

Section 1 - Scope

This section covers the use of fiberglass reinforced plastic (FRP) pipe for medium duty slurry service such as limestone slurry to 225°F and 225 psig pressure.

The piping shall be furnished and installed complete with all fittings, joining materials, supports, specials, and other necessary appurtenances.

Section 2 - General Conditions

2.01 Coordination - Material furnished and work performed under this section shall be coordinated with related work and equipment specified under other sections.

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|-----------|---------|-------|
| Valves | Section | _____ |
| Supports | Section | _____ |
| Equipment | Section | _____ |

2.02 Governing Standards - Except as modified or supplemented herein, all materials and construction methods shall comply with the applicable provisions of the following specifications and be tested using the following standards.

Standard Specifications

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| ASTM D2996 | Standard Specification for Filament-Wound "Fiberglass" (Glass-Fiber-Reinforced-Thermosetting Resin) Pipe |
| ASTM D4024 | Standard Specification for Reinforced Thermosetting Resin (RTR) Flanges |
| ASTM D5685 | Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced-Thermosetting-Resin) Pressure Pipe Fittings |

Standard Test Methods

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| ASTM D1599 | Standard Test Method for Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing and Fittings |
| ASTM D2105 | Standard Test Method for Longitudinal Tensile Properties of "Fiberglass" (Glass-Fiber-Reinforced-Thermosetting Resin) Pipe and Tube |
| ASTM D2412 | Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading |
| ASTM D2925 | Standard Test Method for Measuring Beam Deflection of Reinforced Thermosetting Plastic Pipe Under Full Bore Flow |
| ASTM D2992 | Standard Practice for Obtaining Hydrostatic or Pressure Design Basis for "Fiberglass" (Glass-Fiber-Reinforced-Thermosetting Resin) Pipe and Fittings |

2.03 Operating Conditions - In addition to the above minimum design requirements, the system shall meet the following minimum operating conditions:

- a. Operating Pressure _____
- b. Operating Temperature _____
- c. Fluid Conveyed _____
- d. Test Pressure _____

2.04 Quality Assurance - Pipe manufacturer's quality program shall be in compliance with ISO 9001.

2.05 Delivery, Storage and Handling - Pipe and fittings shall be protected from damage due to impact and point loading. Pipe shall be properly supported to avoid damage due to flexural strains. The contractor shall not allow dirt, debris, or other extraneous materials to get into pipe and fittings. All factory machined areas shall be protected from sunlight until installed.

2.06 Acceptable Manufacturers - NOV Fiber Glass Systems, (501) 568-4010, or approved equal.

Section 3 - Materials and Construction

3.01 2"-24" Pipe - The pipe shall be manufactured by the filament winding process using an amine cured epoxy thermosetting resin to impregnate strands of continuous glass filaments, which are wound around a mandrel at a 54 ¾° winding angle under controlled tension. Pipe shall be heat cured and the cure shall be confirmed using a Differential Scanning Calorimeter.

All pipe shall have a resin-rich corrosion/abrasion resistant barrier reinforced with synthetic surfacing veil. The corrosion/abrasion barrier shall contain a minimum resin/abrasion additive content of 80 percent and a reinforcement content of 20 percent. The minimum acceptable cured thickness of the corrosion/abrasion barrier shall be 80 mils nominal.

3.02 Flanges and Fittings - All fittings shall be manufactured using the same type materials as the pipe. Fittings may be manufactured either by spray-up/contact molding, contact molding/filament winding, or compression molding methods.

All fittings, except compression molded, shall have a minimum corrosion/abrasion barrier of 100 mils.

All elbows shall have a minimum radius of 1½ "D".

Fittings shall be adhesive bonded matched tapered bell and spigot or flanged.

Flanges shall have ANSI B16.5 Class 150 bolt hole patterns.

3.03 Adhesive - Adhesive shall be manufacturer's standard for the piping system specified.

3.04 Gaskets - Gaskets shall be 1/8" thick, 60-70 durometer full-face type suitable for the service shown on the drawings and as recommended in the manufacturer's standard installation procedures.

3.05 Bolts, Nuts and Washers - ASTM A307, Grade B, hex head bolts shall be supplied. SAE washers shall be supplied on all nuts and bolts.

3.06 Acceptable Products - Silver Streak as manufactured by NOV Fiber Glass Systems, or approved equal.

Section 4 - Installation and Testing

4.01 Training and Certification - All joints installed or constructed in the field shall be assembled by employees of the contractor who have been trained by the pipe manufacturer. The pipe manufacturer or their authorized representative shall train the contractor's employees in the proper joining and assembly procedures required for the project, including hands-on training by the contractor's employees. Each bonder shall fabricate one pipe-to-pipe and one pipe-to-fitting joint that shall pass the minimum pressure test for the application without leaking.

Only bonders who have successfully completed the pressure test shall bond pipe and fittings.

Certification by the manufacturer shall be in compliance with ASME B31.3, Section A328.2 for the type of joint being made.

4.02 Pipe Installation - Pipe shall be installed as specified and indicated on the drawings.

The piping system shall be installed in accordance with the manufacturer's current published installation procedures.

4.03 Testing - Hydrostatic testing should be performed to evaluate the structural integrity of a new piping system installation. Test pressures of 1.5 times the design pressure but not exceeding 1.5 times the static pressure rating of the lowest rated fiberglass component in the piping system is recommended. The hydrotest pressure should be repeated up to ten times to provide a high degree of confidence in the piping system. The final pressurization should be allowed to stabilize for 15-30 minutes, then, inspected for leaks. Do not attempt to repair leaks while system is pressurized. The hydro test should be repeated after any re-work is performed.

When hydro testing open vents to prevent entrapment of air in the lines as the system is slowly filled with water. Then close the vents and slowly pressurize to the test pressure. Upon completion of hydro test, relieve the pressure on the system slowly, open vents and any drains to allow for complete drainage of the system.

Piping systems with design temperatures above 150°F should be tested at 1.5 times the static pressure rating of the lowest rated fiberglass component in the system.

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