Red Thread™ IIA Piping System

(Specification Guide)

FUEL HANDLING

Section 1 - Scope

This section covers the use of fiberglass reinforced plastic (FRP) pipe for single wall fuel handling and fuel handling vent and vapor applications including gasoline, unleaded gasoline, gasoline/alcohol mixtures, bio-diesel, DEF and diesel up to 150ºF and 250 psig cyclic pressure.

Section 2 - General Conditions

2.01 Coordination - Material furnished and work performed under this section shall be coordinated with the related work and equipment specified under other sections, i.e. Valves, Flexible Connectors, Equipment.

2.02 Governing Standards - Except as modified or supplemented herein, all materials and construction methods shall comply with and be tested in accordance with the following standards and test methods:

Standard and Test Methods

UL971 2004	Standard for Nonmetallic Underground Piping for Flammable Liquids
ASTM D2310	Standard Classification for Machine-Made "Fiberglass" (Glass Fiber Reinforced Thermosetting Resin) Pipe
ASTM D2992	Standard Test Method 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 and/or API Q1.

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 strain. 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 - Fiber Glass Systems, (501) 568-4010, or approved equal.

Section 3 - Materials and Construction

3.01 2"-4" 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.

Pipe shall be supplied with a T.A.B.™ (Threaded and Bonded) ends.

Pipe shall have a minimum continuous cyclic pressure rating of 125 psig at 150ºF in accordance with ASTM D2992, Procedure A or UL 971 pressure rating.

All pipe shall be 100% hydrotested at the factory before shipment at a minimum pressure of 265 psig and shall be UL971-2004 Listed and labeled.

3.02 ASTM D2310 Classifications (at 73.4°F)

2" - 3"	RTRP-11AF
4"	RTRP-11AH

(Mechanical properties cell classifications shown are minimums.)

3.03 Fittings - All fittings shall be manufactured using the same type of material as the pipe. Fittings may be manufactured either by compression molding, filament winding, resin transfer molding or contact molding methods. All fittings, adapter, and sump penetrations shall be UL971-2004 Listed.

Fittings shall be adhesive bonded matched tapered bell and spigot.

3.04 Connections - Connections to flex connectors or other piping materials shall be made by the use of NPT (National Pipe Thread) threaded adapters or flanges bonded to the FRP piping system.

3.05 Sump Penetrations - Sump penetrations shall be made by means of a permanently bonded FRP coupling. The coupling shall be capable of adjusting for the slope of the piping system entering or exiting the sump wall.

3.06 Adhesives - Adhesives shall be manufacturer's standard for the piping system specified.

Section 3 - Materials and Construction

3.01 2"-4" Primary and 3" - 6" Secondary 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 543/4" winding angle under controlled tension. The pipe shall be heat cured and the cure shall be confirmed using a Differential Scanning Calorimeter.

Pipe shall be supplied with a T.A.B.™ (Threaded and Bonded) or plain ends.

Pipe shall have a minimum continuous cyclic pressure rating of 125 psig at 150ºF in accordance with ASTM D2992, Procedure A or UL 971 pressure rating.

All pipe, both primary and secondary, shall be 100% hydrotested at the factory before shipment at a minimum pressure of 265 psig and shall be UL 971-2004 Listed and Labeled.

3.02 ASTM D2310 Classifications (at 73.4°F)

Primary Pipe	Secondary Pipe
2"-3" RTRP-11AF	3" RTRP-11AF
4" RTRP-11AH	4"-6" RTRP-11AH

(Mechanical properties cell classifications shown are minimums.)

3.03 Fittings - All fittings shall be manufactured using the same type of material as the pipe. Fittings may be manufactured either by compression molding, filament winding, resin transfer molding or contact molding methods. All fittings, adapter, and sump penetrations shall be UL971-2004 Listed.

Primary fittings shall be adhesive bonded, matched tapered bell and spigot and rated the same as the pipe.

Secondary containment fittings shall be two-piece style to allow for 100% inspection of the primary joint pressure test and be rated to a minimum of 50 psig per UL 971-2004.

Should hydrostatic testing be impractical, testing with low pressure air or inert gas may be acceptable. Extreme caution should be used when testing with air. Follow all safety precautions and testing recommendations of the pipe manufacturer.

3.04 Connections - Connections to flex connectors or other piping materials shall be made by the use of NPT (National Pipe Thread) threaded adapters or flanges bonded to the FRP piping system.

3.05 Sump Penetrations - Sump penetrations shall be made by means of a permanently bonded FRP coupling. The coupling shall be capable of adjusting for the slope of the piping system entering or exiting the sump wall.

3.06 Adhesives - Adhesives shall be manufacturer's standard for the piping system specified.

3.07 Acceptable Products - Red Thread IIA piping system as manufactured by Fiber Glass Systems or engineered 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 assembling procedures required for the project, including hands-on participation 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 as stated in Section 2.03 without leaking.

Only bonders that have successfully completed the pressure test shall bond pipe and fittings. Each bonder shall carry a current, manufacturer proof of training card.

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 piping system shall be subjected to 10 pressurization cycles from 0 psig to 1.5 times the design operating pressure as stated in Section 2.03.c. After the 10 cycles, the pressure shall be held on the system for a minimum of 1 hour and the line inspected for leaks.

Test pressures shall not exceed 1.5 times the maximum rated pressure of the lowest rated element in the system.

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

Should hydrostatic testing be impractical, testing with low pressure air or inert gas may be acceptable. Extreme caution should be used when testing with air. Follow all safety precautions and testing recommendations of the pipe manufacturer.

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