

Technical Specification for
Filament Wound Fiberglass Pressure Pipe

Part 1: General**1.01 Scope**

This specification designates the manufacturing, design and installation requirements of Filament Wound Fiberglass (glass-fiber-reinforced polymer) pipe for pressure sewer and water systems. Fiberglass pipe and couplings shall be manufactured in accordance with ASTM D3517 or D3754 (latest edition).

1.02 References

- A. **ASTM D 3517** Standard specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe
- B. **ASTM D 3754** Standard specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer and Industrial Pressure Pipe
- C. **ASTM D 4161** Standard specification for "fiberglass" pipe joints using flexible elastomeric seals
- D. **ASTM D2412** Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
- E. **ASTM D2290** Standard Test Method for Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe by Split Disk Method
- F. **ASTM D638** Standard Test Method for Tensile Properties of Plastics
- G. **ASTM D695** Standard Test Method for Compressive Properties of Rigid Plastics
- H. **ASTM F 477** Specification for elastomeric seals (gaskets) for joining plastic pipe
- I. **ASTM C 33** Standard specification for concrete aggregates

Part 2: Product**2.01 Materials**

- A. **Resin:** The manufacturer shall use only polyester or vinyl ester resin systems designed for the service intended.
- B. **Filler:** A siliceous sand shall conform to the requirements of ASTM C 33, except that the requirements for gradation shall not apply.
- C. **Additives:** Resin additives, such as curing agents, pigments, dyes, fillers and thixotropic agents, when used, shall not be detrimental to the pipe.
- D. **Elastomeric Gaskets:** Gaskets shall be EPDM or SBR rubber and suitable for the service intended. All gaskets shall meet the requirement of ASTM F 477.
- E. **Fiber-Glass Reinforcement:** Fiber-Glass filaments and chop rovings shall be commercial grade glass fibers with a finish compatible with the resin used. For sewer applications E-glass CR (Corrosion Resistant) glass shall be used, and for potable water applications E-glass shall be specified.

2.02 Manufacturing and Product Construction

- A. **Pipe:** The Pipe shall be manufactured using a filament wound - continuous advancing mandrel process utilizing continuous glass fiber reinforcements in the circumferential direction. Both continuous glass fiber rovings and chopped roving will be incorporated for high hoop strength and axial reinforcement. A sand fortifier shall be used to provide increased stiffness with placement near the neutral axis in the core. Pipe shall be manufactured in accordance with either ASTM D3517 or ASTM D3754. The pipe shall meet the following cell limits: Type 1, Glass-fiber-reinforced thermosetting polyester resin mortar (RPMP polyester), Liner 1, Grade 1; pipe stiffness as specified on plans. The pipe shall be field connected with glass reinforced sleeve couplings that utilize elastomeric

sealing gaskets as the sole means to maintain joint water tightness. The couplings shall be manufactured using the same process as the pipe. The joints shall utilize elastomeric sealing gaskets meeting the performance requirements of ASTM D4161.

- B. Restrained Joints:** The pipe shall be connected with a fiber-glass reinforced sleeve/coupling utilizing a double bell with elastomeric sealing gaskets as the sole means to maintain joint water-tightness and locking rods to transfer axial thrust from one pipe section to another. On each side, the coupling bell shall have a standard rubber gasket and a rod-groove system, through which the load is transferred via compressive and shear action. The pipe spigot shall have a matching rod-groove. The joint shall meet the performance requirements of ASTM D4161.
- C. Unrestrained Joints:** The pipe shall be field connected with glass reinforced plastic sleeve couplings that utilize elastomeric sealing gaskets as the sole means to maintain joint water tightness. The joints shall utilize elastomeric sealing gaskets meeting the performance requirements of ASTM D4161.
- D. Fittings:** Elbows, reducers, tees, wyes, laterals and other fittings shall be of the same structural design as adjoining pipe. Fittings shall be manufactured with mitered sections of pipe and joined by fiber-glass overlay. Biaxial fitting with restrained joints shall be required when thrust blocking is not an acceptable means of restraining the fittings.
- E. Acceptable manufacturer:** Manufacturer of pipe and fittings shall employ manufacturing and product technology used in the manufacture of glass-fiber-reinforced polymer pipe for a minimum of twenty years and have a minimum of ten installations completed in the United States. Manufacturer shall be U.S. Composite Pipe South, or approved equal.

2.03 Dimensions

- A. Diameters:** The outside diameter of pipe shall be per the ASTM D3517-Table 3.
- B. Lengths:** Pipe shall be supplied in nominal lengths of 10, 20 or 40 feet. Actual lay length shall be nominal ± 1 inch. Special short lengths may be used where surface geography or installation conditions require shorter lengths.
- C. Wall Thickness:** The average wall thickness of the pipe shall not be less than the nominal wall thickness published in the manufacturer's literature, and the minimum wall thickness at any point shall not be less than 87.5% of the nominal wall thickness.
- D. End Squareness:** All points around each end of a pipe unit shall fall within $\pm 1/4$ inch or $\pm 0.5\%$ of the nominal diameter of the pipe, whichever is greater, to a plane perpendicular to the longitudinal axis of the pipe.

2.04 Testing

- A. Pipes:** Pipe shall be manufactured in accordance with ASTM D3517 or ASTM D3754.
- B. Joints:** Joints shall meet the requirements of ASTM D4161.
- C. Stiffness:** Each pipe shall have sufficient strength to exhibit the minimum pipe stiffness at 5% deflection as required by the Engineer. Stiffness shall be tested in accordance with the test method of ASTM D2412. One pipe shall be tested every 100 lengths of each type, grade, and size pipe produced.
- D. Hydrostatic Leak Test:** All pipes produced shall be hydrostatically tested at two times the pressure rating of the pipe in accordance with ASTM D3517 and ASTM D3754 at the manufacturing facility prior to shipment.
- E. Hoop Tensile Strength:** Pipe shall meet or exceed the hoop-tensile strength shown in ASTM D3517, Table 8 or ASTM D3754, Tables 9 & 10 when tested in accordance with ASTM D2290. One pipe shall be tested every 100 lengths of each type, grade, and size pipe produced.
- F. Longitudinal Beam Strength:** Pipe shall meet or exceed the requirements of ASTM D3517 or ASTM D3754.
- G. Longitudinal Tensile Strength:** Pipe shall meet or exceed the requirements of ASTM D3517 or ASTM D3754 when tested in accordance with ASTM D638.
- H. Longitudinal Compressive Strength:** Pipe shall meet or exceed the requirements of ASTM D3517 or ASTM D3754 when tested in accordance with ASTM D695.

- I. Chemical Resistance:** Pipe shall meet or exceed the requirements of ASTM D3754 when tested in accordance with ASTM D3681.

2.05 Customer Inspection

The Owner or other designated representative shall be entitled to inspect pipes and witness the manufacturing process.

2.06 Packaging, Handling and Shipping

Packaging, handling and shipping shall be performed in accordance with the Manufacturer's instructions.

Part 3: Execution

3.01 Installation

A. Installation: The installation of pipe and fittings shall be in accordance with the project plans and specifications and the manufacturer's recommended practices.

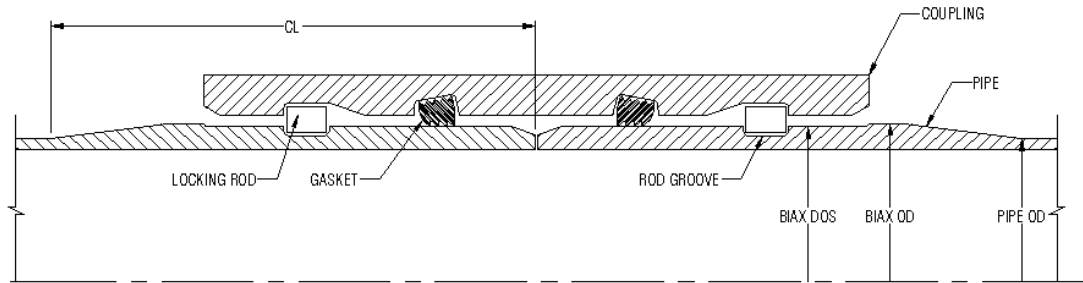
B. Pipe Handling: Textile slings, union anchor lifting devices or other suitable materials and/or a forklift are recommended.

C. Jointing:

1. Pipe end, gasket and sealing surfaces shall be inspected for damage and cleaned of all debris.
2. Apply joint lubricant to the sleeve coupling interior and the elastomeric gasket. Use only lubricants approved by the pipe manufacturer.
3. Use suitable equipment and end protection to push the pipes together.
4. Do not exceed joining or pushing forces recommended by the manufacturer.

D. Field Tests:

1. **Infiltration / Exfiltration Test:** Maximum allowable leakage shall be per local specification requirements.
2. **Field Hydrotesting:** Preparation prior to testing and field hydrotesting shall be performed in accordance with the Manufacturer's instructions.



NOMINAL DIAMETER DN (inch)	PIPE OD (inch)	BIAX. OD (inch)	BIAX. DOS min.	BIAX. DOS max.	CL (inch)
12	13.149	13.622	13.622	13.661	6.299
16	17.362	17.834	17.834	17.874	6.299
18	19.448	19.921	19.921	19.960	6.299
20	21.574	22.047	22.047	22.086	6.299
24	25.748	26.377	26.377	26.417	6.299
30	31.968	32.598	32.598	32.637	8.464
36	38.267	38.897	38.897	38.937	8.464
42	44.448	45.078	45.078	45.118	8.464
48	50.748	51.377	51.377	51.417	9.055
54	57.519	58.149	58.149	58.188	9.055

Figure 1: Restrained Joint System