

Z-Core™ Piping System

Specification Guide

SECTION 1 – Scope

This section covers the use of fiberglass reinforced plastic (FRP) pipe for severe chemical process and chemical handling applications up to 275°F and 150 psig steady pressure.

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 D2997	Standard Specification for Centrifugal Cast Pipe
ASTM D5685	Standard Specification for “Fiberglass” (Glass-Fiber-Reinforced-Thermosetting Resin) Pressure Pipe Fittings
ASTM D4024	Standard Specification for Reinforced Thermosetting Resin (RTR) Flanges

Standard Test Methods

ASTM D2992	Standard Practice for Obtaining Hydrostatic or Pressure Design Basis for “Fiberglass” (Glass-Fiber-Reinforced Thermosetting Resin) Pipe and Fittings
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

1”-8” RTRP-21CO

Mechanical properties cell classification shown are minimum.

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

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

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 1”-8” Pipe - The pipe shall be manufactured by the centrifugal casting process utilizing amine cured, premium grade epoxy thermosetting resin to impregnate woven continuous glass filaments. Pipe shall be heat cured and the degree of cure shall be confirmed by determining the glass transition temperature.

All pipe shall have an integral corrosion barrier of pure resin with a nominal cured thickness of 100 mils.

All pipe shall have a resin rich, reinforced 10 mil nominal exterior layer with a UV (ultraviolet) inhibitor.

The pipe shall have a minimum design pressure of 150 psig @ 275°F following ASTM D2992 Procedure B.

Minimum Reinforced Wall Thickness:

1”	0.09”
1½”-3”	0.14”
4”	0.17”
6”	0.27”
8”	0.31”

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

Fittings shall be adhesive bonded socket joint 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. All adhesive bonded joints shall be cured according to the manufacturer's instructions for maximum structural strength and corrosion resistance.

3.04 Gaskets - Gaskets shall be 3/16" 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 F593, 304, stainless steel hex head bolts shall be supplied. Two each SAE size washers shall be supplied on all nut and bolts.

3.06 Acceptable Products - Z-CORE 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 bondor shall fabricate one pipe-to-pipe or one pipe-to-fitting joint that shall pass the minimum pressure test for the application as stated in Section 2.04.d without leaking.

Only bondors who have successfully completed the pressure test and are certified shall bond pipe and fittings.

Certification by the manufacturer shall be in compliance with ANSI B31.3 Section A328.2.

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 hydrostatic 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 2.04.d.** The pressure shall be held on the system for a minimum of one 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 watertight. All joints that are found to leak by observation or during testing shall be repaired by the contractor and retested.

National Oilwell Varco has produced this brochure for general information only, and it is not intended for design purposes. Although every effort has been made to maintain the accuracy and reliability of its contents, National Oilwell Varco in no way assumes responsibility for liability for any loss, damage or injury resulting from the use of information and data herein nor is any warranty expressed or implied. Always cross-reference the bulletin date with the most current version listed at the web site noted in this literature.

North America
17115 San Pedro Ave. Suite 200
San Antonio, Texas 78232 USA
Phone: 210 477 7500

South America
Avenida Fernando Simoes
Recife, Brazil 51020-390
Phone: 55 31 3501 0023

Europe
P.O. Box 6, 4190 CA
Geldermalsen, The Netherlands
Phone: 31 345 587 587

Asia Pacific
No. 7A, Tuas Avenue 3
Jurong, Singapore 639407
Phone: 65 6861 6118

Middle East
P.O. Box 17324
Dubai, UAE
Phone: 971 4881 3566