

department prior to installation. The pressure rating shall be marked on the pipe.

d. Electric grounding to water distribution systems which have utilized plastic water service piping is prohibited.

e. Plastic materials shall be installed according to manufacturer's recommendation or applicable ASTM Standards.

11. Gel-coated fiberglass bath and shower units. All units shall be approved by the department. All nonexposed areas, those not gel-coated, shall have an outer coating of self-extinguishing resin at least 3/32 of an inch in thickness or shall be constructed entirely of self-extinguishing resin. The resin shall be rated self-extinguishing according to ASTM D 635-68. Domes or ceilings shall meet the same specifications. If wood or other materials are used for structure stability or sound deadening, the material used shall be completely enclosed with self-extinguishing resin. When urethane foam is used, it shall meet ASTM D 1692-68 rating as self-extinguishing.

12. See Wis. Adm. Code section H 62.18 (2) (e) 2.

13. Corrugated steel pipe may be used for storm building sewers subject to the following conditions:

a. The pipe is sized according to tables 11, 11a, 11b and 12, Wis. Adm. Code, section H 62.12, with adjustments considered to allow for flow characteristics and configuration of the pipe.

b. The connection from a building storm drain to a corrugated steel building storm sewer shall be made at least 10 feet outside the building wall or foundation.

14. Asbestos cement storm drainage pipe conforming to ASTM C663-70 may be installed for storm sewers from a point at least 10 feet outside the building wall or foundation.

15. Brass tubing. All brass tubing used for fixtures, traps and overflows between wall or floor and fixtures shall be made of seamless brass tube with a thickness of at least 0.0453 inch (No. 17 Brown and Sharpe gauge) and shall conform to A.S.T.M. "Standard Specifications for Seamless Brass Tubes," serial number B-135-67.

16. Precast concrete and site constructed tanks. a. Precast concrete tanks shall have a minimum wall thickness of 2 inches.

b. Materials and joints. The concrete used in constructing a precast or site-constructed tank shall be a mix to withstand a compressive load of at least 3,000 pounds per square inch. All concrete tanks shall be designed to withstand the pressures to which they are subjected.

c. The floor and sidewalls of a site-constructed concrete tank shall be monolithic except a construction joint will be permitted in the lower 12 inches of the sidewall of the tank. The construction joint shall have a keyway in the lower section of the joint. The width of the keyway shall be approximately 30% of the thickness of the sidewall with a depth equal to the width. A continuous water stop or baffle at least 6 inches in width shall be set vertically in the joint, embedded 1/2 its width in the concrete below the joint with the remaining width in the concrete above the joint. The water stop or baffle shall be

copper, neoprene, rubber or polyvinylchloride designed for this specific purpose.

d. Joints between the concrete septic tank and its cover and between the septic tank cover and manhole riser shall be tongue and groove or shiplap type and sealed watertight using neat cement, mortar or bituminous compound.

17. Steel septic tanks. For general tank design see section H 62.20 (4) (a) and (b) and H 62.19 (2) (a) 17. Steel tanks shall be fabricated of new, hot rolled commercial steel. The tanks including cover with rim, inlet and outlet collars and manhole extension collars shall be fabricated with welded joints in such manner as to provide structural stability and water tightness. Steel tanks shall be coated, inside and outside in compliance with U.L. Standard 70 Bituminous Coated Metal Septic Tanks. Any damage to the bituminous coating shall be repaired by recoating. The gauge of the steel shall be as follows:

Septic Tank Capacity

Tank Design

Vertical Cylindrical

500 thru 1,000 gallons-----	Bottom and sidewalls	14 ga	None
	Cover	12 ga	
	Baffles	12 ga	
1,001 thru 1,250 gallons-----	Complete tank	10 ga	None
1,251 thru 1,500 gallons-----	Complete tank	7 ga	None

Horizontal Cylindrical

500 thru 1,000 gallons-----	Complete tank	13 ga	54" dia
1,001 thru 1,500 gallons-----	Complete tank	12 ga	64" dia
1,501 thru 2,500 gallons-----	Complete tank	10 ga	76" dia
2,501 thru 9,000 gallons-----	Complete tank	7 ga	76" dia
9,001 thru 12,000 gallons-----	Complete tank	¼" plate	None
12,001 or more gallons-----	Complete tank	5/16" plate	None

18. Glass-fibre reinforced polyester septic tanks. a. General. The following paragraphs apply to septic tanks made of glass-fiber reinforced polyester and intended for use in nonindustrial private domestic sewage treatment and disposal systems. For general septic tank design see section H 62.20 (4) (a) and (b). Unless otherwise indicated, the plastic terminology used in this section is in accordance with the definitions given in ASTM Standard D 883.

b. Materials. Septic tanks, covers, baffles, flanges, manholes, etc., shall be made from polyester resins with glass-fiber reinforcement and meet the general design criteria as prescribed in (4) (a) of this section.

c. Resin. The resin shall be a commercial grade of polyester resin and shall be evaluated as a laminate by tests conducted in accordance with ASTM Standard C 581. Unless otherwise approved by the department the same resin shall be used throughout the laminate.

d. Reinforcing material. The reinforcing material shall be of a suitable commercial grade of glass-fiber (E Glass) treated with a coupling agent, approved by the glass-fibre manufacturer, that will provide a compatible bond between the resin and the glass. Glass-fiber surfacing materials, if used, shall be of a chemical-resistant glass (C glass) bonded with a suitable binder.

e. Fillers and pigments. The resins used shall not contain fillers except as required for viscosity control. Up to 5% by weight of the total resin content of thixotropic agent that will not interfere with visual inspection may be added to the resin for viscosity control. Resins may contain pigments and dyes recognizing that such additions may interfere with visual inspection of laminate quality.

f. Laminate. The laminate shall consist of the following. See following sketch.

- 1) Primary chemical-resistant surface.
- 2) Internal anti-wicking barrier.
- 3) Additional structural reinforcing section if required to meet the properties described in subsection n. below and the following table.
- 4) Exterior surface.

-
- 1) Primary Chemical-Resistant Surface
 - 2) Internal Anti-Wicking Barrier
-

1)	2)	2)	3)	3)	3)	To Desired Thickness For Strength	3)	3)	3)	3)	4)
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- 3) Additional Structural Reinforcing Section
 - 4) Exterior Surface
-

g. Primary chemical-resistant surface. This surface shall be between 0.005 and 0.012 inch thick. It shall be a reinforced resin-rich surface. It shall be free from cracks and crazing and have a smooth finish.

h. Internal anti-wicking barrier. Not less than 0.100 inch of chemical-resistant laminate next to the inner surface shall be reinforced with not less than 20% nor more than 30% by weight of mat or chopped strand.

i. Additional structural reinforcing section. This layer or body or the laminate shall be of chemically resistant construction suitable for the intended use and providing the additional strength necessary to meet the tensile and flexural requirements. Where separate layers such as mat, cloth or woven roving are used, all layers shall be lapped at least one inch. Laps shall be staggered as much as possible. If woven roving or cloth is used, layers of chopped strand glass shall be placed as alternate layers.

j. Exterior surface. This surface shall consist of a chopped strand glass over which shall be applied a resin-rich coating. This resin-rich surface layer shall contain less than 20% of reinforcing material.

k. Cut edges. All cut edges shall be coated with resin so that no glass fibers are exposed and all voids are filled. Structural elements having edges exposed to the chemical environment shall be made with chopped strand glass reinforcement only.

l. Wall thickness. The minimum wall thickness shall be as recommended by the manufacturer but in no case shall it be less than

3/16 inch regardless of operating conditions. Isolated small areas may be as thin as 80 percent of the specified minimum wall thickness.

m. Mechanical properties. To establish proper wall thickness and other design characteristics, the minimum physical properties for any laminate shall be as shown in the following table and subdivision n. below.

Requirements for Properties of Newly Fabricated Reinforced Polyester Laminates

Property at 73.4° F. in psi (MPa)*	Thickness in inches				Test Method
	3/16	1/4	5/16	3/8 & up	
Ultimate tensile strength, min.	9,000 (62)	12,000 (83)	13,500 (93)	15,000 (103)	ASTM D 638
Flexural strength, min.	18,000 (110)	19,000 (131)	20,000 (137)	22,000 (152)	ASTM D 790
Flexural modulus of elasticity (tangent), min.	700,000 (4823)	800,000 (5512)	900,000 (6201)	1,000,000 (6895)	ASTM D 790

* (MPa) = mega pascals

n. Surface hardness. The laminate shall have a Barcol hardness of at least 90% of the manufacturer's minimum specified hardness for the cured resins when tested in accordance with ASTM D 2583. This requirement applies to both interior and exterior surfaces.

o. Appearance. The finished laminate shall be as free as commercially practicable from visual defects such as foreign inclusions, dry spots, air bubbles, pinholes, pimples and delamination. The inner surface shall be free from cracks and crazing and have a smooth finish and an average of not more than 2 pits per square foot providing the pits are less than 1/8 inch diameter and not more than 1/32 inch deep and are covered with sufficient resin to avoid exposure of inner surface fabric. Some waviness is permissible provided the surface is smooth and free from pits. Unless otherwise specified, ASTM D 2563 visual acceptance level 3 shall be the minimum standard for acceptance.

p. Tank design. All tanks shall meet the general design criteria as outlined in section H 62.20 (4) (a) and (b). Horizontal cylindrical tanks standard end enclosed shall be convexed heads with a maximum radius of curvature equal to the tank diameter. Rectangular tanks shall have external ribs to prevent sidewall deflection exceeding 1/2% of span at any location when tested by filling with water.

q. Shell joints. Where tanks are manufactured in sections and joined by use of a laminate bond, the joint shall be glass-fiber reinforced resin at least the thickness of the heaviest section being joined. The reinforcement shall extend on each side of the joint a sufficient distance to make the joint at least as strong as the tank wall, and shall be not less than the minimum joint widths specified in the following table. The reinforcement shall be applied both inside and out, with the inner reinforcement considered as a corrosion resistant barrier only and not structural material.

Minimum Total Widths of Overlays for
Reinforced-Polyester Tank Shell Joints

Tank wall thickness in inches	3/16	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4
Minimum outside overlay width in inches	4	4	5	6	7	8	9	10	11	12
Minimum inside overlay width in inches	4	4	5	5	6	6	6	6	6	6

r. Resistance to static load. There shall be not more than 0.25 percent difference in dimensions before and after the tanks are statically loaded. For the static load test bed an empty tank in dry sand to a depth not exceeding 4 inches and oriented as in service. Load top segment of empty tank with evenly distributed load to a total weight in pounds equal to:

$$L = 140 \times A \times b \quad \text{where } L = \text{total load}$$

A = horizontal cross-sectional area
of tank

b = depth of overburden expected

Rotate tank through 90° on its major axis. Bed tank in dry sand to a depth not exceeding 4 inches. Load sides of empty tank with evenly distributed load to total weight in pounds equal to:

$$L = 70 \times A_v \times b \quad \text{where } L = \text{total load}$$

A_v = vertical cross-sectional area of tank

b = depth of overburden expected

s. Siphoning or pumping. There shall be no permanent deflection or change in length of any internal or external component of the tank during the pumping or siphoning when the tank is filled to its working level. There shall be no signs of leaking, weeping or other failure.

t. Weight. No tank shall differ in gross weight by more than +10 or -5 percent from the weight of tanks that have been subjected to the tests for siphoning and static pressure.

u. Tests. Tensile strength test shall be in accordance with ASTM D 638, except that the specimens shall be the actual thickness of the fabricated article and the width of the reduced section shall be one inch. Other dimensions of specimens shall be as designated by the ASTM standard for type one specimens for materials over 1/2 inch to one inch inclusive. Specimens shall not be machined on the surface. Test 5 specimens at 0.20 to 0.25 inch/minute crosshead speed, and average the results. Flexural strength shall be determined in accordance with Procedure A and Table 1 of ASTM D 790, except that the specimens shall be actual thickness of the fabricated article and the width shall be one inch. Other dimensions of specimens shall be as designated by the ASTM standard. Specimens shall not be machined on the surface. Test 5 specimens, with the resin-rich side in compression. Determine the tangent modulus of elasticity in flexure by ASTM D 790.

(b) *Miscellaneous materials.* 1. Backwater valves. Backwater valves shall have cast iron or brass bodies, noncorrosive bearings, seats and self-aligning disks, and shall be so constructed as to insure a positive mechanical seal and to remain closed, except when discharging wastes. Such valves shall remain sufficiently open during periods of low flows

to avoid screening of solids and shall not restrict capacities or cause excessive turbulence during peak loads. Valve access covers shall be bolted type with gasket and each valve shall bear the manufacturers name cast into the body.

2. Caulking ferrules. a. Caulking ferrules for lead pipe or copper tube to cast iron shall be of red brass, free from sand holes, flaws or other defects, uniform in thickness, and at least 4¼ inches long, of a size and weight as shown in table 33.

Table 33

Inside diameter, inches	Weight
1½	1 lb. 1 oz.
2	1 lb. 4 oz.
3	1 lb. 14 oz.
4	2 lb. 8 oz.
5	3 lb. 0 oz.
6	3 lb. 8 oz.

b. Caulking ferrules for connection between national taper pipe thread and cast iron pipe shall be brass or cast iron. Brass ferrules shall conform to section H 62.19 (2) (b) 2. a. as to materials. Cast iron ferrules shall conform to Wis. Adm. Code section H 62.10 (5), table 7.

3. Cleanout ferrules and plugs. See Wis. Adm. Code section H 62.10 (5) (a) and (7).

4. Closet bolts, nuts and screws for floor outlet fixtures connecting to a floor flange shall be brass or copper. Bolts and nuts for wall outlet fixtures shall be brass or corrosive resistant plated steel.

5. Dishwasher air-gaps as approved by the department.

6. Floor flanges for water closets and similar fixtures shall be brass not less than ⅛ inch thick, cast iron not less than ¼ inch thick or galvanized malleable iron, hard lead or other material approved by the department. Caulked-on flanges shall have a caulking depth of at least 2 inches.

7. Footing, foundation and groundwater collecting piping within a building shall be asbestos cement, bituminous fiber, cast iron, concrete, vitrified tile or other material approved by the department.

8. Lead soil, waste and vent piping shall be the best quality drawn lead pipe, having a minimum weight per foot as follows:

Inside diameter, inches-----	1¼	1½	2	3	4
Weight per foot, pounds-----	2½	3½	4¾	6	8

Lead traps and lead bends shall have a minimum wall thickness of ⅝ inch. Lead water piping shall have minimum weights as indicated in table 34.

Table 34

Inside diameter, inches	Weight lbs. per foot	Wall thickness inches
$\frac{3}{8}$	2
$\frac{1}{2}$	2
$\frac{5}{8}$	3
$\frac{3}{4}$	3½	.231
1	4½	.246
1¼	7½	.320
1½	11¼	.386
2	19½	.504

Sheet lead for safin pans shall weigh not less than 4 pounds per square foot. Sheet lead for flashings and roof terminals shall weigh not less than 3 pounds per square foot.

9. Solder bushings shall be red brass with minimum weights as follows:

Pipe size inches	Minimum weight each
1¼	6 oz.
1½	8 oz.
2	14 oz.
2½	1 lb. 6 oz.
3	2 lb. 0 oz.
4	3 lb. 8 oz.

10. Sheet copper for the following uses: a. General use including safe pans—minimum 12 ounces per square foot.

b. Flashings for vent terminals—minimum 8 ounces per square foot.

11. Galvanized sheet iron or steel for vent terminal flashings shall not be lighter than number 28 Brown and Sharpe gauge.

Note: Copies of standards promulgated by the following technical societies, referred to above are on file in the offices of secretary of state, health and social services and revisor of statutes and may be obtained for personal use from the following addresses:

American National Standards Institute, Inc.
1430 Broadway, New York, New York 10018

American Society for Testing and Material
1916 Race St., Philadelphia, Pa. 19103

American Water Works Association
2 Park Avenue, New York, New York 10016

Cast Iron Soil Pipe Institute
2029 K Street, NW
Washington, D. C. 20006

National Sanitation Foundation
Testing Laboratory, Inc.
P.O. Box 1468
Ann Arbor, Michigan 48106

American Society of Sanitary Engineering
960 Illuminating Building
Cleveland, Ohio 44113

History: 1-2-56; r. and recr. Register, November, 1972, No. 203, eff. 12-1-72; cr. (2) (a) 16, 17 and 18, Register, July, 1976, No. 247, eff. 8-1-76, am. (2) (a) 17, Register, July, 1977, No. 259, eff. 8-1-77.

H 62.20 Private domestic sewage treatment and disposal systems.

(1) APPROVALS AND LIMITATIONS. (a) Allowable use. Septic tank and

Register, July, 1977, No. 259
Health

effluent absorption systems or other treatment tank and effluent disposal systems as may be approved by the department may be constructed when no public sewerage system is available to the property to be served or likely to become available within a reasonable time. All domestic wastes shall enter the septic or treatment tank unless otherwise specifically exempted by the department or this chapter. The private domestic sewage treatment and disposal system of each building shall be entirely separate from and independent of that of any other building. Mobile home parks, campgrounds, sanitary districts, school districts, resorts and so forth with limited area or other limitations may with departmental approval use a common system.

(b) *Public sewer connection.* When public sewers approved by the department of natural resources become available to the premise served, the private domestic sewage treatment and disposal system shall be discontinued within that period of time required by local order but not to exceed one year. The building sewer shall be disconnected from the private system and be connected to the public sewer. All abandoned treatment tanks and seepage pits shall have the contents pumped and disposed of in accordance with NR 113, Wis. Adm. Code, the tank or entire top shall be removed and the remaining portion of the tank or excavation shall be immediately filled with suitable fill material.

(c) *Plans and specifications.* 1. One- and two-family residences. Unless required elsewhere in this chapter, the submission of plans and specifications and departmental approval of initial, modified, additional or replacement construction of private domestic sewage treatment and disposal systems serving one- and two-family residences is not required. All applicable approvals and permits required by local government shall be obtained prior to the commencing of construction. The local authority may require plans and specifications prior to issuing permits or approval.

2. Public buildings — departmental approval. Complete plans and specifications shall be submitted in accord with section H 62.20 (1) (c) 4. and 6. and section H 62.25 and written approval received before commencing work on the initial installation of a private domestic sewage treatment and disposal system or for the addition to, modification or replacement of the system, if the system serves or will serve any public building. The owner shall submit a copy of the approved plans to the local authority. Included as public buildings but not limited by enumeration are:

- a. Theaters and assembly halls
- b. Schools and other places of instruction
- c. Apartment buildings, hotels and places of detention
- d. Factories, office and mercantile buildings
- e. Mobile home parks, campgrounds and camping resorts
- f. Parks

3. Public buildings — local approval. The approval by the county or other local governmental agency having authority shall not eliminate the need for approval by the department for the installation of private