

Boiler and furnace rooms-----Wis. Adm. Code sections Ind 54.13,
 Ind 55.29, 56.15, 57.20, 57.50

Heating and ventilating equipment and
 wiring-----Wis. Adm. Code section E 1-E 900

Ind 59.22 Design conditions. (1) INSTALLATION OF EQUIPMENT. All heating, ventilating and air conditioning installations shall be designed and installed to provide the service and results required by this code.

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.

(2) **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 provided in this code.

(3) **OUTSIDE TEMPERATURE DESIGN CONDITIONS.** In the accompanying map, the state of Wisconsin has been divided into 3 zones. The maximum heat losses for a heating system shall be calculated on the basis of the temperatures indicated in Table 1 with reference to location of the project in each respective zone.

(4) **INSIDE TEMPERATURE DESIGN AND OPERATION CONDITIONS.** The heating system shall be designed to maintain a temperature of not less than that shown in Table 2 and must be operated at not less than that temperature during occupied periods.

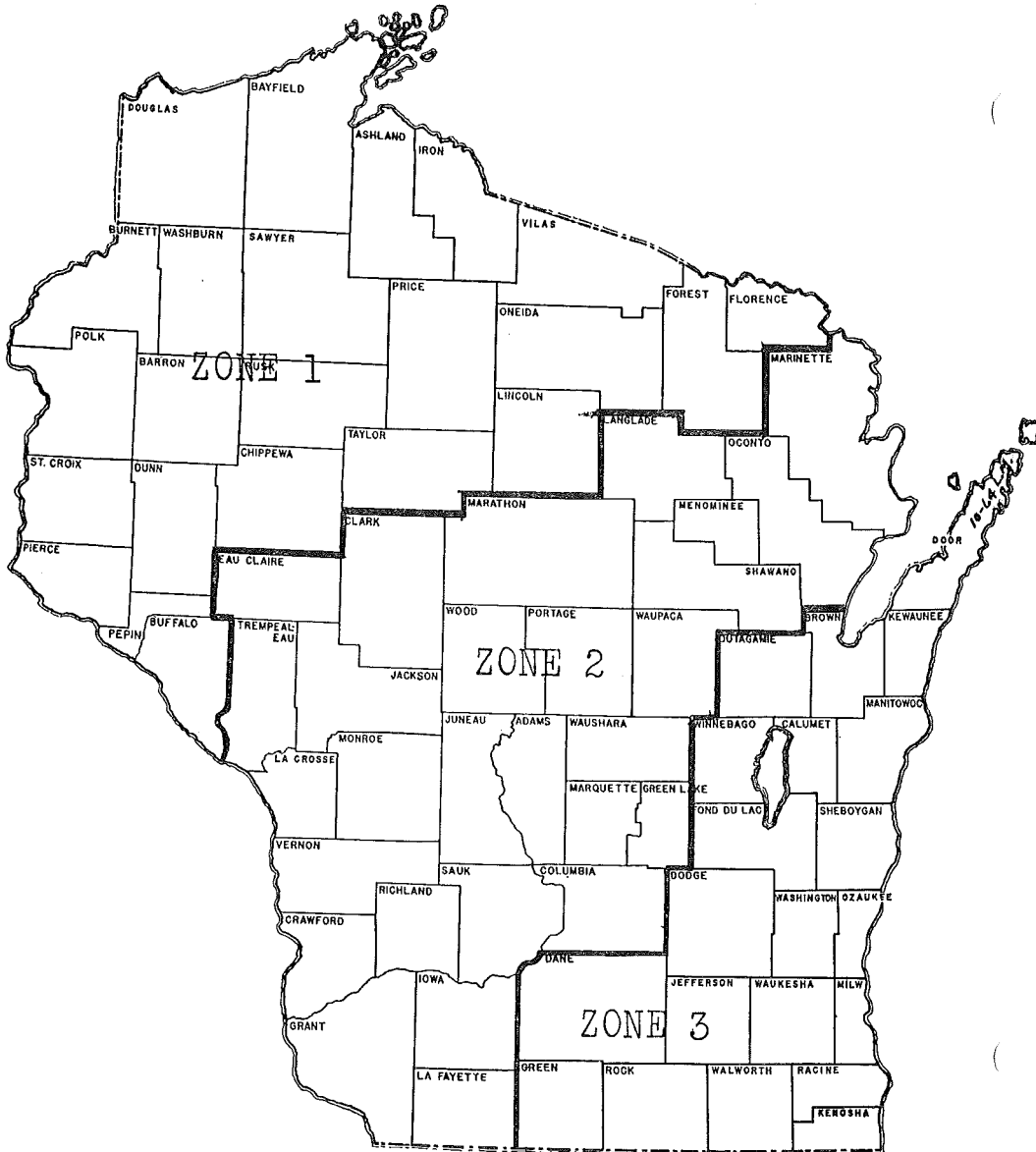
TABLE 2

Type of Building	Deg. Fahr.	Type of Building	Deg. Fahr.
Barber Shops and Beauty Parlors	67	Hotels:	
Schools:		Bedrooms and Baths	67
Classrooms	67	Dining Rooms	67
Gymnasiums	55	Kitchens and Laundries	60
Wardrobe	67	Ballrooms and Assembly Halls	67
Locker and Shower Rooms	70	Service Rooms	60
Kitchens	60	Residential:	
Dining and Lunch Rooms	65	Apartments	67
Play Rooms	60	Housing for the Elderly	70
Natoriums and Bathrooms	70	Jails	67
Toilet Rooms	65	Offices	67
Hospitals and Nursing Homes:		Stores	65
Private Rooms	75	Factories and Machine Shops	60
Operating Rooms	70	Foundries and Boiler Shops	50
Wards	75	Toilet and Locker Rooms:	
Kitchens and Laundries	60	General	65
Bathrooms	75	With Shower	70
Toilet Rooms	75	Garages:	
Libraries and Museums	67	Repair and Service Areas	60
Theaters and Assembly Halls:		Storage and Parking	NMR
Seating Space	67	Warehouses	NMR
Lounge Rooms	67		

NMR = No minimum required.

(5) **AIR-CLEANSING APPARATUS. (a)** Air-cleansing apparatus shall be designed and installed to permit access to the equipment for maintenance and to insure proper operation of the heating and ventilating system.

TABLE 1
MAP OF WISCONSIN SHOWING DESIGN TEMPERATURE ZONES



Zone 1 - - - - - 30° Below Zero F.
 Zone 2 - - - - - 25° Below Zero F.
 Zone 3 - - - - - 15° Below Zero F.

Register, May, 1974, No. 221
 Building and heating, ventilating
 and air conditioning code

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 161
Heating, Ventilating
and Air Conditioning

(6) **SUPPLY AIR TEMPERATURE.** The design condition of the supply air temperature shall not exceed 140° Fahrenheit.

(7) **CONTROLS.** Where ventilation is required by this code, controls shall be provided so that minimum air circulation, supply and exhaust shall be maintained continuously during periods of occupancy.

(8) **AIR QUANTITY.** The quantity of air used to ventilate a given space during period of occupancy shall always be sufficient to maintain the standards of air temperature, air quality, air motion and air distribution as required by this code. (See Wis. Adm. Code section Ind 59.24).

(9) **NUMBER AND ARRANGEMENTS.** The capacity, number and arrangement of outlets, returns and exhausts shall insure a uniform distribution of air.

(10) **ELEVATOR SHAFTS AND STAIRWELLS.** Air shall not be transferred through elevator shafts and stairwells where doors are required at any floor level.

(11) **GRILLES OR DIFFUSERS REQUIRED.** All air supply outlets and returns shall be equipped with grilles or devices which will provide a uniform distribution of air.

(12) **CORRIDOR VENTILATION.** Air in a volume equal to the outside air required from a room may be discharged and recirculated through a corridor and exhausted through lockers, toilet rooms, kitchens, janitor closets and similar areas. Additional exhaust ventilation shall be provided where the volume of air exhausted from the corridor is less than the volume of air supplied.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65; am. table 2, cr. (9), (10), (11) and (12), Register, September, 1973, No. 213, eff. 10-1-73; emerg. r. and recr. (4), eff. 1-5-74; r. and recr. (4), Register, May, 1974, No. 221, eff. 6-1-74.

Ind 59.24 General requirements for heating, ventilating and exhaust systems. (1) **HEATING SYSTEMS REQUIRED.** Heating systems complying with the requirements of this code shall be provided, maintained and operated for all occupied areas within the scope of this code.

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

- (a) Any surface temperatures that exceed 180° F.
- (b) Surfaces that are likely to cause lacerations.

Note: For more restrictive conditions, see Ind 59.66 (2).

(3) **VENTILATING SYSTEMS REQUIRED.** Ventilating systems shall be provided, maintained and operated to accomplish required ventilation service for all occupied areas within the scope of this code.

Note: Cross reference: For requirements pertaining to all places of employment or occupancy where smoke, gas, dust, fumes, steam, vapor, industrial poisons, or other detrimental materials are used, stored, handled, or are present in the air in sufficient quantities to obstruct the vision, or to be irritating, or to be injurious to the health, safety or welfare of the employees or frequenters, see Wis. Adm. Code Chapter Ind 20—Dusts, Fumes, Vapors and Gases.

(4) **NATURAL VENTILATION.** Where outdoor openings are used for natural ventilation the openings shall be within 100 feet, or 5 times the least dimensional width of the occupied area, whichever is the least.

Register, May, 1974, No. 221
Building and heating, ventilating
and air conditioning code

(a) Outdoor openings below grade will not be accepted unless there is a clear space outside of the opening having a width not less than $1\frac{1}{2}$ 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 shall be at least 5 feet from a property line and/or lot line or an adjacent building on the same property. This distance restriction does not apply to property lines along streets.

Note: For further restrictions, see Table 51.03-B and section Ind 59.60.

(5) GRAVITY DIRECT-INDIRECT SYSTEMS. The installation of gravity direct-indirect systems is prohibited.

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

(6) HOT WATER HEATING AND VENTILATING SYSTEMS. Hot water systems installed in areas where ventilation is required under this code shall comply with the following requirement:

(a) The system hot water shall be circulated continuously by mechanical means.

(7) EXHAUST VENTILATING SYSTEM. (a) Exhaust ventilating systems shall be designed to reasonably prevent contaminated air reentering the building.

(b) The required exhaust ventilating systems shall operate continuously whenever the space exhausted is occupied.

Note: See Wis. Adm. Code Chapter Ind 20.

(8) TEMPERED AIR SUPPLY. (a) Where ventilation is affected by exhaust methods, an outside tempered air supply shall be provided to replace the air exhausted from the area if the volume of air exhausted exceeds one air change per hour.

(b) Where heat gain from a process is equal to all or part of the ventilation heat load, the air may be recirculated and supplied mechanically within the immediate area and mixed with a quantity of outside air to temper the air supply, provided that dampers and temperature controls are installed in the system to maintain a discharge temperature of not less than 50° F.

Note: See other applicable sections of Chapter Ind 59 for further restrictions.

(c) A tempered air supply depending on a negative pressure within the space is prohibited except in foundries, steel fabricating shops and similar areas.

(9) CONTAMINATION OF ADJACENT AREA. The ventilation of all equipment and system service rooms which house sources of odors, fumes, noxious gases, smoke, steam, dust, spray, or other contamination, shall be such as to prevent spreading of any such contamination to other parts of the building occupied by people.

(a) 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

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 163
Heating, Ventilating
and Air Conditioning

Freon F-114. For example, these materials are used in dry cleaning establishments, in degreasing operations, and where pressure can propellants are used. Pressure cans are used for such products as enamels, lacquers, paint removers, stencil inks, lubricants, pesticides, hair sprays, shaving lathers, shampoos and colognes.

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

2. The volume and distribution of air movement within the area shall be such that the average threshold limit values of specific airborne contaminants are not exceeded. See Wis. Adm. Code Chapter Ind 20—Dusts, Fumes, Vapors and Gases.

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

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

Note: Toxic materials are those covered in Wis. Adm. Code Chapter Ind 20—Dusts, Fumes, Vapors and Gases.

(b) Ventilation air shall not be drawn from an area of greater contamination to satisfy code requirements.

Note: The following examples are typical of acceptable systems: corridor to toilet; corridor to cloak rooms or janitor closets; dining room to kitchen; locker room to toilet room; gymnasium to locker room; and showroom to garage.

(10) **FINAL TEST REQUIRED.** The designer or installer shall be responsible for the testing and balancing of every heating, ventilating and air conditioning system.

(11) **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, January, 1965, No. 109, eff. 2-1-65; r. and recr., Register, September, 1973, No. 213, eff. 10-1-73.

Ind 59.25 Maintenance and operation. (1) MAINTENANCE. All heating, ventilating, exhaust and air conditioning systems shall be maintained in good working order and shall be kept clean and sanitary.

(2) **OPERATION.** All heating, ventilating and exhaust systems shall be operated to satisfy the requirements of this code during periods the building is occupied unless otherwise exempted by this code.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65.

Ind 59.40 Occupancy classification. (1) The various occupancies to which the provisions of this code apply shall be classified as follows:

- (a) Require ventilation on an occupancy basis.
- (b) Require ventilation on an occupancy basis unless otherwise exempted.
- (c) Require exhaust.
- (d) Require ventilation on the basis of floor area.

(2) Table 3 is a list of occupancies to determine ventilation requirements and number of persons.

Register, May, 1974, No. 221
Building and heating, ventilating
and air conditioning code

TABLE 3

Use or Occupancy	Classification	Basis of Capacity
Arenas and field houses*-----	(a)	4 sq. ft. per person. Use seated area only.
Armories (drill halls)-----	(a)	30 sq. ft. per person.
Assembly halls*-----	(a) or (b)	7 sq. ft. per person. See Wis. Adm. Code section Ind 59.42.
Banquet halls*-----	(a) or (b)	15 sq. ft. per person. See Wis. Adm. Code section Ind 59.42.
Barber shops-----	(b)	20 sq. ft. per person. See Wis. Adm. Code section Ind 59.51.
Bath and shower rooms-----	(c)	See Wis. Adm. Code section Ind 59.48.
Beauty parlors-----	(b)	20 sq. ft. per person. See Wis. Adm. Code section Ind 59.51.
Billiard rooms-----	(a) or (b)	15 sq. ft. per person. See Wis. Adm. Code section Ind 59.51.
Bowling alleys-----	(a) or (b)	Seating capacity, plus 6 persons per alley. Terminate occupied area at foul line. See Wis. Adm. Code section Ind 59.51.
Brokerage board rooms-----	(a) or (b)	7 sq. ft. per person. See Wis. Adm. Code section Ind 59.51.
Cafeterias*-----	(a) or (b)	15 sq. ft. per person. See Wis. Adm. Code section Ind 59.42.
Churches and places of worship--	(a) or (b)	See Wis. Adm. Code section Ind 59.44.
Chapel-----	(a) or (b)	7 sq. ft. per person.
Dining and social rooms-----	(a) or (b)	15 sq. ft. per person.
Nave or auditorium-----	(a) or (b)	7 sq. ft. per person.
Club rooms-----	(a) or (b)	Depends on usage.
Dance halls-----	(a) or (b)	15 sq. ft. per person. See Wis. Adm. Code section Ind 59.51.
Dining rooms*-----	(a) or (b)	15 sq. ft. per person. See Wis. Adm. Code section Ind 59.42.
Educational facilities†		
Academic classrooms-regular--	(a)	20 sq. ft. per person.
Administrative and office space	(a) or (b)	75 sq. ft. per person.
Arts, crafts, drafting-----	(a) or (c)	30 sq. ft. per person. Also see Wis. Adm. Code chapter Ind 20—Dusts, Fumes, Vapors and Gases.
Bleachers-----	(a)	One seat per 18 inches of bench length.
Gymnasiums, field houses, auditoriums, theaters, lecture rooms (fixed seating)-----	(a)	6 sq. ft. per person.
Gymnasiums, field houses, multipurpose rooms, cafeterias, study halls, commons and other level floor areas with nonfixed individual seating-----	(a)	10 sq. ft. per person.
Home economics, business education-----	(a)	30 sq. ft. per person.
Industrial arts-vocational shop-----	(a) or (c)	50 sq. ft. per person. See Ind 59.52 and Wis. Adm. Code chapter Ind 20—Dusts, Fumes, Vapors and Gases.
Laboratories-science (fixed lab. tables)-----	(a) or (c)	30 sq. ft. per person. Also see Wis. Adm. Code chapter Ind 20—Dusts, Fumes, Vapors and Gases.
Libraries and resource centers	(a)	20 sq. ft. per person.
Museums and art galleries----	(a)	40 sq. ft. per person.
Music		
Vocal-----	(a)	10 sq. ft. per person.
Instrumental-----	(a)	20 sq. ft. per person.
Special education (mentally retarded, physically handicapped, etc.)-----	(a)	35 sq. ft. per person.
Factories and machine shops----	(b)	See Wis. Adm. Code section Ind 59.53. Also see rules of Wis. Adm. Code chapter Ind 20—Dusts, Fumes, Vapors and Gases.
First-aid rest rooms-----	(a) or (b)	15 sq. ft. per person. See Wis. Adm. Code section Ind 59.53.
Foundries and boiler shops-----	(b)	See Wis. Adm. Code section Ind 59.53. Also see rules of Wis. Adm. Code chapter Ind 20—Dusts, Fumes, Vapors and Gases.

Register, May, 1974, No. 221
Building and heating, ventilating
and air conditioning code

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 166a
Heating, Ventilating
and Air Conditioning

(b) Provide a continuous supply of tempered outside air as determined by the number of occupants of not less than 5 cubic feet of air per minute per person.

(c) Maintain design temperature.

(7) AIR CLEANSING DEVICES. Approved air cleansing devices shall be installed in a manner to filter the outside air and recirculated air used with mechanical heating and ventilating systems except as follows:

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

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

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

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

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65; emerg. cr. (2) (c) and (3) (a), eff. 1-5-74; cr. (2) (c), r. and recr. (3) and am. (6) (b), Register, May, 1974, No. 221, eff. 6-1-74.

Register, May, 1974, No. 221
Building and heating, ventilating
and air conditioning code