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Definitions and standards

exceed an area greater than 20% of the roof area except as permitted under occupancy sections.

1. No individual dome or group of domes or skylights shall exceed 100 square feet.

a. Domes or groups of domes or skylights shall be separated from each other by at least 8 feet laterally and 10 feet along the slope of the roof.

(7) Building locations:

(a) When the distance between buildings located on the same property is less than 10 feet, the following shall apply:

1. Where the combined gross area for these buildings is less than that allowable for one building the exterior wall shall satisfy minimum requirements listed for class of construction in table 51.03-A.

a. Buildings classified as wood frame under subsections Ind: 51.03 (7) or (8) shall have exterior walls with a fire-resistive rating of not less than that required for these buildings when satisfying the 10 feet to 30 feet distance to property line shown in table 51.03-A.

2. Where the combined gross area for these buildings is greater than that allowable for one building, one of the opposing walls shall be not less than a 4-hour fire-resistive rated fire division wall or building division wall, whichever applies. Where buildings are of different classes of construction, the lesser allowable gross area shall apply.

(8) Interior balcony or mezzanine. Interior balconies or mezzanine floors shall have fire-resistive ratings as required for the story in which it is located.

(9) No pipes, wires, cables, ducts or other service equipment shall be imbedded lengthwise in the required fire-resistive protection of any structural member except as allowed in approved fire rated assemblies.

(10) Exposed exterior structural columns and framing. The required fire-resistive hourly rating may be omitted on noncombustible columns and framing when the building does not exceed 2 stories and the fire separation to the center of a street, or to the property line or buildings on the same property, is greater than 30 feet.

(11) Stairways, elevators and vertical shafts which serve 3 or more floor levels shall be enclosed with fire-resistive rated construction equal to or better than requirements specified in Table 51.03-A, except as exempted below:

(a) In buildings with 3 floor levels, the stairways in the upper 2 levels may be left open provided all stairways leading to the lowest level are separated from the upper levels with fire-resistive rated construction as specified in Table 51.03-A or better.

(b) Conditions specified in subsections Ind 55.09 (1) (a) and (b) as applied to a place of worship are acceptable.

(12) PARAPET WALLS: (a) Parapet walls not less than 8 inches in thickness and 2 feet in height shall be provided on all exterior walls of masonry or concrete, where such walls connect with roofs other than roofs that are of noncombustible construction throughout; but this section shall not apply to:

1. Buildings where type No. 7 and No. 8 construction would be permitted under the provisions of this code.

* See Appendix A for further explanatory material.

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2. Walls which face streets or alleys;
3. Walls where not less than 10 feet of vacant space is maintained between the wall and the property line;
4. Walls which are not less than 10 feet from other buildings on the same property.

(b) All parapet walls shall be properly coped with noncombustible weatherproof material.

(13) FIRE DIVISION WALLS. Fire division walls shall have not less than a 4-hour fire-resistive rating as specified in section Ind 51.04 and shall comply with one of the following conditions:

- (a) The wall shall extend 3 feet above the roof.
- (b) The wall shall connect and make tight contact with roof decks of at least 2-hour fire-resistive noncombustible construction on both sides of the wall.
- (c) The wall shall connect and make tight contact with roofs of noncombustible construction on both sides of the wall and shall be noncontinuous at the wall.

(14) DETERMINATION OF NUMBER OF STORIES.* For purposes of establishing the maximum allowable stories in the various classes of construction stated in section Ind 51.03, the number of stories shall be determined on the following basis:

- (a) The first floor shall be determined first and this level shall satisfy the following conditions:
 1. Is the lowest floor having one or more required exits for that floor and for any floor(s) above or below.
 - a. If condition stated in 1. is not satisfied, the highest floor level shall be considered the first floor.
 2. The elevation of the first floor shall be at or not more than 6 feet above an exit discharge grade.
 3. The door sill of all required exit discharges from the first floor shall be at or not more than 2 feet above exit discharge grade.
- (b) An interior balcony or mezzanine floor which exceeds 25,000 square feet or one third (1/3), whichever is least, of the net area enclosed within exterior walls and/or fire division walls shall be counted as a story.
- (c) Penthouse(s) with a total area that exceeds 50% of the total roof area shall be counted as a story(ies).
- (d) Construction according to subsection Ind 51.02 (4) (b) 1. b. shall also be counted as a story(ies).
- (e) Total number of stories shall include the first floor plus all stories above and those stories determined by subsections Ind 51.02 (14) (b), (c) and (d).
 1. Floor levels satisfying the definition of basement(s), ground floor(s), attic, interior balcony(ies) and/or mezzanine floor(s), unless otherwise stated, shall not be counted as a story(ies). For exception, see Appendix A-51.02 (14), Illustration No. 4.

History: Cr. Register, June, 1972, No. 198, eff. 1-1-73: r. (3) and (10), renum. (3) to be (4), (4), (5), (6), (7), (8) to be (6), (7), (8), (9), (10), am. (2) (a), cr. (3), (5), (11), (12), (13) and (14), Register, September, 1973, No. 218, eff. 10-1-73; am. (14) (d), Register, February, 1974, No. 218, eff. 3-1-74.

* See Appendix A for further explanatory material.

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General

Ind 52.58 Walls and ceilings. (1) The walls and ceilings of every toilet room shall be completely covered with smooth plaster, galvanized or enameled metal, gypsum wallboard $\frac{5}{8}$ inch in thickness with taped joints, or constructed of brick, tile or other masonry units with flush joints or other equivalent smooth, non-absorbent material. Wood may be used only if it is smooth and well covered with 2 coats of body paint and one coat of enamel paint or spar varnish. Wood shall not be used for partitions between toilet rooms nor for partitions which separate a toilet room from any room used by the opposite sex. All such partitions shall be made soundproof. This is not intended to prohibit the use of wood stud partitions between rooms if partitions are lathed and plastered on both sides.

(2) The interior surface of walls and partitions shall be of light color to improve illumination and facilitate cleaning.

History: 1-2-55; r. and rec. Register, September, 1953, No. 45, eff. 10-1-53.

Ind 52.59 Enclosure of fixtures. (1) The fixtures (closets and urinals) in every toilet room shall be arranged to secure privacy in use. Water-closets shall be enclosed with partitions. Urinals shall be placed against walls and arranged individually. Individual floor type urinals shall be placed not less than 24 inches center to center and the space between urinals shall be filled flush with the front and top with non-absorbent material. *Exception:*

(a) The above requirements need not apply to toilet rooms accommodating only a single closet or urinal.

(2) A space of 6 to 12 inches shall be left between the floor and the bottom of each partition. The top of the partition shall be from $5\frac{1}{2}$ to 6 feet above the floor. Doors with the top $5\frac{1}{2}$ to 6 feet above the floor, and the bottom 6 to 12 inches above the floor, shall be provided for all water-closet compartments. All partitions and doors shall be of material and finish required for walls and ceilings under Wis. Adm. Code section Ind 52.58.

(3) The water-closet compartments in toilet rooms shall be not less than 30 inches in width, and shall be not less than 54 inches in depth with a clearance of not less than 24 inches between the fixture and the compartment door when closed except as specified in subsection (4). Compartment doors which are hung to swing inward shall clear the fixture not less than 2 inches.

Note: Section 146.315, Wis. State, provides that not more than 50% of the toilet compartments of any public toilet room of any public building, other than licensed hotels and resorts, shall be kept locked.

(4) **Water-closet compartments for physically handicapped persons.**
(a) One toilet room for each sex in every public building or place of employment except those exempted in section Ind 51.15 (7) (j) shall have at least one water-closet compartment that is not less than 36 inches in width and at least 54 inches in depth.

(b) The door shall be not less than 32 inches in width and shall be hung to swing outward.

(c) A grab bar or handrail 33 inches high and parallel to the floor shall be provided on each side of the compartment.

History: 1-2-55; am. (2) and or. (4), Register, November, 1961, No. 55, eff. 11-1-63; am. (2), Register, February, 1974, No. 218, eff. 3-1-74.

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Ind 52.60 Fixtures. (1) Only individual water closets of porcelain or vitreous china shall be used. Water closet seats shall be of wood or other non-heat absorbing material, and shall have a finished surface that is impervious to water or cleaning agents. In public buildings, places of employment, and all other public places except within living units of apartment, hotel and motel buildings, the water closets shall have elongated bowls. All water closets except within living units of apartment buildings shall have open front seats without cover.

(2) Only individual urinals of porcelain, vitreous china, or stainless steel shall be used. Such urinals shall be set into the floor, the floor graded to the urinal and the urinals shall be equipped with an effective automatic or foot operated flushing device.

History: 1-2-56: r. and corr. Register, September, 1959, No. 45, eff. 10-1-59. (1), Register, September, 1973, No. 213, eff. 10-1-73.

Ind 52.61 Protection from freezing. All water-closets and urinals and the pipes connecting therewith shall be properly protected against freezing, so that such water-closets and urinals will be in proper condition for use at all times.

Ind 52.62 Disposal of sewage. (1) Each water-closet and urinal, and each lavatory or slop sink, located in a toilet room shall be connected with a sewer and water system, where such systems are available. In locations where a sewer system is not available, or cannot be made available, the disposal of human waste may be accomplished as follows:

(a) Sewage treatment tank and disposal system.

Note: For detailed requirements on such systems see state plumbing code.

(b) Where the local conditions make it impractical to install such system, outdoor toilets, as described in Wis. Adm. Code section Ind 52.63, or other facilities, such as septic toilets installed in accordance with the provisions of the septic toilet code issued by the state board of health, may be used; provided that in the case of places of employment for more than 10 persons, schools larger than 2 rooms, and apartment houses, water-flush toilets as herein described shall be provided, unless outdoor toilets or other facilities are permitted in writing by the department of industry, labor and human relations or the state board of health. In every case where chemical or septic toilets are installed, the approval of plans and specifications therefor by the state board of health shall be secured before work is started.

Ind 52.63 Outdoor toilets. (1) Outdoor toilets shall comply with Wis. Adm. Code sections Ind 52.50 to Ind 52.59, inclusive, and in addition:

(a) No privy, with or without a leaching pit or other container, shall be erected or maintained within 50 feet of any well, 10 feet of the line of any street or other public thoroughfare, 5 feet of the property line between premises or 25 feet of the door or window of any building.

(b) Located on ground that is well drained, and where there is no possibility of contaminating any drinking water supply.

(c) Provided with suitable approach, such as concrete, gravel or cinder walk.

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Ind 59.48 General sanitation and service areas. (1) SCOPE. This classification shall include toilet rooms, locker rooms, natatoriums, shower rooms and janitor closets.

Note 21: A janitor closet is a service closet with one or more plumbing fixtures.

Note 22: For exhaust ventilation requirements in hospital service areas, see Wis. Adm. Code section Ind 59.56 (2).

Note 23: For exhaust ventilation requirements in places of employment, see Wis. Adm. Code section Ind 59.53.

(2) VENTILATION REQUIRED. (a) Exhaust ventilation shall be provided for all areas of this class unless otherwise exempted. The volume of air exhausted shall not be less than 2 cubic feet per minute per square foot of floor area.

(b) The effectiveness of the exhaust shall be greater than the supply.

(c) Exhaust ventilation shall be installed in toilet rooms having more than one fixture (water-closets and urinals).

Note: Exhaust ventilation is not required from toilet rooms having one water-closet or one urinal when the window area is greater than 4 square feet and more than 2 square feet is openable.

(d) The air movement in the natatorium shall be not less than 6 air changes per hour and the volume of tempered outside air supplied and exhausted shall be not less than 2 cubic feet per minute per square foot of pool surface.

(e) Locker rooms used with natatoriums, baths and toilet rooms, shall be supplied with tempered air.

Note: The air supplied may be exhausted through baths or toilet rooms.

(f) Exemptions. Exhaust ventilation is not required from toilet rooms having one water closet or one urinal, or from janitor closets having one service sink or receptor, providing the room has an outside window of at least 4 square feet with at least 2 square feet that is openable.

(3) EXHAUST VENTILATING SYSTEMS. Exhaust ventilating systems serving this class of occupancy shall not be used for any other service.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65; am. (1), cr. (1) (f), Register, September, 1973, No. 213, eff. 10-1-73.

Ind 59.49 Kitchens. (1) SCOPE. This classification includes all areas where food is prepared, except in domestic science educational facilities from grades kindergarten thru 12, and single unit apartments in hotels, motels and apartment buildings.

(2) VENTILATION REQUIRED. (a) Exhaust. The exhaust ventilation shall be not less than 4 cubic feet per minute per square foot of floor area for every occupied area within the scope of this section.

1. Exception: The exhaust ventilation shall be not less than 2 cubic feet per minute per square foot of floor area for kitchens used in the preparation of only one meal a day. The exception may apply to churches, auditoriums and lodge halls.

(b) Exhaust ventilating system. Exhaust ventilating systems serving this class of occupancy shall not be used for any other services.

(3) EXHAUST HOODS. (a) Where required. Exhaust hoods are required under the following conditions:

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1. Where frying and/or broiling is done.

Note: The above includes deep-fat frying and surface frying.

2. Where cooking is a regular commercial operation.

Note: The above includes ranges, griddles, fryers, broilers and similar grease-producing equipment.

(b) *Size of hood.* The horizontal inside dimensions of the hood 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.

(c) The volume of exhaust air from the hood shall be not less than 100 cubic feet per minute per square foot of the overall horizontal dimensions of the grease-producing equipment.

(d) When hoods are connected to ducts supplying outside air, performance data shall be submitted as required by subsection Ind 59.20 (4) (g).

(e) Hood surfaces and exposed exhaust ducts within 18 inches of combustible material shall be protected by 2-hour fire-resistive construction.

(f) Hood surfaces that are concealed by or recessed into adjoining construction shall be protected by 2-hour fire-resistive construction.

(g) Recirculation of air as described under subsection Ind 59.24 (8) (b) is prohibited.

(4) **DUCTS.** (a) Exhaust ducts or vents connected to required hoods that pass through any other area of the building, including suspended ceilings, shall be protected with not less than 2-hour fire-resistive construction. Where 2-hour fire-resistive construction cannot be provided, a manufactured or masonry chimney shall be used. The manufactured chimney shall be tested and approved for use at a flue gas temperature of not less than 1000° F.

Note #1: See Wis. Adm. Code section Ind 51.04 for various building materials having a 2-hour rating.

Note #2: See Ind 59.69 (13) (a) 6. for fire dampers.

(b) Accessible clean-out openings shall be installed in the area of the duct not requiring a 2-hour fire-resistive construction.

(c) The air discharge shall be directed away from combustible materials.

(d) Sheet metal ducts shall be constructed of not less than 20 U.S. gauge sheet steel.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65; am. (1) and (4) (a), r. and rec. (2) (3) and (3). Register, September, 1974, No. 214, eff. 10-1-74.

Ind 59.50 Offices. (1) **SCORE.** This classification shall include areas where clerical and administrative work is the chief usage.

(2) **VENTILATION REQUIRED.** The air movement supply and distribution for this classification shall conform to the requirements of Wis. Adm. Code section Ind 59.41 unless each of the following requirements has been satisfied:

(a) The total area of outdoor openings is not less than 3% of the floor area served.

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(b) The available floor space for each occupant is not less than 75 square feet per person.

(c) Heat or odors are not present in sufficient quantities to be injurious to the health, safety or welfare of the occupants.

History: Cr. Register, January, 1965, No. 109, eff. 3-1-65.

Ind 59.51 Retail establishment. (1) **SCOPE.** This classification shall include barber shops, beauty parlors, brokerage board rooms, taverns, bowling alleys, retail establishments where goods and commodities are bought and sold and places where not more than 100 persons assemble for recreation, entertainment or dining purposes.

(2) **VENTILATION REQUIRED.** The air movement, supply and distribution for all occupancies of this class shall conform to the requirement of section Ind 59.41 unless the total area of "outdoor openings" is more than 3% of the floor area served. Window openings below grade will not be accepted unless there is a "clear space" outside of the window having a width of not less than 1½ times the distance below grade at the bottom of the window.

Note: Width of "clear space" means the horizontal distance measured at right angles to the plane of the window.

History: Cr. Register, January, 1965, No. 109, eff. 3-1-65.

Ind 59.52 Garages and service stations. (1) **SCOPE.** Ventilation shall be provided for all repair garages, service stations, body shops, repair service shops and live storage garages where vehicles or equipment having internal combustion engines are operated for repair or other purposes.

Note: A live storage area does not include vehicles or equipment stored for a seasonal period or where such vehicles or equipment, when new, are displayed in a showroom area.

(2) **VENTILATION REQUIRED.** The supply and exhaust ventilation shall be provided for areas of this class, whenever open to the public or to employees.

(3) **STORAGE AREAS.** (a) *Heated live storage area.* Areas used for the storage of 6 or more motor-driven vehicles shall be provided with a tempered outside air supply of not less than ½ cubic foot per minute per square foot of floor area. Exhaust ventilation shall equal the volume of air supplied.

Note: A live storage area is any area within a building used for the storage of fire trucks, tractors, automobiles, trucks and other self-propelled vehicles driven in and out under their own power. For exception, see note under (1).

(b) *Unheated live storage area.* Areas used for the storage of 6 or more motor-driven vehicles and where heat is not required, shall be provided with exhaust ventilation equal to ½ cubic foot of air per minute per square foot of floor area unless the following requirements have been satisfied:

1. The floor is at or above grade level.

2. A permanent open wall of the included area is not less than 30% of the total wall area and arranged to cause air circulation throughout the respective area.

(4) **REPAIR AREAS.** (a) All areas in which motor-driven vehicles are repaired shall be supplied with a volume of tempered outside air not

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less than $\frac{1}{2}$ cubic foot per minute per square foot of floor area. An equal volume of exhaust ventilation shall be provided and maintained. Exhaust air shall be drawn from a line not more than 18 inches above the floor.

(b) Provide a mechanical exhaust system 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. Provide flexible hose equipped with a device for connecting it to the exhaust pipe of the vehicle and to the exhaust system. 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.

(c) 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 requirements stated in (b) above.

Note: The requirements stated in (4) (a) need not be increased when satisfying requirements of either (b) or (c). Also see Wis. Adm. Code Chapter Ind 20—Dusts, Fumes, Vapors and Gases, for additional requirements.

(d) Areas involved in the servicing of small internal combustion engines such as lawnmowers, snowmobiles, chainsaws, cycles, boat engines, etc. shall be provided with at least $\frac{1}{2}$ cubic foot of tempered outside air per square foot of enclosed service floor area and an equivalent exhaust.

(5) **SERVICE STATIONS.** Buildings of this classification shall include liquid fuel dispensing stations and/or where vehicles can be driven into the building for washing, greasing, oil change, motor tune-up or repair, tire replacement, battery charging or replacement, and similar operations.

(a) All service and/or workroom areas, other than where engine tune-up or repair is made, shall be supplied with a volume of tempered outside air not less than $\frac{1}{2}$ cubic foot per minute per square foot of floor area.

1. An exhaust ventilation system shall be provided to satisfy the minimum required air movement.

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

(b) All service and/or workroom areas involving engine tune-up or repair requiring the operation of internal combustion engines shall be provided with ventilation to satisfy requirements of (4) above.

(c) Buildings or portions of buildings having a capacity of and used exclusively for washing 2 or more vehicles simultaneously shall be supplied and exhausted with a volume of air equal to $\frac{1}{2}$ cubic foot per minute per square foot of floor area.

1. The minimum floor area calculated for wash areas provided with vehicle conveyor systems shall be based on that portion of floor

TABLE 4

| | Maximum Allowable Velocities | |
|---|------------------------------|----------------|
| | Mechanical System | Gravity System |
| Intake openings using propeller fans..... | 800 F.P.M. | |
| Vertical vent ducts..... | | 300 F.P.M. |
| Roof siphon ventilators..... | 600 F.P.M. | 800 F.P.M. |

Note: The allowable velocity may be increased to 600 feet per minute for gravity vent ducts equipped with siphon ventilators and the tempered outside air is supplied by mechanical means.

Note: For supply and return air duct velocities, reference may be made to the standards of the American Society of Heating, Refrigerating and Air Conditioning Engineers Guide and Data Book, which are acceptable.

(3) Use. No duct designed for the transmission of air shall be used for any other purpose.

Note: See Wis. Adm. Code section Ind 59.69 (4) (g) for exception.

(4) UNDERGROUND DUCT CONSTRUCTION AND INSTALLATION. (a) All underground duct systems using cement tile, glazed clay tile and other tile having a composition of cement and minerals shall be waterproof and shall have sufficient strength to prevent failure of duct at 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) Metal and other approved materials not specified in (a) may be used for underground systems if encased in not less than 2 inches of concrete. The ducts shall be round, water-proof, incombustible, smooth, and of sufficient strength to prevent collapse.

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

(d) 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.

(e) All room inlets and outlets for underground ducts shall comply with Wis. Adm. Code, section Ind 59.22. A water-tight connection shall be provided where the inlet and outlet risers are connected to underground ducts.

(f) In addition to the requirements of subsections (4) (a), (b), (c), (d), and (e), the trunk duct shall not be less than 12 inches high and 12 inches wide and branch ducts not more than 16 feet long may be 8 inches high and 8 inches wide. All ducts shall be provided with inspection and clean-out openings equipped with tight fitting incombustible covers.

(g) In addition to the requirements in subsections (4) (a), (b), (c), (d) and (e) warm air supply ducts shall be designed in compliance with allowable air velocities in Table 4. Where supply air ducts are installed parallel and adjacent to an outside wall, a moisture-proof insulating material (thermal conductance factor of .19 BTU per hour per square foot per degree Fahrenheit) shall be placed

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between the duct and outside wall. The insulation shall extend from bottom of floor to 2 feet below finished grade.

(h) Non-hazardous piping may be installed in underground ducts if it does not restrict the air flow and the inside dimensions of the duct are greater than 4 feet wide and 4 feet high.

(5) CONSTRUCTION. (a) All sheet metal ducts and fittings shall be constructed in compliance with standards approved by the department of industry, labor and human relations. All ducts or airways of wood or other combustible material shall be lined on the inside with sheet metal or other approved incombustible material.

Note: For acceptable standards, see ASHRAE Guide and Data Book, published by the American Society of Heating, Refrigeration and Air-Conditioning Engineers or as illustrated in the Duct Manual published by the Sheet Metal and Air Conditioning Contractors National Association, Inc.

(b) Ducts constructed of other than metal need not conform to subsection (5) (a), provided:

1. They are approved for such use and the method for fabricating, installing and supporting is approved by the department of industry, labor and human relations.

Note: The department of industry, labor and human relations accepts Class 1 air ducts tested (Standards for Safety U.L. 181) and listed by Underwriters' Laboratories, Inc.

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

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.

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(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 $\frac{1}{2}$ 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.

(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 AND FIRE DOOR ASSEMBLIES.** (a) Where heating and ventilating ducts pass through required fire-resistive walls or floor systems, such ducts shall have approved fire dampers or fire door assemblies installed in the approved tested position and located at the point where the ducts pierce the walls or floor systems. Ducts shall be protected according to the following conditions:

1. For construction requiring a fire-resistive rating of one hour or less, the damper or fire door assembly shall be rated not less than the rating of construction. See the following exception.

a. If the above referenced duct is constructed entirely of 20 U.S. gauge sheet metal, no damper will be required. Ducts installed in combustible fire-resistive construction shall satisfy the installation requirements for smoke pipes as stated in section Ind 52.12.

2. For construction requiring a fire-resistive rating of not less than 1½ hours up to ratings not more than 2 hours, the damper or door shall be rated not less than 1½ hours.

3. For construction requiring a fire-resistive rating of 3 or 4 hours, the door assembly shall be rated not less than 3 hours.

4. Access panels shall be provided next to damper or door assembly to permit viewing and servicing.

Note 1: Special attention should be given to design and installation of equipment where highly corrosive conditions exist.

Note 2: See Wis. Adm. Code Chapters 50 through 57 for fire-resistive rated construction.

5. No openings will be permitted in fire-resistive rated doors unless such door assemblies satisfy the requirements of Ind 51.047.

6. Fire dampers are prohibited in kitchen exhaust ducts where combustion-supporting grease deposits can accumulate unless approved kitchen hood assemblies including fire dampers and extinguishing systems are used.

Note 1: The department will accept those hoods and systems approved by Underwriters' Laboratories.

Note 2: The above includes those exhaust ducts serving ranges, broilers, fryers and griddles, for example, but does not include such equipment as dishwashers and steam kettles.

(b) Where heating and ventilating ducts terminate after penetration of required fire-resistive walls or floor systems, such duct openings shall be protected by approved fire dampers or fire door assemblies installed in the approved tested position and rated to satisfy one of the following conditions:

Note: The above includes transfer grilles, combustion air intakes, and supply and return air ducts.

1. Where construction of enclosure must satisfy a fire-resistive rating of one hour or less, the damper or fire door assembly shall be rated not less than the rating of construction. See the following exception.

a. Exception: If the above referenced duct is constructed entirely of 20 U.S. gauge sheet metal, no damper will be required. Ducts installed in combustible fire-resistive construction shall satisfy the installation requirements for smoke pipes as stated in section Ind 52.12.

2. Where construction of enclosure must satisfy a fire-resistive rating of one and one-half (1½) hours or two (2) hours, the damper or fire door assembly shall be rated not less than one and one-half (1½) hours.

3. Where construction of enclosure must satisfy a fire-resistive rating of three (3) or four (4) hours, the fire door assembly shall be rated not less than three (3) hours.

Note: The department will accept listed fire damper and fire door assemblies tested by a nationally recognized testing laboratory and the systems recommended in publications of Sheet Metal, Air Conditioning Contractors National Association, Inc. and National Fire Protection Association Bulletin No. 90A.

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(c) Exceptions: Fire damper or fire door assemblies are not required in (a) where

1. Maximum duct area does not exceed 20 square inches.
2. Duct serves as an exhaust for kitchen range hood.

History: Cr. Register, January, 1965, No. 109, eff. 2-1-65; r. and recr. Register, September, 1973, No. 213, eff. 10-1-73; am. (4) (c), Register, February, 1974, No. 218, eff. 3-1-74.

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 History: Cr. Register, January, 1965, No. 109, eff. 2-1-65; r. Register, September, 1973, No. 213, eff. 10-1-73.

Ind 59.72 Equipment location and protection required. Heating and ventilating equipment in gymnasiums, play rooms and similar 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.

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

Ind 59.74 Piping. (1) PIPE SIZES AND ARRANGEMENT. All steam and hot water supply and return piping, air-line piping and auxiliary equipment shall be of appropriate sizes, elevations and arrangements in accordance with standard engineering practices to accomplish the calculated services in practical operation, without undue noise, stress or other detriment.

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

(3) **PIPE INSULATION.** Steam, hot water supply and return piping in occupied areas shall be covered with not less than $\frac{1}{2}$ inch insulating material, where the heat emission is objectionable or where piping is subject to freezing.

Note: For additional requirements see Wis. Adm. Code section Ind 52.13.

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

Ind 59.75 Refrigerants. The rules covering the use of refrigerants as a function of air conditioning systems shall conform with Wis. Adm. Code chapter Ind 45 (Mechanical Refrigeration).

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