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	N.P.	N.P.		
Restaurants	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	N.P.[7]	N.P.		
Type of Occupancy												
Tennis Facilities (court areas only)	Yes	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N.P.	N.P.		
Tennis Facilities (all other areas)	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.	N..P.	N.P.	N.P.		
Schools and other places of Instruction	Yes	Yes[20]	Yes	Yes	Yes	N.P.[10]	N.P.	N.P.	N.P.[9]	N.P.		
Hospitals, Nursing Homes and Penal Institutions	Yes	Yes[20]	N.P.	N.P.	N.P.	N.P.	N.P.	N.P.	N.P.	N.P.	Permitted in all Occupancies	Permitted in all Occupancies
Residential Occupancies	Yes	Yes	N.P.	N.P.	N.P.	N.P.	N.P.[11]	N.P.[14]	N.P.	N.P.		
Hazardous Occupancies												
Garages	Yes	Yes	Yes[12]	Yes[12]	Yes	Yes	N.P.[15]	N.P.	Yes[12]	Yes[12]		
Aircraft Hangers	Yes	Yes	Yes[13]	Yes[13]	Yes[13]	Yes[13]	N.P.	N.P.	Yes[13]	Yes[13]		
Day Care Centers	Yes	Yes	Yes	Yes	Yes	N.P.	N.P.[6]	N.P.[6]	N.P.	N.P.		
Community–Based Residential Facilities[17]	Yes	Yes	N.P.	N.P.	N.P.	N.P.	N.P.[6]	N.P.6	N.P.	N.P.		

N.P. = Not Permitted

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

Clearance to combustibles and combustible construction. 1. Heating equipment shall be installed in accordance with the manufacturer's recommendations to provide minimum clearance. In the absence of manufacturer's recommendations, a minimum clearance of 36 inches shall be provided. 2. Combustible construction, such as partitions, shelving or storage lockers, shall not encroach upon the required clearance.

Note: Electrical Code clearances specified in ch. Comm 16 apply. Electrical components and burners may be required to be at least 18 inches from the floor in "Class I" areas including garages.

[1] See s. Comm 64.22 (7) (d) for fireplace requirements.

[2] 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.

[3] Except as provided in Footnote 4, direct–fired make–up air units shall be mechanically exhausted in the range of 90% to 110% of the air supplied.

[4] See s. Comm 64.22 (4) for other permitted uses of direct–fired unvented natural gas heaters.

[5] Boilers, water heaters, gas and liquid fuel–fired space heaters, suspended furnaces, vented and unvented unit heaters may be suspended where approved by the department. Except in factories, suspended boilers and water heaters shall be limited to up to 200,000 Btu input. All such units shall be located in an occupied space and suspended at least 7 feet above the floor. The blow–off pipe for suspended boilers and water heaters shall be extended down to within 6 inches of the floor. Infrared equipment shall be located at least 8 feet above the floor. Suspension of solid–fuel fired equipment is not permitted. See ss. Comm 51.08 and 64.22 (3) for additional requirements.

[6] Permitted with combustion air ducted to unit in occupancies less than 3,000 square feet gross area and with occupant load less than 100 persons.

[7] Permitted in kitchens to provide make–up air for kitchen exhaust systems if located outside building or in a rated enclosure.

[9] Permitted only in shops with a 3–hour separation from other areas of the school building. See s. Comm 51.08.

[10] Permitted only in shops with a 3–hour separation from other areas of the school building. See s. Comm 51.08.

[11] Gas–fired, direct–vent wall furnaces are permitted in apartments and motels. Space heaters fired with liquid fuel may be used without an enclosure in motels and apartment buildings not more than one story in height.

[12] Suspended heating units are allowed in garages if located at least 8 feet off the floor. Suspension of solid–fuel fired equipment is not permitted.

[13] 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.

[14] Solid–fuel fired space heaters are permitted in rowhouse units only.

[15] 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.

[17] See s. Comm 61.24 for requirements.

[19] See s. Comm 51.08 for hazard enclosure requirements.

[21] Includes water heaters used for space heating and for plumbing system supply.

Comm 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. Comm 41 to 42.

(b) *Installation notification.* The installing contractor shall notify the department of boiler installation, in accordance with the requirements of s. Comm 41.41 (1), before the boiler or pressure vessel is put into operation.

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

(3) SUSPENDED EQUIPMENT. (a) Equipment suspended as specified in s. Comm 64.21 shall be installed in an occupied space. Suspended equipment may be used in multiple tenant buildings providing the equipment is located in tenant spaces of an occupancy use where suspended equipment is permitted. The equipment shall be visible to persons within the room.

(b) Suspended units shall be designed and listed for such use. Furnaces designed for floor mounting only may be mounted on platforms that serve only to hold the unit.

(c) Where the clearance to the floor specified in s. Comm 64.21 cannot be provided for suspended units, provisions shall be made for maintaining clearances to combustibles and collision protection. The collision protection shall be capable of withstanding a horizontal impact load of 1,000 pounds per lineal foot. The unit shall be visible to the occupants of the room. The unit shall be suspended to provide a minimum clearance of 18 inches from the floor. The minimum clearances specified by the manufacturer shall also be provided.

(d) In factories, where the clearance to the floor specified in s. Comm 64.21 cannot be provided, a floor mounted unit may be used in accordance with this paragraph. Provisions shall be made for maintaining clearances to combustibles and collision protection. The collision protection shall be capable of withstanding a horizontal impact load of 1000 pounds per lineal foot. The unit shall be visible to the occupants of the room. The unit shall be installed to provide a minimum clearance of 18 inches from the floor to the burner. The minimum clearances specified by the manufacturer shall also be provided.

Note: See Electrical Code, Ch. Comm 16, for clearance requirements for electrical components in hazardous locations.

(e) Duct furnaces and unit heaters required to be suspended under s. Comm 64.21 may be installed in an unoccupied or concealed space without a rated enclosure providing the following conditions are met:

1. The appliance complies with the requirements for separated combustion appliances as specified in ANSI Z83.8 or Z83.9, whichever is applicable; and

2. The unit is properly suspended and clearances to combustibles are maintained as specified in the manufacturer's listing.

(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) The amount of air supplied which exceeds the building's designed infiltration rate shall be relieved through relief openings or interlocked power exhaust. Relief openings may be louvers, gravity siphon−type roof ventilators, counterbalanced gravity dampers or motorized dampers provided the motorized damper is interlocked with the supply fan so as not to permit blower operation until the damper is proved in the open position.

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

(e) Direct fired unvented natural gas heaters shall comply with ANSI Z83.18.

(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 fuel−fired space heating equipment shall be prohibited except for the equipment types and occupancies specified in Table 64.21.

(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. Comm 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.

(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 C 64, or the equivalent, at least 2 inches thick laid−in fire−clay mortar complying with the provisions of ASTM C 105, 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 subd. 1. 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 1/4 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.

Note: 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 1 1/2 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. Comm 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. Comm 54 and 55;

2. In health care facilities as specified in s. Comm 58.24 (2);

3. In common use areas of residential occupancies; and

4. In individual living units of residential occupancies except that fireplaces in individual living units of hotels and motels shall comply with the following:

a. The appliance shall be gas–fired and shall be tested and installed in accordance with standards recognized by the department.

Note: ANSI Z21.50 and ANSI Z32.60 are recognized by the department. See s. Comm 64.20(3) for listing requirements.

b. The appliance shall be designed to be ignited by an intermittent ignition device.

c. The fire box shall be provided with a permanently installed glass partition to prevent access to the fire box and appliance. The partition shall be designed to be compatible with the appliance listing.

Note: Operation of the appliance via a control located outside the fire box will be necessary.

d. Outside air shall be provided for combustion in accordance with s. Comm 64.09. Combustion air shall not be provided via infiltration.

(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. Comm 51.08.

(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.

(10) WATER HEATERS USED FOR SIMULTANEOUS SPACE HEAT AND HOT WATER SUPPLY FOR PLUMBING SYSTEM. (a) *Water heater construction standards.* Water heaters that provide simultaneous space heat and hot water supply for a plumbing system shall be listed for compliance with ANSI Z 21.10.1 or ANSI Z 21.10.3 and be specifically designed for such use. The water heater shall have an input rating of 100,000 Btu/h or less.

(b) *Heat exchanger unit.* Heat exchanger units that are part of the plumbing system shall meet the requirements of Chs. Comm 82–84.

(c) *Sizing.* The water heater shall be sized with a sufficient capacity to simultaneously offset the heat loss at design temperatures and meet the other system demands it serves. The design recovery rate of the water heater shall be less than one hour for the hot water load for plumbing at design temperatures.

Note: See ch. Comm 84 for additional requirements for water heating equipment and s. Comm 63.20 for energy conservation requirements.

(11) PROCESS EQUIPMENT. Section Comm 64.21 does not apply to process equipment unless the equipment provides water supply for a plumbing system or provides space heating, exclusive of waste heat.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97; corrections in (7) (d) 2. and (8) made under s. 13.93 (2m) (b) 7., Stats., Register, November, 1999, No. 527**;** am. (8), Register, March, 2000, No. 531, eff. 4–1–00**; am. (3) (e) 1., Register, September, 2000, No. 537, eff. 10–1–00.**

Comm 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.

(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:

1. National Fuel Gas Code, NFPA No. 54; or

2. Installation of Oil–Burning Equipment, NFPA No. 31.

(b) *Oil tank installation.* Oil tanks serving oil–burning equipment shall be installed in accordance with ch. Comm 10.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Subchapter V — Air Delivery Systems

Comm 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, March, 1997, No. 495, eff. 4–1–97.

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

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 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 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. Comm 63.29.

(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, March, 1997, No. 495, eff. 4–1–97.

Comm 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 HVAC Duct Construction Standards, Metal and Flexible and HVAC Air Duct Leakage Text Manual as published by the Sheet Metal and Air Conditioning Contractors National Association, Inc.

(2) COMBUSTIBLE DUCTS. All ducts or airways of wood or other combustible building elements 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 in fume hood exhaust ducts or for kitchen hood supply or exhaust ducts. Nonmetallic or coated metal ducts may be used to convey solids or corrosive gasses if information is provided to show the duct is suitable for the specific use and approval is granted by the department.

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

(4) ADDITIONAL DUCT SEALING. In addition to requirements of standards specified in sub.(1), where supply ductwork and plenums that are designed to operate at static pressures from 0.25 inches to 2 inches water column inclusive are located outside of the conditioned space or in return plenums, joints shall be sealed in accordance with Seal class C as defined in the SMACNA HVAC Duct Leakage Test Manual. Pressure sensitive tape shall not be used as the primary sealant where such ducts are designed to operate at static pressures of 1 inch water column or greater.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 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, March, 1997, No. 495, eff. 4–1–97.

Comm 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, March, 1997, No. 495, eff. 4–1–97.

Comm 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. Comm 63.29 for additional requirements.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

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

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

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

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

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 64.39 Ventilation discharge. All gravity and mechanical ventilation ducts shall be protected from the weather and shall be located and constructed to prevent contamination of an outside air supply. Gravity ventilation ducts shall extend not less than 2 feet above the highest portion of the building within a 10–foot radius of the duct and shall be provided with an approved type of siphon roof ventilator.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 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 s. Comm 64.05. Where barometric relief vents are installed on the roof, the discharge openings shall be not less than 2 feet above the roof surface where the vent pierces 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 s. Comm 64.05.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 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.

(b) *Ceiling systems with fire−resistive ratings.* Return air plenums shall not be placed in rated ceiling systems unless specifically allowed by the listing.

Note: 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: 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. Comm 64.34 (1) or approved nonmetallic materials in accordance with s. Comm 64.34 (3).

(3) DUCT CONNECTORS. Duct connectors shall comply with the requirements of s. Comm 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.

Note: 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. Comm 51.06, for envelope insulation is permitted provided the foam plastic is protected by a thermal barrier as specified in s. Comm 51.06 (3).

(5) HAZARDOUS PIPING. The installation of hazardous piping as defined in s. Comm 51.01 (102) is prohibited in the plenum space, except as permitted under NFPA 54.

(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. Comm 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 noncombustible insulation or enclosed with 1/2 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. Comm 50.03 (1) or (2), the entire plenum space, new and existing, shall be provided with a smoke detection system according to par. (a).

(c) *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, March, 1997, No. 495, eff. 4−1−97.

Comm 64.42 Fire dampers and ceiling dampers. History: Cr. Register, March, 1997, No. 495, eff. 4−1−97; correction in (2) (d) made under s. 13.93 (2m) (b) 7., Stats., Register, November, 1999, No. 527**;** r. Register, March, 2000, No. 531, eff. 4−1−00.

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

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

History: Cr. Register, March, 1997, No. 495, eff. 4−1−97.

Comm 64.44 Fans and blowers. 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.

History: Cr. Register, March, 1997, No. 495, eff. 4−1−97.

Subchapter VI — Chimneys, Gas Vents, Mechanical Draft and Venting Devices

Comm 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. Comm 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 211.

(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 of the roof where the chimneys or smokestacks pass through the roof of the building, and at least 2 feet higher than any portion of the building measured 10 feet horizontally from 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 of the roof where the vents or pipes pass through the roof of the building, and at least 2 feet higher than any portion of the building measured 10 feet horizontally from 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, March, 1997, No. 495, eff. 4−1−97; am. (1), Register, February, 1999, No. 518, eff. 3−1−99.

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

(1) MATERIALS. The walls shall be built of brick or other approved fire−resistive material. No chimney shall rest upon a flooring of wood nor shall any wood be built into or in contact with any chimney. Combustible headers, beams, joists and studs shall be located at least 2 inches from the outside face of a chimney.

The foundation shall be designed and built in conformity with the requirements for foundations for buildings. In no case shall a chimney be corbeled out more than 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. Comm 53.12.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 64.47 Metal smokestacks. (1) SMOKESTACKS IN EXCESS OF 30 FEET. (a) 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.

(b) Public utility or industrial power plants are exempted from the protection requirements of this paragraph if they are of type 1 or 2 construction.

(2) SMOKESTACKS LESS THAN 30 FEET. Smokestacks less than 30 feet high may be constructed of not less than No. 10 U.S. gauge steel, with either welded or riveted joints, and may be mounted directly upon masonry chimneys or foundations or upon industrial heating or power boilers provided all of which are designed to support the stack load. A clearance of not less than 6 inches shall be maintained at all times around such smokestacks and any combustible material within 12 inches of such smokestacks shall be protected by noncombustible insulation covered by sheet metal.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 64.48 Factory–built chimneys and gas vents. (1) GENERAL. Factory–built chimneys and gas vents shall be of an approved type.

(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.

Note: Residential type and building heating appliance chimneys were formerly referred to as Class A chimneys.

(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. Comm 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, March, 1997, No. 495, eff. 4–1–97.

Comm 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. Comm 64.48 and for connectors as specified in s. Comm 64.50. Commercial kitchen appliances including but not limited to ranges, ovens, booster heaters and similar equipment may be vented into the kitchen hood exhaust system.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 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.* 1. 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:

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

b. 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;

c. 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

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

Note: Engineered venting systems designed in accordance with NFPA 54, "National Fuel Gas Code" are acceptable to the department.

2. Gas utilization appliances and appliances burning liquid fuel may be connected to one chimney flue in accordance with NFPA 211.

(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 1/4 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 automatically 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. 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	Minimum 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, March, 1997, No. 495, eff. 4–1–97.

Subchapter VII — Equipment Location, Protection, Maintenance and Operation

Comm 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. (a) 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.

(b) Surfaces that are located less than 7 feet above the floor that exceed 180°F in temperature shall be covered with insulating material or be guarded.

(3) GUARDING OF MECHANICAL APPARATUS. All mechanical apparatus shall be guarded to comply with the requirements of ch. Comm 32––Safety and Health Standards for Public Employes.

(4) FIRE PROTECTION. (a) Heat–producing appliances and their chimney or vent connectors shall be installed with clearances to combustible material as specified in NFPA 211 unless listed for installation at other clearances.

(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, March, 1997, No. 495, eff. 4–1–97; am. (4) (a), Register, March, 2000, No. 531, eff. 4–1–00.

Comm 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. Clearances and accessibility shall be provided for equipment maintenance. 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, March, 1997, No. 495, eff. 4–1–97.

Comm 64.53 Final test required. **(1)** The designer, installer or recognized balancing agency shall be responsible for the testing and balancing of every heating, ventilating and air conditioning system. The person or agency responsible for balancing of the ventilating system shall document in writing the amount of outdoor air being provided and distributed for the building occupants and any other specialty ventilation. The document shall be retained at the site and shall be made available to the department upon request.

(2) (a) Air systems shall be balanced in a manner to minimize losses from damper throttling by first adjusting fan speed then adjusting dampers to meet design flow conditions. Balancing procedures shall be acceptable to the department. Damper throttling alone may be used for air system balancing with fan motors of 1 hp or less, or if throttling results in no greater than 1/3 hp fan horsepower draw above that required if the fan speed were adjusted.

(b) 1. Except as provided in subd. 2., hydronic systems shall be balanced in a manner to minimize valve throttling losses by first trimming the pump impeller or adjusting the pump speed then adjusting the valves to meet design flow conditions.

2. As an exception to subd. 1., valve throttling alone may be used for hydronic system balancing under any of the following conditions:

a. Pumps with pump motors of 10 hp or less;

b. If throttling results in no greater than 3 hp pump horsepower draw for pumps of 60 hp or less, or no greater than 5% of pump horse power draw for pumps greater than 60 hp, above that required if the impeller were trimmed;

c. To reserve additional pump pressure capability in open circuit piping systems subject to fouling. Valve throttling pressure drop shall not exceed that expected for future fouling; or

d. Where it can be shown that throttling will not increase overall building energy costs.

(3) An operating and maintenance manual shall be provided to the building owner or operator. The manual shall include basic data relating to the operation and maintenance of HVAC systems and equipment. Required routine maintenance actions shall be clearly identified. Where applicable, HVAC controls information such as diagrams, schematics, control sequence descriptions, and maintenance and calibration information shall be included.

Note: National Environmental Balancing Bureau(NEBB) Procedural Standards, the Associated Air Balance Council(AABC) National Standards or equivalent balancing procedures are acceptable to the department.

(4) HVAC control systems shall be tested to assure that control elements are calibrated, adjusted, and in proper working condition.

Note: Submittal of the compliance statement is accepted as verification of compliance with this section.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Subchapter VIII — Occupancy Requirements

Comm 64.54 Factories, office and mercantile buildings. (1) SCOPE. This section applies to 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. Comm 64.05, Table 1.

(2) VENTILATION.. The air change, supply and distribution for all occupancies in this class shall conform to the requirements of s. Comm 64.05, 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 ch. Comm 32, Safety and Health Standards for Public Employes.

(b) *Make–up air.* Make–up air shall be provided as required by s. Comm 64.14. The quantity of make–up air shall equal at least 90% of the air exhausted.

Note: The quantity of makeup air shall equal at least 90% of the air exhausted.

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

(4) LOCKER ROOMS AND CHANGE ROOMS. Locker rooms and change rooms provided in accordance with s. Comm 54.13 (1) for employes exposed to toxic materials or industrial poisons shall be provided with a direct supply of outside air or air that is transferred from uncontaminated areas. All other locker rooms shall be provided with outside air as specified in Table 64.05.

Note: Exhaust air from locker rooms other than those provided in accordance with s. Comm 54.13 may be directed through the adjoining toilet room or shower room.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 64.55 Theaters and places of assembly. (1) SCOPE. This section applies to all 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. Comm 64.54.

(2) VENTILATION. The air change, supply and distribution for all occupancies under this classification shall conform to the requirements of s. Comm 64.05.

(3) ALTERNATE SERVICE AND CAPACITY. Heating and ventilating systems installed in places of worship, Sunday schools, 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.

Note: See ss. Comm 55.21 through 55.23 concerning proscenium walls and curtains.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 64.56 Schools and other places of instruction. (1) SCOPE. This section applies 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. (a) The air change, supply and distribution shall conform to the requirements of s. Comm 64.05.

(b) For corridors provided with lockers, the air supply shall be accomplished by means of air inlets admitting air from adjacent classrooms or by a direct tempered air supply. Air from corridors with lockers may be recirculated.

(3) EXHAUST SYSTEMS AND HEAT RECOVERY. (a) An exhaust system, as specified in s. Comm 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.

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, March, 1997, No. 495, eff. 4–1–97.

Comm 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 sections shall be designed, operated and maintained as specified in AIA, "Guidelines for Construction and Equipment of Hospital and Medical Facilities."

Note: Newer versions of the Guidelines may be used in their entirety when approved by the Department.

Note: The 1992–93 edition of the Guidelines has been deemed as acceptable and although other portions of the Guidelines may be used for determining the needs of the HVAC system, the majority of the requirements pertaining to the HVAC system will be found in sections 2, 7.31.A. to D., 8.11.A. to D., 9.2.L., 9.4.I., 9.5.L., and 9.6.J of that standard.

Note: The newest version of the Guidelines which has been deemed acceptable is the 1996–97 edition titled "Guidelines for Design and Construction of Hospital and Health Care Facilities" Although other portions of the Guidelines may be used for determining the needs of the HVAC system, the majority of the requirements pertaining to the HVAC system will be found in sections 2, 7.31.A. to D., 8.31.A. to D., 9.31.L., 9.4.I., 9.5.L., and 9.6.J of the newest standard.

(b) The heating, ventilating and air conditioning system shall also be designed, operated and maintained as specified in the applicable sections of the following standards as referenced in AIA, "Guidelines for Construction and Equipment of Hospital and Medical Facilities."

1. NFPA No. 90A;
2. ASHRAE Handbook of Fundamentals; and
3. ASHRAE Standard No. 52.

(3) APPLICATION OF RULES. Where other provisions of ch. Comm 64 specify different requirements than those contained in this section, the requirements in sub.(2) shall govern.

Comm 64.58 Penal institutions and places of detention. (1) SCOPE. This section applies to all corridors and areas of compulsory occupancy in penal institutions, mental hospitals and other places of detention.

(2) VENTILATION. The air change, supply and distribution for all areas of this class shall conform to the requirements of s. Comm 64.05.

(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, March, 1997, No. 495, eff. 4–1–97.

Comm 64.59 Residential occupancies. (1) SCOPE. This section applies to all apartments, row houses, rooming houses, hotels, motels, dormitories, and all other places of abode.

Note: See s. Comm 51.01 (102a) for definition of "place of abode."

(2) VENTILATION. The air change, supply and distribution for all areas of this class shall conform to the requirements of s. Comm 64.05.

(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, March, 1997, No. 495, eff. 4–1–97.

Comm 64.60 Day care facilities. (1) SCOPE. This section applies to 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 change, supply and distribution for all areas of this class shall conform to the requirements of s. Comm 64.05.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 64.61 Repair areas. (1) SCOPE. This section applies to 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 change, supply and distribution shall be provided in accordance with the requirements of s. Comm 64.05. The exhaust air shall be drawn from not more than 18 inches above the floor.

(3) TAIL PIPE EXHAUST. (a) *Mechanical exhaust system.* A mechanical exhaust system shall be provided in the repair area to remove the exhaust fumes from internal combustion engines. The duct system shall be designed with sufficient outlets to accommodate the total number of vehicles in the repair area. A flexible hose, equipped with a device for connecting it to the exhaust pipe of the vehicle and to the exhaust system, shall be provided. Each outlet shall be provided with a shut–off valve that can be closed when not in use. The blower capacity shall be sufficient to exhaust a volume of air not less than 100 cubic feet per minute for each opening.

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

Note: The requirements stated in sub.(2) need not be increased when satisfying the requirements of either sub.(3) (a) or(b). Also see ch. Comm 32, Safety and Health Standards for Public Employes.

(4) MISCELLANEOUS REPAIR AREAS. Areas involved in the servicing of small internal combustion engines such as lawn mowers, snowmobiles, chainsaws, cycles, boat engines, and similar types of engines, and battery charging areas, shall be ventilated as required for repair areas under s. Comm 64.05.

(5) CONTAMINANTS. If the provisions of this section do not provide sufficient ventilation to meet the standards for threshold limit values covered in ch. Comm 32, Safety and Health Standards for Public Employes, the additional exhaust requirements with an equivalent volume of outside air shall be provided to satisfy the requirements found in ch. Comm 32.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 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.

(2) VENTILATION. (a) Air change, supply, distribution and exhaust shall be provided as specified in s. Comm 64.05.

(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 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.

(c) If the provisions of this section do not provide sufficient ventilation to meet the standards for threshold limit values covered in ch. Comm 32, Safety and Health Standards for Public Employes, the additional exhaust requirements with an equivalent volume of outside air shall be provided to satisfy the requirements found in ch. Comm 32.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 64.63 Garages. (1) SCOPE. This section applies to all buildings, or parts of buildings, into which motor vehicles are driven for loading or unloading or are stored.

(2) VENTILATION. (a) Except as permitted in pars. (b), (c) and (d), the air change, supply and distribution for garages shall be provided in accordance with s. Comm 64.05. Exhaust air shall be drawn not more than 18 inches above the floor.

(b) The air change, supply and distribution for a storage garage accommodating 6 or more vehicles may be provided by permanent open–wall areas, if:

1. The open–wall areas equal at least 30% of the total wall area enclosing the garage;

2. The open–wall areas are distributed to permit air circulation throughout the garage; and

3. The entire floor of the garage is located at or above grade.

(c) The air movement, supply and distribution for a storage garage accommodating 6 or more vehicles may be provided by 3% openings that comply with s. Comm 64.05 (4) if:

1. The building is unoccupied.

2. The storage garage building does not contain and is not attached to any other occupancy or use.

3. The entire floor of the garage is located at or above grade.

(d) An intermittent mechanical exhaust ventilation system may be used in lieu of continuous exhaust if the conditions given in subds. 1. and 2. are met.

1. The system shall be activated to provide exhaust ventilation rates specified in s. Comm 64.05 by a continuous monitoring and detection system which can maintain carbon monoxide levels below 35 ppm and nitrogen dioxide levels below one ppm.

2. The system shall be provided with automatic controls to provide exhaust ventilation at a rate of 1/2 cfm per square foot for a total of at least five hours in each 24–hour period.

3. A means shall be provided to maintain negative pressure relative to adjacent areas.

(3) CONTAMINANTS. If the provisions of this section do not provide sufficient ventilation to meet the standards for threshold limit values covered in ch. Comm 32, Safety and Health Standard

for Public Employes, the additional exhaust requirements with an equivalent volume of outside air shall be provided to satisfy the requirements found in ch. Comm 32.

Comm 64.64 Vehicle showrooms. (1) SCOPE. This section applies to all vehicle showrooms with offices and occupancies unless designed as part of the vehicle garage adjacent to repair or vehicle storage areas 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 change, supply and distribution shall be provided in accordance with the requirements of s. Comm 64.05.

(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. Comm 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 ch. Comm 32, Safety and Health Standards for Public Employes, the additional exhaust requirements with an equivalent volume of outside air shall be provided to satisfy the requirements found in ch. Comm 32.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 64.65 General sanitation and service areas. (1) SCOPE. This section applies to toilet rooms, diaper changing rooms, locker rooms, shower rooms, and janitor closets. Separate diaper changing rooms shall be ventilated in the same manner as required for toilet rooms at 2 cfm per square foot.

(2) EXHAUST VENTILATING SYSTEMS. Exhaust ventilating systems serving this class of occupancy may 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 ch. Comm 32, exhaust that requires electrical grounding, or exhaust that requires spark resistant fan construction.

(3) VENTILATING SYSTEM APPLICATION. Ventilation shall be provided for all areas of this class in accordance with this subsection. Areas of this class that are not ventilated in accordance with applicable pars. (a) through (e) shall be provided with mechanical exhaust ventilation as specified in s. Comm 64.05. The effectiveness of the exhaust shall be greater than the supply.

(a) Toilet rooms that have only one water closet or urinal shall be provided with either natural ventilation via a window with at least 2 square feet of area openable directly to the outside, or mechanical exhaust ventilation as specified in s. Comm 64.05. Toilet rooms that have only one water closet or urinal that are not located in restaurants or taverns may use an approved ductless air circulating and treatment device in place of natural or exhaust ventilation.

(b) Janitor closets that have only one service sink or receptor shall be provided with either natural ventilation via a window with at least 2 square feet of area openable directly to the outside, or an approved ductless air circulating and treatment device, or mechanical exhaust ventilation as specified in s. Comm 64.05.

(c) Bathrooms with one bathtub or shower, or one combined tub and shower, and one water closet or urinal shall be provided with mechanical exhaust ventilation capable of exhausting 50 cubic feet per minute.

(d) Adjoining locker, shower and toilet rooms shall be exhausted at the rate specified in s. Comm 64.05, based on the largest amount of exhaust required for any of the three rooms. The rooms shall be provided with tempered make–up air supplied directly from the outside or transferred from other areas of the building in accordance with s. Comm 64.18. A negative pressure relationship shall be maintained in the shower and toilet rooms with respect to the locker room.

(e) Rooms for the changing of clothing only with provisions for short–term storage of clothes, other than areas for industrial employes as specified in s. Comm 64.54 or areas for employes exposed to toxic materials as specified in s. Comm 54.13, shall be ventilated as changing rooms as specified in s. Comm 64.05, Table 64.05. This paragraph does not apply to shower or toilet rooms.

(f) Chemical or septic toilets shall not be placed in rooms provided with mechanical ventilation. Toilet rooms with chemical or septic toilets shall be provided with natural ventilation via a window with at least 2 square feet of area openable directly to the outside. The window shall be provided with a screen to limit the passage of insects and vermin.

(4) MAINTENANCE OF NEGATIVE PRESSURE. Toilet rooms and janitor closets shall be provided with negative pressure relative to adjacent areas. If supply air is provided to toilet rooms or janitor closets, the exhaust must also be provided simultaneously.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.

Comm 64.66 Natatoriums. (1) POOL VENTILATION. In natatoriums, a volume of tempered outside air supply and exhaust shall be provided at the rate specified in s. Comm 64.05. The tempered outside air may be supplied directly from the outside or transferred from other areas of the building in accordance with s. Comm 64.18. The volume of tempered air and exhaust may be reduced to a minimum of one cubic foot per minute per square foot of pool surface provided automatic humidity controls are used to limit the relative humidity to 60%.

(2) AIR MOVEMENT. The air change rate 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, March, 1997, No. 495, eff. 4–1–97.

Comm 64.67 Kitchens. (1) SCOPE. This section applies to all areas where food is prepared, except in domestic science educational facilities from grades kindergarten through 12, and within individual dwelling units of buildings under the scope of chs. Comm 57 and Comm 66.

(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 specified in s. Comm 64.05 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 7.5 cfm per person or natural ventilation with openings equal in area to 3% of the floor area as specified in s. Comm 64.07 shall be provided during periods of occupancy.

(b) *Kitchen exhaust hoods.* Cooking equipment which produces grease laden vapors, including but not limited to fryers, grills, griddles and broilers, shall be provided with a kitchen exhaust hood, except an exhaust hood does not have to be provided for a single piece of equipment if:

1. The piece of equipment has a frying/cooking surface area of 4 square feet or less; and

2. The piece of equipment is the only piece of grease–producing equipment for the entire food preparation operation.

(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 = 125 cfm A (area).

2. 'Wall hood.' Hood open on 3 sides or less: Q = 80 cfm 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; and

4. 'Noncanopy hood.' The minimum volume of exhaust air for noncanopy type hoods(prefabricated backshelf) may be not less than Q = 200 cfm 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.

Note: The Department of Health and Social Services(DHSS) may have additional requirements for materials in commercial food preparation areas. For more information, contact the DHSS Environmental Sanitation Unit.

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

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

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

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

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

(f) *Duct enclosure.* 1. A grease duct that penetrates or passes through any ceiling, wall or floor shall be completely enclosed from the point of penetration to the outlet terminal.

2. The duct enclosure shall meet one of the following requirements:

a. The duct shall be enclosed in a noncombustible 2–hour rated fire–resistive enclosure.

b. The duct shall be completely covered on all sides with a material classified and labeled for such purpose and the penetration shall be protected with a classified through–penetration firestop system with F and T ratings at least equal to the rating of the assembly being penetrated.

(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.* 1. 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.

2. Dampers shall be accessible for cleaning and maintenance.

(6) AUTOMATIC SUPPRESSION SYSTEMS. (a) *General.* 1. Exhaust hood and duct systems in commercial kitchen applications shall be protected with an automatic fire suppression system.

2. The type of automatic fire suppression system used shall be recognized by a national standard as being appropriate for use in commercial kitchen applications.

3. Manufactured fire suppression systems shall be listed and labeled for use in commercial kitchen applications or shall comply with one of the applicable standards listed in s. Comm 51.235.

4. Alternate suppression systems shall comply with the applicable standard listed in s. Comm 51.235.

5. Automatic fire sprinkler systems shall comply with s. Comm 51.23.

(b) *System interconnection*. 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;

(c) *Actuation.* 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.

(d) *Manual actuator location.* 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 and shall be securely mounted not less than 4 1/2 feet nor more than 5 feet above the floor, unless otherwise specifically approved by the chief of the fire department having jurisdiction;

(e) *Maintenance*. The automatic fire suppression system shall be maintained at full operating capacity by the owner in accordance with its listing, the manufacturer's instructions and the maintenance requirements of ss. Comm 51.23 or 51.235.

(f) *Service accessibility.* All nozzles shall be accessible for cleaning and replacement.

(g) *Carbon dioxide systems.* Carbon dioxide systems protecting commercial cooking equipment shall be installed in accordance with NFPA 12 and the following provisions:

1. A nozzle shall be provided at the top of the duct.

2. Where ducts exceed 20 feet of vertical distance or 50 feet of horizontal distance, additional nozzles shall be installed within the duct in a symmetrical pattern to give uniform distribution of carbon dioxide.

3. a. Dampers shall be installed at either the top or the bottom of the duct and shall operate automatically upon activation of the carbon dioxide system.

b. Where the damper is located at the top of the duct, the top nozzle shall be immediately below the damper.

4. The carbon dioxide system shall be sized to protect all hazards venting through a common duct simultaneously.

(h) *Automatic fire sprinkler systems.* Automatic fire sprinkler systems protecting commercial cooking equipment shall be installed in accordance with NFPA 13 and the following provisions:

1. Automatic sprinkler systems protecting commercial cooking equipment shall be provided with a separate, readily–accessible indicating–type control valve that is clearly identified.

2. Sprinklers used to protect fryers shall be listed for such use and shall be installed in accordance with the listing.

(7) SUPPLY DUCTS TO HOODS. Kitchen hood supply ducts shall meet SMACNA gauge steel thicknesses. Exhaust hood assemblies with integrated air supply plenums shall be designed and provided with a fire–actuated damper as specified in NFPA 96.

(8) MAINTENANCE OF DUCT AND HOOD SYSTEMS. Duct and hood systems shall be maintained in accordance with NFPA 96.

(9) PORTABLE FIRE EXTINGUISHERS. (a) Portable fire extinguishers shall be provided in accordance with s. Comm 51.22.

(b) The extinguishing agent in the portable fire extinguisher shall be compatible with the extinguishing agent in the automatic suppression system as determined by the manufacturers.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97; am. (1), r. and recr. (5) (f), r. (6) (intro.), renum. (6) (a) to (e) to be (6) (b) to (f), cr. (6) (a), (g), (h), (8) and (9) and am. (6) (e) as renum., Register, March, 2000, No. 531, eff. 4–1–00.

Comm 64.68 Seasonal occupancies. When approved in writing by the department, heating requirements may be waived but not ventilation required by s. Comm 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. DWD 301.

History: Cr. Register, March, 1997, No. 495, eff. 4–1–97.