

INDUSTRY, LABOR AND HUMAN RELATIONS

ILHR 82

Wash Fountain, circular and semi-circular	2	1½
Receptors of Indirect Wastes, gravity flow discharge		
1½ inch receptor outlet diameter	2	1½
2 inch receptor outlet diameter	3	2
3 inch receptor outlet diameter	4	3
4 inch receptor outlet diameter	6	4
larger than 4 inch receptor outlet diameter	8	f
Soda Dispenser	½	1¼
Sterilizers,		
Bedpan	4	2
Garbage can washer	3	3
Instrument or water	1	1½
Urinal	2	2
Water Closet, nonpublic	4	g
Water Closet, public	6	g

a Based on discharge rate of the fixture.

b Includes foot, sitz and infant baths and regular bathtubs with or without showers or whirlpool circulation piping.

c Based on discharge rates and number of outlets; a 4-inch diameter trap and drain pipe minimum recommended.

d Trap size corresponds to the size of the floor drain.

e Minimum trap size corresponds to size of the fixture's tail piece as provided by the manufacturer.

f Trap size corresponds to the size of the receptor drain outlet.

g Trap size specified in referenced standards of s. ILHR 84.20 (4) (a).

(4) **SIZE OF DRAIN PIPING.** (a) *Maximum loading.* 1. The total drainage load in any portion of drain piping shall not exceed the limits specified in Tables 82.30-2 and 82.30-3.

2. The drainage fixture unit values assigned to a receptor which is to receive only the indirect waste discharge from a relief valve on a domestic water heater may be disregarded when determining the minimum size of the building drain and building sewer. Any drain piping between the receptor and the building drain shall be sized by including the assigned fixture unit values for the type of receptor.

Note: See s. ILHR 82.31 (17) for sizing requirements of combination drain and vent systems.

(b) *Minimum size of underground drain piping.* Any pipe of the drain system installed underground, other than the building sewer, shall not be less than 2 inches in diameter. Any portion of underground drain piping which is 2 inches in diameter shall not exceed a length of 20 feet.

(c) *Minimum size of building sewers.* 1. Gravity flow sewers. The minimum size of a gravity flow sanitary building sewer shall be 4 inches in diameter. A municipality or sanitary district by ordinance may require that portion of the building sewer between the lot line and the public sewer to be larger than 4 inches in diameter.

2. Pressurized sewers. a. Sewers pressurized through the use of sewage ejectors, sewage pumps or sewage grinder pumps shall be sized to maintain a minimum flow velocity of 2 feet per second and shall be in accordance with the ejector or pump manufacturer's recommendations.

b. Pressurized building sewers shall be sized not less than 2 inches in diameter for sewage ejectors and sewage pumps, and 1¼ inches in diameter for all sewage grinder pumps.

(d) *Minimum size of private interceptor main sewers.* 1. Except as provided in subd. 3., the minimum size of a gravity flow private interceptor main sewer shall be 4 inches in diameter.

2. Except as provided in subd. 3., the minimum size of pressurized private interceptor main sewer shall be such so as to maintain a minimum flow velocity of 2 feet per second.

3. A municipality or a sanitary district may by ordinance, require the minimum size of a private interceptor main sewer to be larger than 4 inches in diameter.

4. Private interceptor main sewers 6 inches or less in diameter may not exceed the drainage fixture limits in Table 82.30-3.

5. Private interceptor main sewers 8 inches or larger in diameter shall conform with the design flow criteria specified in ch. NR 110.

(e) *Future fixtures.* Where provisions are made for the future installation of fixtures, the drainage fixture unit values of such fixtures shall be considered in determining the required sizes of drain and vent pipes. Construction to provide for future installations shall be terminated with a plugged fitting or fittings.

Table 82.30-2
HORIZONTAL AND VERTICAL DRAIN PIPING

Pipe Diameter (in inches)	Maximum Number of Drainage Fixture Units Which May Drain Through Any Portion of Horizontal and Vertical Drain Piping			
	Horizontal Drain Piping ^a	Vertical Drain Piping of 3 Branch Intervals or Less ^b	Vertical Piping in Drain Stacks of more than 3 Branch Intervals ^b	
			Total Discharge from Side Connections into One Branch Interval	Total Discharge through Any Portion
1½	1	2	1	2
1½	3	4	2	8
2	6	10	6	24
3	20 ^c	48 ^d	20 ^c	72 ^d
4	160	240	90	500
5	360	540	200	1,100
6	620	960	350	1,900
8	1,400	2,200	600	3,600
10	2,500	3,800	1,000	5,600
12	3,900	6,000	1,500	8,400

Note: a: Does not include building drains and building sewers.

Note: b: Drain stacks may be reduced in size as the drainage load decreases to a minimum diameter of one half of the diameter required at the base of the stack, but not smaller than that required for a stack vent under s. ILHR 82.31 (14) (a).

Note: c: Not more than 2 water closets or similar flush action type fixtures of 4 or more drainage fixture units.

Note: d: Not more than 2 water closets or similar flush action type fixtures of 4 or more drainage fixture units within each branch interval nor more than 6 flush action type fixtures on the stack.

(12) PRIVATE INTERCEPTOR MAIN SEWERS. (a) The connection of a private interceptor main sewer to a public sewer shall be in accordance with the conditions of approval for the public sewer granted by the department of natural resources under s. 144.04, Stats.

(b) Private interceptor main sewers which discharge to a municipal treatment facility shall be designed in accordance with the appropriate water quality management plan.

(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) (b); 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 subds. 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.

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.

(8) **INSTALLATION.** (a) *Frost protection.* Adequate measures shall be taken to protect all portions of the water supply system from freezing. All private water mains and water services shall be installed below the predicted depths of frost specified in s. ILHR 82.30 (11) (a) 2. d., Figure 82.30-1 and Table 82.30-6, unless other protective measures from freezing are taken.

(b) *Location.* 1. Water supply piping may not be located in, under or above sanitary sewer manholes, septic tanks, holding tanks, soil absorption areas or seepage pits for private sewage systems.

2. Water supply piping shall be located at least 10 feet horizontally away from a septic tank or soil absorption area for a private sewage system.

3. Water supply piping located downslope from a mound type private sewage system shall be at 25 feet horizontally away from the toe of the basal area.

Note: See also s. ILHR 84.30 (4) relative to water supply piping to be installed in contaminated soils.

4. If a private water main or a water service crosses a sanitary sewer, the water piping within 10 feet of the point of crossing shall be installed:

a. At least 12 inches above the top of the sewer from the bottom of the water piping;

b. At least 18 inches below the bottom of the sewer from the top of the water piping; or

c. Within a waterproof sleeve made of materials as specified for sanitary building sewers in s. ILHR 84.30 (2).

5. Private water mains and water services 2-1/2 inches or larger in diameter shall be installed at least 8 feet horizontally from any sanitary sewer. The distance shall be measured from center to center of the piping.

6. Except as provided in subd. 5., private water mains and water services 2 inches or less in diameter shall be installed at least 30 inches horizontally from any sanitary sewer. The distance shall be measured from center to center of the piping.

7. Private water mains and water services 2 inches or less in diameter may be installed less than 30 inches horizontally from a sanitary sewer, if the bottom of the water piping is installed at least 12 inches above the sewer, except that portion of a water service within 5 feet of developed length from the point where the water service first enters the building may be less than 12 inches above the sewer.

8. No private water main or water service may be installed within 6 inches of a storm sewer.

(c) *Limitations.* No private water main or water service may pass through or under a building to serve another building, unless:

1. The private water main or water service 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 water main or water service serves only buildings which are all located on one property;

b. The functions or operations of the buildings to be served by the water main or water service 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.

(d) *Water distribution piping.* 1. Water distribution piping shall be supported in accordance with s. ILHR 82.60.

2. Provisions shall be made to evacuate all water out of the water distribution system.

3. Except where parallel water meters are installed, water distribution piping shall be provided to bypass a water meter 1-1/2 inches or larger.

4. Water distribution piping shall be provided to bypass a water softener and an iron removal device. The bypass piping may be an internal part of the water softener or the iron removal device.

(e) *Valves.* 1. All control valves installed in a water service, except a valve serving only as a corporation cock, shall be accessible.

2. Stop and waste-type control valves may not be installed underground.

3. All control valves and fixture stop valves installed in a water distribution system shall be accessible. Control valves for the individual plumbing fixtures and appliances within dwelling units shall be accessible from within the dwelling unit.

(f) *Water hammer arrestors.* All plumbing fixtures, appliances and appurtenances with 3/8 inch or larger inlet openings and with solenoid actuated quick closing valves shall be provided with water hammer arrestors. Water hammer arrestors shall be installed in the fixture supplies serving the fixtures, appliances or appurtenances. Water hammer arrestors shall be accessible.

(g) *Temperature control.* The water temperature to all showers in public buildings shall be controlled by thermostatic mixing valves or by individually controlled pressure balanced mixing valves.

(h) *Fittings and connections.* The drilling and tapping of water supply piping shall be prohibited except for:

1. Corporation cocks for a water service or a private water main; and
2. Self-tapping valves which serve individual plumbing appliances.

(i) *Flushing and disinfection of potable water supply systems.* 1. a. Before a newly constructed water supply system is to be put into use, the piping of the system shall be filled with water and allowed to stand for at least 24 hours. After 24 hours each water outlet shall be flushed beginning

with the outlet closest to the building control valve and then each successive outlet in the system. The flushing at each water outlet shall continue for at least one minute and until the water appears clear at the outlet.

b. Each portion of a water supply system which is altered or repaired shall be flushed for at least one minute and until the water appears clear.

2. New private water mains and extensions to private water mains shall be disinfected prior to use in accordance with AWWA C601 or the following method:

a. The pipe system shall be flushed with clean water until no dirty water appears at the points of outlet.

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INDUSTRY, LABOR AND HUMAN RELATIONS 133
ILHR 82

Table 82.40-7
ALLOWABLE MAXIMUM LOAD FOR GALVANIZED STEEL PIPE, SCHEDULE 40
ASTM A53 and ASTM 120

Pressure Loss Due to Friction (in lbs. per 100 ft. of length)	Pipe Diameter (in Inches)																												
	1/2"			3/4"			1"			1 1/4"			1 1/2"			2"			2 1/2"			3"			4"				
	WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU			WSFU				
	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM
0.5	-	-	-	1.5	-	1.5	3.5	-	3.5	7.0	-	9.0	11.0	4.0	15.0	21.0	7.0	32.0	34.0	19.0	67.0	60.0	75.0	175	122	375	485		
1	0.5	-	0.5	2.5	-	2.5	5.0	-	6.0	10.5	4.0	14.0	16.0	5.0	23.0	30.0	14.0	55.0	49.0	46.0	124	87.0	180	310	190	770	810		
2	2.0	-	2.0	4.0	-	4.0	7.5	-	9.5	15.5	5.0	22.5	23.0	7.5	37.0	45.0	37.0	110	72.0	116	235	127	405	510	260	1440			
3	2.5	-	2.5	5.0	-	6.0	9.5	-	12.5	19.0	6.0	28.5	29.0	12.0	52.0	55.0	62.0	150	90.0	192	325	160	615	695	285	1660			
4	2.5	-	2.5	5.5	-	6.5	11.0	4.0	15.0	22.0	7.0	35.0	34.0	19.0	67.0	65.0	90.0	200	105	270	400	180	770	810	NP				
5	3.0	-	3.0	6.5	-	8.0	12.5	4.5	17.5	25.0	8.5	42.0	39.0	26.0	83.0	73.0	120	240	120	365	475	NP			NP				
6	3.5	-	3.5	7.5	-	9.5	14.0	4.5	20.0	28.0	11.0	50.0	43.0	32.0	103	81.0	152	280	NP			NP			NP				
7	3.5	-	3.5	8.0	-	10.0	15.0	5.0	22.0	31.0	15.0	57.0	46.0	40.0	113	NP			NP			NP			NP				
8	4.0	-	4.0	8.5	-	11.0	16.0	5.0	23.0	33.0	17.0	63.0	50.0	48.0	128	NP			NP			NP			NP				
9	4.0	-	4.0	9.0	-	12.0	17.0	5.5	25.0	35.0	20.0	70.0	NP			NP			NP			NP			NP				
10	4.5	-	5.0	9.5	-	12.5	18.0	6.0	27.0	37.0	23.0	77.0	NP			NP			NP			NP			NP				
11	5.0	-	6.0	10.0	4.0	13.0	19.0	6.0	28.5	NP			NP			NP			NP			NP			NP				
12	5.0	-	6.0	10.5	4.0	14.0	20.0	6.5	30.0	NP			NP			NP			NP			NP			NP				
13	5.0	-	6.0	11.0	4.0	15.0	21.0	7.0	32.0	NP			NP			NP			NP			NP			NP				
14	5.5	-	6.5	11.5	4.0	16.0	NP			NP			NP			NP			NP			NP			NP				
15	6.0	-	7.0	12.0	4.0	17.0	NP			NP			NP			NP			NP			NP			NP				
16	6.0	-	7.0	12.5	4.5	17.5	NP			NP			NP			NP			NP			NP			NP				
17	6.0	-	7.0	13.0	4.5	18.0	NP			NP			NP			NP			NP			NP			NP				
18	6.0	-	7.0	13.5	4.5	19.0	NP			NP			NP			NP			NP			NP			NP				
19	6.5	-	8.0	NP			NP			NP			NP			NP			NP			NP			NP				
20	6.5	-	8.0	NP			NP			NP			NP			NP			NP			NP			NP				
21	7.0	-	9.0	NP			NP			NP			NP			NP			NP			NP			NP				
22	7.0	-	9.0	NP			NP			NP			NP			NP			NP			NP			NP				
23	7.0	-	9.0	NP			NP			NP			NP			NP			NP			NP			NP				
24	7.5	-	9.5	NP			NP			NP			NP			NP			NP			NP			NP				
25	7.5	-	9.5	NP			NP			NP			NP			NP			NP			NP			NP				

Note: WSFU means water supply fixture units.

GPM means - gallons per minute.

FM means - predominately flushometer type water closets or syphon jet urinals.

FT means - predominately flush tank type water closets or washdown urinals.

NP means - not permitted, velocities exceed 8 feet per second

For using this table, round the calculated pressure loss due to friction to the next higher number shown

ILHR 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping

Table 82.40-8

MAXIMUM ALLOWABLE LOAD FOR POLYBUTYLENE TUBING - ASIM D3309 AND
CHLORINATED POLYVINYL CHLORIDE TUBING - ASIM D2846

Pressure Loss Due to Friction (in lbs. per 100 ft. of length)	Pipe Diameter (in Inches)																	
	1/2"			3/4"			1"			1 1/4"			1 1/2"			2"		
	WSFU			WSFU			WSFU			WSFU			WSFU			WSFU		
	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT	GPM	FM	FT
0.5	-	-	-	0.5	-	0.5	2.5	-	2.5	4.0	-	4.0	6.5	-	8.0	13.0	4.5	18.0
1	-	-	-	1.5	-	1.5	3.5	-	3.5	6.0	-	7.0	9.5	-	12.5	19.0	6.0	28.5
2	-	-	-	2.5	-	2.5	5.5	-	6.5	9.0	-	12.0	14.0	4.5	20.0	28.0	11.0	50.0
3	0.5	-	0.5	3.5	-	3.5	6.5	-	8.0	11.5	4.0	15.0	17.0	5.5	25.0	35.0	20.0	70.0
4	1.0	-	1.0	4.0	-	4.0	7.5	-	9.5	13.0	4.5	18.0	20.0	6.5	30.0	42.0	30.0	100
5	1.5	-	1.5	4.5	-	5.0	8.5	-	11.0	15.0	5.0	22.0	23.0	7.5	37.0	47.0	42.0	117
6	2.0	-	2.0	5.0	-	6.0	9.5	-	12.5	16.5	5.5	24.0	25.0	8.5	43.0	52.0	53.0	136
7	2.0	-	2.0	5.5	-	6.5	10.5	-	14.0	18.0	6.0	27.0	27.0	10.0	48.0	58.0	70.0	165
8	2.0	-	2.0	6.0	-	7.0	11.5	4.0	16.0	19.0	6.0	28.5	30.0	14.0	55.0	NP		
9	2.5	-	2.5	6.0	-	7.0	12.0	4.0	17.0	20.5	6.5	31.0	32.0	16.0	60.0			
10	2.5	-	2.5	6.5	-	8.0	12.5	4.5	17.5	22.0	5.0	35.0	34.0	19.0	67.0			
11	2.5	-	2.5	7.0	-	9.0	13.5	4.5	19.0	23.0	6.0	38.0	NP					
12	3.0	-	3.0	7.0	-	9.0	14.0	4.5	20.0	24.0	7.0	40.0						
13	3.0	-	3.0	7.5	-	9.5	14.5	4.5	21.0	NP								
14	3.0	-	3.0	8.0	-	10.0	15.5	5.0	22.0									
15	3.0	-	3.0	8.0	-	10.0	16.0	5.0	23.0									
16	3.5	-	3.5	8.5	-	11.0	16.5	5.5	24.0									
17	3.5	-	3.5	8.5	-	11.0	NP											
18	3.5	-	3.5	9.0	-	12.0												
19	3.5	-	3.5	9.0	-	12.0												
20	4.0	-	4.0	9.5	-	12.5												
21	4.0	-	4.0	10.0	4.0	13.0												
22	4.0	-	4.0	NP														
23	4.0	-	4.0															
24	4.0	-	4.0															
25	4.0	-	4.0															
26	4.0	-	4.0															
27	4.5	-	5.0															
28	4.5	-	5.0															
29	4.5	-	5.0															
30	5.0	-	6.0															
31	5.0	-	6.0	NP														

Note: WSFU means water supply fixture units.

GPM means gallons per minute.

FM means predominately flushometer type water closets or syphon jet urinals.

FT means predominately flush tank type water closets or washdown urinals.

NP means - not permitted, velocities exceed 8 feet per second

For using this table, round the calculated pressure loss due to friction to the next higher number shown

ILHR 82.40 (7) (f) and (g) specifies minimum sizes for water distribution piping.

History: 1-2-56; r. and recr. Register, November, 1972, No. 203, eff. 12-1-72; r. and recr. Register, February, 1979, No. 278, eff. 3-1-79; renum. from H 62.13, Register, July, 1983, No. 331, eff. 8-1-83; renum. from ILHR 82.13 and r. and recr. (2) (b) and (4) (d) 1., am. (4) (c) 3. and (6) (a) (intro.), cr. (6) (b). Register, February, 1985, No. 350, eff. 3-1-85; r. and recr. Register, May, 1988, No. 389, eff. 6-1-88; am. (5) (d) 5 a., r. and recr. (7) (h) 1. and (8) (c), renum. (8) (c) 2. to 6. to be (8) (b) 4. to 8. and am. (8) (b) 4. c., Register, August, 1991, No. 428, eff. 9-1-91.