

(c) *Prohibited fittings and connections.* The types of fittings and connections specified in subds. 1. to 4. shall not be used for drain piping:

1. A heel inlet bend when the heel inlet is in the horizontal position;

2. A fitting or connection which has an enlargement chamber or recess with a ledge or shoulder, or reduction in pipe area in the direction of flow;

3. A fitting which has running threads; and

4. A connection by means of drilling and tapping of a drain or vent pipe, unless as otherwise approved by the department.

(d) *Saddles.* If a pipe saddle is used to connect drain piping together, the saddle shall be installed in accordance with s. ILHR 84.30 (5) (d).

(10) **SUMPS, EJECTORS AND PUMPS.** (a) *Sumps.* 1. General. All sanitary building subdrains shall discharge into an approved, vented sump with an airtight cover. The sump shall be so located as to receive the sewage by gravity flow, and shall be located at least 25 feet from any water well.

2. Capacity. The minimum capacity of the sump shall be determined in accordance with the provisions of subpars. a. to e.

a. The water supply fixture unit method shall be used to determine peak input flow in gallons per minute; only the fixtures that drain to the sump shall be included.

Note: When converting water fixture units to gallons per minute it is permissible to calculate the load as a supply system with predominantly flush tanks.

b. The capacity of the sump shall be such that the pump when actuated by the lowest "pump on" switch runs at least 20 seconds.

c. Between the highest "pump on" switch level and the sump inlet, the sump shall hold the amount of input that exceeds the discharge of the pumping equipment in a 5 minute peak input period, but in no case shall the vertical distance between the switch and the inlet be less than 3 inches.

d. The low water level shall be maintained in accordance with the pump manufacturer's requirements, but shall not be less than 4 inches above the sump bottom.

e. Minimum sump diameter. Sumps containing one pump shall have an inside diameter of at least 24 inches. Sumps containing 2 pumps shall have an inside diameter of at least 30 inches.

Note: See Appendix for further explanatory material.

3. Vents. All sumps and all drains leading to a sump shall be vented in accordance with s. ILHR 82.31.

4. Materials. All sumps shall be constructed in a water-tight manner of approved materials in accordance with ch. ILHR 84.

5. Removable covers. Penetrations through the top of removable sump covers shall be limited to those for the electrical supply, the vent piping and the discharge piping for the pump or pumps.

(b) *Ejectors and pumps.* 1. Where required. The liquid from all sanitary building sumps shall be lifted and discharged into the building sanitary drain system by automatic ejectors, pumps or any other equally efficient method approved by the department.

2. Duplex equipment. a. Duplex ejector or pumping equipment shall be installed in a public building where 3 or more water closets or more than 20 drainage fixture units discharge into a sump.

b. Duplex ejector or pumping equipment shall be installed where the sanitary wastes of 2 or more one- or 2-family dwellings discharge into a sump.

c. Where duplex ejector or pumping equipment is installed, appropriate devices shall be installed to automatically alternate operation of the pumps or ejectors and to operate both pumps or ejectors when one unit cannot handle the load.

3. Size. The size and design of an ejector or pump shall be determined by the capacity of the sump to be served, the discharge head and discharge frequency. All ejectors and pumps shall provide a minimum flow velocity of 2 feet per second in the forced discharge piping.

Note: Ejectors or pumps discharging to septic tanks may disturb the normal settling properties of the tank environment; contact the bureau of plumbing for more information.

a. All sewage grinder pumps shall have a minimum 1 $\frac{1}{4}$ inch diameter discharge opening and discharge piping.

b. All nongrinder-type sewage pumps serving water closets shall be capable of passing a 2 inch diameter solid ball and shall have a minimum 2 inch diameter discharge opening and discharge piping. All other pumps handling sanitary wastes shall be rated by the manufacturer as an effluent pump, shall be capable of passing a $\frac{1}{2}$ inch diameter solid ball and shall have a minimum 1 inch diameter discharge opening and discharge piping.

4. Discharge connections. a. The discharge pipe from the ejector or pump shall be connected to the gravity drain by means of a wye pattern fitting. Where the fitting connects to a horizontal drain, the bottom of the wye branch of the fitting shall be located above the horizontal center line.

b. A full flow check valve shall be installed in the discharge piping from each ejector or pump.

c. Where duplicate ejector or pumping equipment is installed, each discharge pipe from an ejector or pump shall be provided with a gate or ball type valve installed downstream of each full flow check valve.

5. Discharge pipe air relief. Air relief valves shall be provided at all high points in the discharge piping of an ejector or pump where the piping arrangement creates an air trap.

6. Prohibited connections. No fixtures may be connected to the discharge pipe between the ejector or pump and the point where it enters the gravity drain.

7. Maintenance. All ejectors, pumps and like appliances shall receive care as needed to keep them in a satisfactory operating condition.

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(11) BUILDING DRAINS AND BUILDING SEWERS. (a) Limitations. No building sewer may pass through or under a building to serve another building, unless:

- 1. The building sewer serves farm buildings or farm houses, or both, which are all located on one property; or
- 2. A petition for variance is granted under s. ILHR 82.20 (11). The approval or nonapproval of a petition for variance request relative to this paragraph shall be determined on an individual basis. The request shall be evaluated on site specific factors including, at least, whether:
 - a. The building sewer serves buildings which are located on one property;
 - b. The functions or operations of the buildings to be served by the building sewer are related; or
 - c. A document, which indicates the piping and distribution arrangement for the property and buildings, will be recorded with the register of deeds.

(b) Building drains. 1. Elevation. a. All building drains shall be installed below the lowest floor levels on which fixtures may be installed if the public sewer, septic tank or private interceptor main sewer elevation permits.

b. Where any portion of an above-ground building drain discharges to a vertical pipe, the building drain shall connect to the building sewer at an elevation at least 30 inches above the basement floor.

Note: See Appendix for further explanatory material.

2. Backwater protection. A building drain subject to backflow or backwater shall be protected with a backwater valve or with a sump with pumping equipment in accordance with sub. (10).

a. Backwater valves, when fully open, shall have a capacity not less than that of the pipes in which installed.

b. Backwater valves shall be so located as to be readily accessible for cleaning.

3. Floor drain required. Where a plumbing fixture or appliance is located on a floor which is entirely below grade, a floor drain shall be installed to serve that floor.

(c) Building sewers. 1. Minimum depth. a. The top of a building sewer shall be located at a depth of not less than 42 inches below finished grade, except as provided in subpar. b. or subd. 2.

b. The top of a building sewer which discharges to a septic tank, holding tank or grease interceptor shall be located at a depth of not less than 18 inches below finished grade.

2. Protection from frost. a. Except as provided in subpars. c. and d., a building sewer shall be protected from frost in accordance with subd. 3. in areas where the top of the building sewer is located less than 60 inches below a surface area from which snow will be cleared.

b. Except as provided in subpars. c. and d., a building sewer shall be protected from frost in accordance with

subd. 3. in areas where the top of the building sewer is located less than 42 inches below a surface which snow will not be cleared.

c. Where a building sewer discharges to a septic tank, holding tank, or grease interceptor, the portion of a building sewer which is within 30 feet from the connecting building drain and which is under a surface area from which snow will not be cleared shall not be required to be protected from frost.

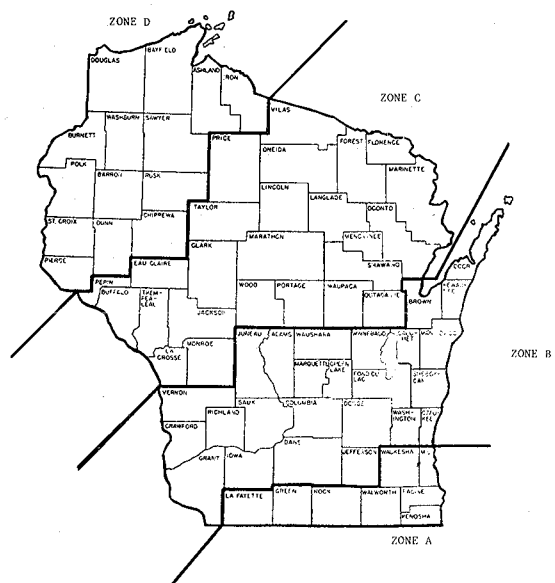
d. Frost protection for a building sewer shall not be required where the predicted depth of frost as determined from Figure 82.30-1 and Table 82.30-6 does not extend below the top of the building sewer.

3. Insulations for building sewers. Where required by subd. 2. a. or 2. b., building sewer insulation for frost protection shall be provided in accordance with one of the methods specified in subpars. a. to c.

a. Extruded polystyrene foam insulation shall be installed at a depth of at least 18 inches below finished grade and at least 6 inches above the top of the sewer pipe. The minimum thickness and width of the foam insulation shall be determined from Figure 82.30-1 and Tables 82.30-5 to 82.30-7. If the insulation is to be installed more than 6 inches above the top of the sewer, the number of inches exceeding 6 inches shall be added to the width of insulation determined from Table 82.30-7.

b. Lightweight insulating concrete shall be installed to the depth of the spring line of the sewer and shall extend laterally at least 6 inches on both sides of the sewer. The minimum thickness of the insulating concrete shall be determined from Figure 82.30-1 and Table 82.30-5. The thickness shall be measured from the top of the sewer. The top of the insulation shall be installed at least 12 inches below finished grade.

c. Alternative methods of frost protection shall be approved by the department.



(c) All private interceptor main sewers shall be tested in accordance with s. ILHR 82.21.

(d) Private interceptor main sewers 6 inches or less in diameter shall be installed in accordance with the criteria for building sewers specified in sub. (11) (b) and (c) and (d) and (e).

(e) Private interceptor main sewers 8 inches or larger in diameter shall be:

1. Provided with frost protection in accordance with sub. (11) (c); and

2. Installed in accordance with the municipal sewer criteria specified in s. NR 110.13.

(f) No private interceptor main sewer may pass through or under a building to serve another building, unless:

1. The private interceptor main sewer serves farm buildings or farm houses or both which are all located on one property; or

2. A petition for variance is granted under s. ILHR 82.20 (11). The approval or nonapproval of a petition for variance request relative to this paragraph shall be determined on an individual basis and shall be evaluated on site specific conditions including, at least, whether:

a. The private interceptor main sewer serves only buildings which are all located on one property;

b. The functions or operations of the buildings to be served by the interceptor main sewer are related; or

c. A document, which indicates the piping and distribution arrangement for the property and buildings, will be recorded with the register of deeds.

(13) LOCATION OF DRAIN PIPING. (a) Drain piping located below the ceilings of areas where food, ice or potable liquids are prepared, handled, stored or displayed shall be installed with the least number of joints and shall be installed in accordance with subs. 1. to 5.

1. All pipe openings through floors shall be provided with sleeves bonded to the floor construction and protruding not less than one inch above the top of the finish floor with the space between sleeve and the piping sealed.

2. Plumbing fixtures, except bathtubs and showers, shall be of the wall mounted type. Bathtubs shall have waste and overflow connections made above the floor and piped to a trap below the floor.

3. Floor and shower drains installed shall be equipped with integral seepage pans.

4. Cleanouts for piping shall be extended through the floor construction above.

5. Piping subject to operation at temperatures that will form condensation on the exterior of the pipe shall be thermally insulated.

(b) Where drain piping is located in ceilings of areas where food, ice or potable liquids are prepared, handled stored or displayed, the ceilings shall be of the removable type, or shall be provided with access panels in order to provide an access for inspection of the piping.

(c) Exposed drain piping shall not be located over a pool, surge tank or an open filter for a pool.

History: Cr. Register, February, 1985, No. 350, eff. 3-1-85; am. Table 82.30-1, (8) (a), (9) (c) (intro.) and 3., and (10) (b) 3. b., r. and recr. (4) (d) 2., Table 82.30-4, (10) (a) 2. b., (11) (intro.) and (f) 2., cr. (8) (a) 1. to 3. and (9) (d), r. (9) (c) 4., renum. (9) (c) 5. to be 4. and am., Register, May, 1988, No. 389, eff. 6-1-88; r. and recr. (4) (d), am. Table 82.30-3 and 82.30-7, r. (11) (intro.), renum. (11) (a) to (f) to be (b) to (g), cr. (11) (a) and (12) (f), Register, August, 1991, No. 428, eff. 9-1-91; am. Table 82.30-1, Register, April, 1992, No. 436, eff. 5-1-92; am. (7) (a) and (b), (11) (c) 1. a., (12) (e) 1. and Table 82.30-1, cr. (10) (a) 5., r. (11) (b) 1. b., renum. (11) (b) 1. c. to be (11) (b) 1. b., Register, February, 1994, No. 458, eff. 3-1-94.

ILHR 82.31 Vents and venting systems. (1) SCOPE. The provisions of this section set forth the requirements for the design and the installation of vents and venting systems.

(2) MATERIALS. All vents and venting systems shall be constructed of approved materials in accordance with ch. ILHR 84.

(3) GENERAL. (a) *Vents.* Every trap and trapped plumbing fixture shall be provided with an individual vent, except as otherwise permitted in this chapter. Vents and venting systems shall be designed and installed so that the water seal of a trap shall be subject to a maximum pneumatic pressure differential equal to one inch of water column.

(b) *Main stack.* Each gravity-flow sanitary building sewer shall be served by at least one stack which extends from a building drain to a vent terminal or vent header. The stack shall be not less than 3 inches in diameter from the building drain to the vent terminal or vent header.

(4) VENT STACKS AND STACK VENTS. (a) *Where required.* Where individual vents, relief vents, or other branch vents are required, a vent stack and a stack vent shall be installed to serve all drain stacks of 2 or more branch intervals.

(b) *Installation.* 1. The connection of the vent stack to a drain stack shall be at or below the lowest branch drain connection to the drain stack. The connection to the drain stack shall be by means of a wye pattern fitting installed in a vertical portion of the stack.

2. A vent stack and a stack vent shall:

a. Extend to a vent terminal in accordance with sub. (16);

b. Connect to a vent stack which extends to a vent terminal; or

c. Connect to a stack vent at least 6 inches above the flood level rim of the highest fixture discharging into a drain stack.

3. Vent stacks and stack vents may connect into a common vent header and then shall extend to a vent terminal.

Note: See Appendix for further explanatory material.

4. The connection of a vent stack with another vent may not be less than 38 inches above the next higher floor level where the plumbing fixtures are vented, but in no case lower than 2 inches above the elevation of the highest flood level rim of any fixture served by the vent.

(5) RELIEF AND YOKE VENTS FOR STACK OFFSETS. (a) *Offsets of 30 to 45°.* Where a horizontal branch drain connects to a drain stack within 2 feet above or below a stack offset

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with a change of direction of 30 to 45° from the vertical and the offset is located below 2 or more branch intervals, a relief vent shall be installed in accordance with par. (c), except where an offset of more than 45° from the vertical is located in the drain stack within 12 feet above the offset of 30 to 45 degrees.

(b) *Offsets of more than 45°.* Except as provided in subds. 1. and 2., where a drain stack has an offset of more than 45° from the vertical located below 2 or more branch intervals, a relief vent and a yoke vent shall be installed in accordance with par. (c).

1. Where an offset of more than 45° from the vertical is located in the drain stack within 12 feet above the lower stack offset, the installation of a yoke vent shall not be required.

2. Where the offset of more than 45° is located below the lowest branch drain connection, the installation of the relief vent shall not be required.

(c) *Installation.* 1. Relief vent. a. A relief vent serving a drain stack offset shall be installed as a vertical continuation of the portion of the stack below the offset or as a side connection to the portion of the stack below the offset. No drain connection may be installed between the offset and the side connection of the relief vent.

b. The connection of the relief vent to the drain stack shall be by means of a wye pattern fitting.

c. The connection of a relief vent with another vent may not be less than 38 inches above the next higher floor level where the plumbing fixtures are vented, but in no case lower than 2 inches above the elevation of the highest flood level rim of any fixture served by the vent.

2. Yoke vent. a. A yoke vent serving a drain stack offset shall connect to the drain stack at or below the lowest branch drain connection to the portion of the drain stack above the offset.

b. The connection of the yoke vent to the drain stack shall be by means of a wye pattern fitting.

c. The connection of the yoke vent to another vent may be not less than 38 inches above the next higher floor level where plumbing fixtures are installed that discharge into the drain stack.

Note: See Appendix for further explanatory material.

(6) YOKE VENTS FOR STACKS OF MORE THAN 10 BRANCH INTERVALS. Drain stacks of more than 10 branch intervals shall be provided with yoke vents.

(a) Yoke vents shall be installed not more than 10 branch intervals apart nor more than 10 branch intervals from the top or bottom of the drain stack.

(b) The connection of the yoke vent to the drain stack shall be by means of a wye pattern fitting.

(c) The connection of the yoke vent to another vent shall be not less than 38 inches above the next higher floor level where plumbing fixtures are installed that discharge into the drain stack.

(7) RELIEF VENTS FOR BUILDING DRAINS. A building drain with a change in elevation of 12 feet or more and at an angle of 45° or more from the horizontal shall be provided with a relief vent.

(a) The connection of the relief vent to the building drain shall be by means of a wye pattern fitting installed within 2 feet upstream of the top of the change in elevation.

(b) The connection of the relief vent to another vent shall be not less than 38 inches above the next higher floor level where plumbing fixtures are installed that discharge through the building drain.

Note: See Appendix for further explanatory material.

(8) VENTS FOR SANITARY SUMPS. Sanitary sumps shall be provided with a vent connecting either to the sump above the drain inlet or to the drain inlet within 12 inches of the sump.

(9) FIXTURE VENTS. (a) *Developed length between vent and trap.* Each fixture trap shall be protected with a vent located in accordance with the provisions of subds. 1. and 2.

1. Each fixture trap which is not an integral part of the fixture shall be protected with a vent so located that the developed length of the fixture drain piping from the trap weir to the vent connection is within the limits set forth in Table 82.31-1.

2. Each fixture trap which is an integral part of the fixture shall be protected with a vent so located that the developed length of the fixture drain piping from fixture outlet to the vent connection is within the limits set forth in Table 82.31-1. For a floor outlet water closet or similar fixture, the point where the fixture drain piping turns horizontal shall be considered as the fixture outlet.

(b) *Minimum distance.* A vent shall not connect to a fixture drain within the distance equal to 2 diameters of the drain piping from the weir of a trap.

Note: See Appendix for further explanatory material.