

# F-Chem<sup>®</sup> Piping System

## GENERAL SPECIFICATIONS

### SECTION 1 – Scope

This section covers the use of fiberglass reinforced plastic (FRP) pipe for chemical and water services.

The piping system 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.

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

ASTM D2310	Standard Classification for Machine-Made “Fiberglass” (Glass-Fiber-Reinforced Thermosetting) Resin Pipe
AWWA M45	Fiberglass Pipe Design

#### Standard Test Methods

ASTM D2992	Standard Practice for Obtaining Hydrostatic or Pressure Design Basis for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Pipe
ASTM 2925	Standard Practice for Measuring Beam Deflection of Reinforced Thermosetting Plastic Pipe Under Full Bore Flow
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
ASME B31.3	Process Piping

**2.03 ASTM D2310 Designation Code** - All pipe shall be labeled with a four (4) character cell classification based on the design conditions in Section 2.04.

**2.04 Design Conditions** - The specified product shall meet the following design/operating conditions:

- a. Operating Pressure \_\_\_\_\_
- b. Operating Temperature \_\_\_\_\_
- c. Fluids Conveyed \_\_\_\_\_
- d. Minimum Liner Thickness \_\_\_\_\_
- e. Resin Type \_\_\_\_\_

**2.05 Quality Assurance** - Pipe manufacturer’s quality program shall be in compliance with ISO 9001.

**2.06 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.

**2.07 Acceptable Manufacturers** - NOV Fiber Glass Systems (918) 245-6651, or approved equal.

### SECTION 3 – Materials and Construction

**3.01 14”- 72” Pipe** - The pipe shall be manufactured by the filament winding process utilizing the thermosetting resin listed in Section 2.04.e to impregnate strands of continuous glass filaments, which are wound around a mandrel at a 54<sup>3</sup>/<sub>4</sub>° winding angle under controlled tension. Pipe cure shall be confirmed using a Differential Scanning Calorimeter (DSC) or Thermal Mechanical Analysis (TMA)

The Pipe corrosion barrier shall consist of a 10-mil layer of synthetic surfacing veil, a 10 mil glass veil, and additional layers of 1½ ounce chopped strand mat to reach the liner thickness listed in Section 2.04.d. The nominal resin content in the veil layers shall be 80%. The minimum resin content in the 1½ ounce chopped strand mat layers shall be 60%.

**3.02 Flanges and Fittings** - All fittings shall be manufactured using the same type materials and liner construction as the pipe. Fittings may be manufactured either by spray-up/contact molding or mitered/spray-up methods. Compression molded fittings manufactured with the same resin as the pipe are acceptable.

Flanges shall have ANSI B16.1 Class 125 bolt hole patterns.

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**3.03 Joints** - All joints shall be butt and wrap, tapered bell & spigot, or flanged as specified on the project drawings. The joints shall be the manufacturer's standard thickness and shall utilize the same resin system as the piping system specified. All joints shall have a pressure rating equal to the pipe rating.

**3.04 Gaskets** - Gaskets shall be 1/4" 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. Two each SAE size washers shall be supplied on all nut and bolt sets.

**3.06 Buried Pipe** - All buried pipe shall have a minimum ASTM D2412 pipe stiffness of 9 psi at 5% deflection and must be buried in accordance with the manufacturer's standard installation instructions.

**3.07 Acceptable Products** - F-CHEM 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 or 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 and are certified 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** - A steady pressure test shall be conducted on the completed piping system. The pipe shall be subjected to a steady pressure at 1½ times the design operating pressure as stated in Section 2.04a. The pressure shall be held on the system for a minimum of 1 hour and the line inspected for leaks.

Test pressure shall not exceed 1½ times the maximum rated pressure of the lowest rated element in the system.

The system shall be filled with water at the lowest point and air bled off from all the highest points. Systems shall be brought up to test pressure slowly to prevent water hammer or over-pressurization.

All pipe joints shall be water tight. All joints that are found to leak by observation or during testing shall be repaired by the contractor and retested.

All the system high points shall be open when draining the system to prevent vacuum collapse of the pipe.



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