

Reg. # 198

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 149
 Heating, Ventilating
 and Air Conditioning

Chapter Ind 59

HEATING, VENTILATING AND AIR CONDITIONING

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History: Chapter Ind 58 as it existed on January 31, 1965 was repealed and a new chapter Ind 59 was created effective February 1, 1965.

Ind 59.01 Scope of code. (1) PUBLIC BUILDINGS AND PLACES OF EMPLOYMENT. The provisions of this code shall apply to all buildings used, or to be used, as places of employment or as public buildings, as defined by statutes.

Note: For a definition of "public buildings" and "places of employment" see section 101.01 (1), Wis. Stats. For a definition of "farming" see section 102.04 (3), Wis. Stats.

(2) NEW BUILDINGS. The provisions of this code shall apply to the heating, ventilating and air conditioning of all new buildings.

(3) EXISTING INSTALLATIONS. The provisions of this code shall apply to the addition of or replacement of any major apparatus in existing buildings.

(4) CHANGE IN USE. The provisions of this code shall apply to every building, or portion of a building, devoted to new use for which the requirements under this code are in any way more stringent than the requirements covering the previous use.

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

Ind 59.10 Definitions. (1) "Air conditioning" is the process of treating air to control simultaneously its temperature, humidity, cleanliness and distribution to meet the requirements of the conditioned space.

(2) "Combustible" refers to a material or structure made of or surfaced with wood, compressed paper, plant fibers or other material that will ignite and burn.

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(3) A "duct" is any pipe, flue, or tunnel used to convey air, gases and entrained materials. An underground duct is any part of a duct that is below the surface of the ground.

(4) A "duct furnace" is a suspended direct-fired heating appliance normally installed in air ducts. Air circulation is provided by a blower not furnished as part of the appliance.

(5) An "exhaust ventilating system" is any combination of building construction, machinery, devices or equipment, designed and operated to remove harmful gases, dusts, fumes or vitiated air, from the breathing zone of employes and frequenters.

(6) "Existing buildings" shall include buildings, structurally completed, or for which drawings have been approved prior to April 11, 1936. Buildings constructed after April 11, 1936 shall comply with requirements of the code in effect at the time the drawings were approved or construction was completed.

(7) A "furnace" is completely self-contained direct-fired, automatically controlled, vented appliance for heating air by transfer of heat of combustion through metal to the air and designed to supply heated air through ducts to spaces remote from the appliance location.

(8) "Gravity exhaust ventilation" is 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.

(9) "Hazardous piping" is any service piping conveying oxygen, flammable liquids, flammable gases or toxic gases.

(10) A "heating system" is any combination of building construction, machinery, devices or equipment, so proportioned, arranged, installed, operated, and maintained as to produce and deliver in place the required amount and character of heating service.

(11) A "jacketed stove" is a vented, self-contained free standing, non-recessed heating appliance, using solid, liquid or gas fuels. The effective heating is dependent on a gravity flow of air circulation over the heat exchanger.

Note: See definition for "space heaters".

(12) "Major apparatus" shall be defined as central air-handling equipment supplying more than one occupancy or rooms and heat-producing equipment generating heat for the heating and ventilating system.

(13) "Mechanical ventilation" is the process of supplying or removing air by power-driven fans or blowers.

(14) The term "new building" includes buildings, additions thereto, and alterations thereof, for which complete drawings have not been approved by the department of industry, labor and human relations, or construction is not in progress, prior to February 1, 1965.

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

(16) The "outside air intake" includes the ducts and outdoor openings through which outside air is admitted to a ventilating, air conditioning or heating system.

(17) An "occupied area" is any room, area or enclosure used by one or more persons.

(18) "Outdoor openings" may be doors, windows or skylights located in outside walls or roof and can be opened to provide natural ventilation to the occupied space. Natural ventilation is permitted through window openings arranged in conformance with Wis. Adm. Code section Ind 52.02.

(19) An "outlet" or supply opening is an opening, the sole purpose of which is to deliver air into any space to provide heating, ventilation or air conditioning.

(20) A "return" or exhaust opening is any opening the sole purpose of which is to remove air from any space being heated, ventilated or air conditioned.

(21) A (gravity or circulating type) "space heater" is a vented, self-contained free standing or wall recessed heating appliance using liquid or gas fuels.

Note: See definition for "Jacketed stove"

(22) "Tempered outside air". Outside air heated before distribution.

(23) "Tempered air". Air transferred from heated area of building.

(24) A "unit heater". (Direct-fired low and high static type).
(a) Low static type is a direct-fired suspended, self-contained automatically controlled, vented heating appliance, having integral means for circulation of air by means of a propellor fan or fans.

(b) High static pressure type is a direct-fired suspended or floor standing, self-contained, automatically controlled and vented, heating appliance having an integral means for circulation of air against 0.2 inch or greater static pressure.

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

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

Ind 59.20 Drawings, specifications and data. (1) DESIGN AND PREPARATION OF DRAWINGS. All drawings and data for the installation of heating, ventilating and air conditioning equipment shall be designed and prepared to satisfy the requirements of this code.

(a) All drawings and design data to be submitted for review and approval under the provision of this code for buildings greater than 50,000 cubic feet shall be sealed or stamped by an engineer, architect, or designer registered in accordance with the laws of Wisconsin.

Note: Laws regulating the practice of engineering and architecture are found in chapter 443, Wis. Stats.

(2) APPROVAL OF DRAWINGS AND SPECIFICATIONS. Where heating, ventilating and air conditioning equipment is required, complete drawings, specifications, and data sheets shall be submitted to the department of industry, labor and human relations for approval. Approval shall be obtained before affected work is commenced and all work shall be executed according to the approved drawings and specifications.

Note: To expedite approval of drawings the heating and ventilation drawings should be submitted for approval with the building drawings.

Note: Approval is not required for the installation of air cooling equipment when added to an approved heating and ventilating system.

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(a) Drawings for installations within the city limits of Milwaukee shall be submitted to the Inspector of Buildings, Milwaukee for examination and approval.

(b) The replacement of major apparatus is subject to department of industry, labor and human relations approval.

(c) A statement in triplicate, showing capacities of old and new equipment may be submitted instead of data required in subsection (7).

(3) NUMBER OF DRAWINGS AND SPECIFICATIONS. One copy of specifications and 3 complete sets of drawings shall be submitted for approval.

Note: Extra copies of drawings may be filed for an approval and shall be submitted with the original submittal.

(4) APPROVAL OF CHANGES ON DRAWINGS. When it is necessary to change approved heating and ventilating drawings or specifications, revised drawings shall be approved before installation is commenced.

(5) APPROVED DRAWINGS KEPT AT BUILDING. A complete set of approved drawings shall be kept available at the job site.

(6) INFORMATION REQUIRED ON DRAWINGS AND IN SPECIFICATIONS. The lines, data and information shown on drawings for heating, ventilating and air conditioning systems submitted for approval shall be permanent, clear, legible and complete, and shall include all details and data necessary for review of the proposed installation, such as:

(a) Name of the owner of the building.

(b) Complete address of the building.

(c) Architect, engineer or designer's name shall appear on the title sheet.

(d) A floor plan for each floor where equipment is installed shall be furnished as part of the set of drawings.

(e) A room schedule, indicating the intended use of all rooms.

(f) Description of the construction for walls, floor, ceiling, and roof.

(g) Elevation and sectional plans to illustrate and clarify equipment arrangements.

(h) Location, size and type of all principal units of equipment.

(i) Size and continuity of all ducts and vents.

(j) Description and location of chimney.

(k) Specifications shall be properly identified with and completely supplement the drawings.

(7) DATA REQUIRED. All drawings submitted for approval shall be accompanied by sufficient data and information for the department of industry, labor and human relations to judge if the capacity of the equipment and the performance of the system will meet the requirements of this code. The following data shall be submitted:

(a) Heat loss calculated in BTU per hour.

(b) Calculated air volume at design temperature for each occupied area.

(c) Calculated direct and indirect radiation required for each occupied area.

(d) Calculations for ventilation requirements.

(e) Summation of total heating and ventilation requirements.

Note: Cross reference: The department of industry, labor and human rela-

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2. They resist puncture, deformation or collapse.
 3. They are not used where the air temperature exceeds 250 degrees Fahrenheit.
 4. They do not pass through required fire-resistive construction.
 5. They are not connected to a furnace, duct heater or similar heat-producing appliance unless a connecting duct of steel, having a length of not less than 6 feet is used to separate them from the appliance.
- (c) Flexible duct connectors between duct systems and air outlets or air outlet units need not conform to subsections (5) (a) and (b), provided:

1. The duct material is approved for such use.
Note: Flame-retarded fabric of metal or mineral listed in Building Materials List published by Underwriters' Laboratories, Inc. are acceptable.
2. The construction is approved by the department of industry, labor and human relations.
3. The connector is not subject to deterioration from mildew or moisture.
4. The connector does not pass through required fire-resistive construction.

(d) The vibration isolation connectors at the joint between the duct and fan or heat-producing equipment shall conform to the following:

1. The connector shall be a type approved for such use.
Note: The department of industry, labor and human relations accepts the use of flame-proofed fabric of metal or mineral and listed in Building Materials List published by Underwriters' Laboratories, Inc.
2. The connector shall be not more than 10 inches wide.
3. The connector shall not be used where the air temperature is in excess of 250 degrees Fahrenheit.

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

(6) **SUSPENDED CEILING PLENUM.** The plenum above suspended ceilings shall be of incombustible construction. The installation of hazardous piping is prohibited. Openings into the plenum that would affect the fire-resistive rating of the roof and ceiling are prohibited.

(7) **INSULATION.** Heating supply ducts shall be covered with not less than ½ inch of insulation unless an allowance is made for temperature drop in the system.

(8) **GRAVITY VENT DUCTS.** (a) Separate vent ducts from each area of similar occupancy shall extend to a plenum at the base of a siphon ventilator.

(b) The use of open pipe space for a gravity vent duct is prohibited.

(9) **TERMINATION OF VENT DUCTS.** Vent ducts used with mechanical ventilation supply systems shall not terminate in attic space, unless the space is air tight, of incombustible construction and the attic floor is smooth. All such gathering chambers shall be connected to an approved siphon type roof ventilator or to an exhaust fan discharging outside the building.

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(10) **VENT DUCTS, HORIZONTAL RUN.** (a) Horizontal runs in vent 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 direct mechanical supply or the vent duct is connected to an exhaust fan.

(b) Dampers are prohibited in gravity vent ducts, unless automatic back draft dampers are installed.

(11) **VENT DUCTS ABOVE ROOF.** Final delivery of all vent circuits shall be protected from weather, and shall be so located and constructed as to prevent contamination of air supply for or in any occupied area. Gravity vent ducts shall extend not less than 2 feet above the high portion of the roof or parapet wall, and shall be surmounted with an approved type of siphon roof ventilator.

(12) **RELIEF VENTS.** (a) The use of barometric relief vents is prohibited where exhaust ventilation is required for occupancies classified as (c) and (d) in Table 3.

(b) Barometric relief vents may be used to exhaust an air volume equal to the mechanical ventilation supplied for occupancies classified as (a) and (b) in Table 3.

(c) Where barometric relief vents are installed on the roof, the discharge opening shall not be less than 2 feet above the roof.

(13) **FIRE DAMPERS.** (a) Heating and ventilating ducts shall not pass through fire walls, fire partitions, floors and air shaft walls requiring fire-resistive construction of 2-hour or better rating unless approved fire dampers or doors are installed in the opening.

Note: The department of industry, labor and human relations accepts fire damper and door test data from a nationally recognized testing laboratory, fire dampers and doors complying with specifications in duct manual published by Sheet Metal, Air Conditioning Contractors National Association, Inc. or complying with specifications in National Board of Fire Underwriters' Bulletin No. 90A.

(b) Fire dampers are prohibited in kitchen hood exhaust ducts.

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

Ind 59.70 Volume dampers and deflectors. Necessary 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.

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

Ind 59.71 Outlets and returns. (1) **NUMBER AND ARRANGEMENTS.** The capacity, number and arrangement of outlets, returns and exhausts shall insure a uniform distribution of air.

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

(3) **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. Floor registers and grilles are prohibited.

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