

VII. SPECIFICATION**A. SPECIFICATION****PVDF Piping--General Grade****PART 1 GENERAL****1.1 SUMMARY**

- A. Furnish a complete PVDF piping system to include pipe, fittings, anchors, specialty fittings and valves.

1.2 References

- A. The following standards apply to products used within this section.

ASTM D 1598
ASTM D 1559
ASTM D 2122
ASTM D 2837-85
ASTM D 2637
ASTM D 3222-81

- B. The system design shall meet the requirements of ASME/ANSI B31.3 for design criteria where temperature and pressure fall within the limits of the code.

1.3 Definitions

PVDF
Polyvinylidene Fluoride

1.4 System Description

- A. System shall be a PVDF system of uniform pipe and fitting materials. System pressure ratings shall be based on continuous use of 50 years.

1.5 System Performance Requirements

- A. System performance requirements shall handle the following:

Operating Pressure
Operating Temperature
Text Pressure
Media: Deionized Water

All PVDF systems shall be designed taking into consideration the above parameters, end loads, thermal expansion and proper burial and/or hanging methods.

1.6 Submittals

Submit the Following:

- A. Product data for the system specified; relative to materials, dimensions of

individual components, profiles and finishes.

- B. Product certificates signed by manufacturer of PVDF piping product stating compliance to stated requirements.

- C. Welder certificates, certifying that welders comply with the installation procedures as outlined by ASTM D-2657. All training should be scheduled and completed prior to job start-up.

- D. Qualification of firms supplying PVDF. Firms must have a minimum of five years experience in design, installation and operation of thermoplastic high-purity piping systems.

1.7 Quality Assurance

Obtain components from a single source having responsibility and accountability to answer and resolve problems regarding proper installation, compatibility, performance, and acceptance.

1.8 Delivery, Storage and Handling

- A. Deliver all PVDF pipe to arrive on-site wrapped or protected to prevent damage in shipping.
- B. Deliver all PVDF fittings to arrive on-site in boxes.
- C. Store products on elevated platforms in a dry location with protection from the environment.
- D. Lift, support and transport PVDF piping per manufacturers' recommendations.

1.9 Warranty

- A. Warranty period is one year after date of substantial completion.

1.10 Extra Material

- A. Turn over to owner at end of construction, necessary welding equipment as suggested by manufacturer for repair, additions and maintenance of PVDF piping system.

PART 2 PRODUCTS**2.1 Manufacturers**

- A. Subject to compliance with requirements products which may be incorporated in the work include: PVDF by Chemline Plastics Limited, Thornhill, Ontario, Canada, 1-905-

889-7890. Produced by Alois Gruber
GmbH AGRU of Bad Hall, Austria.

2.2 Material

A. General

Pipe, valves and fittings shall be made from virgin resin produced by one supplier. The resin shall meet or exceed the requirements outlined for a Type II suspension grade homopolymer resin in ASTM D-3222.

Pipe shall be made of Solef 1010/0001 HP resin

Fittings shall be made of Solef 1008/0001 or 1009/0001 resin.

Manufacturer shall test all lots to ensure the melt flow index is within allowable range.

- ### B. Chemical Resistance and application of PVDF to be verified and approved by manufacturer.
- ### C. Engineering and Design criteria should be per Manufacturer's printed literature.

2.3 System Components

A. Pipe

All pipe through 12" shall be extruded from Solef 1010/0001 resin. All piping is produced based on an SDR system and calculated utilizing a Hydrostatic Design Basis according to ASTM D 2837

Fittings

All fittings through 12" shall be injected molded. Fittings shall have same wall thickness and pressure ratings as the pipe.

Packaging

All fittings are to be packaged in a single PE bag or boxed depending on size. All fittings are shipped in boxes.

B. Valves

All valves shall be produced in the same manner as the fittings.

Spigot Diaphragm Valves:

1/2"-2" shall be of a PVDF body and a PTFE diaphragm. Valves will be of spigot single body design.

True Union Diaphragm Valves:

1/2"-2" shall be constructed of PVDF resin. The valves are to be by Chemline Plastics. The diaphragm is Teflon with a PVDF gas

barrier. End connectors are for butt fusion style and gaskets are Viton.

Butterfly Valves:

All sizes 1-1/2"-12" shall be a class 150 lug style PVC or PVDF body. Seat liner and seals shall be Viton or platinum chloride cured silicone. Disc shall be PVDF as outlined above.

Reduced Dead leg Valve:

All reduced dead leg valves shall be made of PVDF Solef resin. Valve bodies are to be unibody, molded design with a full 150 psi rating. All valves shall be T-Diaphragm valves by Agru.

Check Valves:

All sizes class 150, ball type PVDF body with Viton seat and seals. 230 PSI at 73.4°F for sizes 1/2" through 2-1/2" nominal 150 PSI at 73.4°F for sizes above 2-1/2" nominal.

2.3 Pressure Rating

Pipe and fittings shall be 230 psi rated from 1/2" to 2 1/2". Sizes 3" – 12" shall be 150 psi rated. High temp or pressure systems shall be 230 psi rated in all sizes. 150 and 230 psi ratings are at 68 F. Consult manufacturer for pressure deratings higher temperatures.

2.4 Pressure Rating--Valves

Pressure rating of valves shall be per manufacturer's recommendations based on materials, valve type and size.

2.5 Specialty Fittings

Specialty fittings are to include restraint fittings, instrumentation fittings, instrumentation donuts, etc. Specialty fittings shall be machined and are molded of the same PVDF resin as the pipe.

2.6 Joining Equipment

- ### A. Installers shall be pre-qualified through training on welding technique according to ASTM D-2657.
- ### B. Manufacturer shall provide on-site training in the assembly and installation of the PVDF piping system.
- ### C. Joining Equipment shall be either butt-fusion or socket fusion method.

Part 3 Installation

3.1 Testing

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- A. Prior to pressure testing, the system shall be examined for the following items:
1. Pipe shall be completed per drawing layout with all pipe and valve supports in place.
 2. Pipe, valves and equipment shall be supported as specified, without any concentrated loads on the system.
 3. Pipe shall be in good condition, void of any cracks, gouges or deformation.
 - a. Pipe flanges shall be properly aligned. All flange bolts should be checked for correct torque.
 - b. All joints should be reviewed for appropriate welding technique.
 - c. Socket--to have two beads on the end of the fitting and on the outside of the pipe in contact.
Joints should have two beads 360° around the joint.
- B. If any deficiencies appear, the quality control manager shall provide directions for repair.
- C. Pressure Test
1. Test fluid should be deionized water with quality level set by Quality Control Engineer. In all cases test must be done hydrostatically. Air is not acceptable.
 2. Filling the system--Open all valves and vents to purge the system of air. Slowly inject the water into the system, making sure that air does not become trapped in the system.
 3. Begin pressurizing the system in increments of 10 PSI. Bring the system up to 100 PSI and hold. Allow the system to hold pressure for a minimum of two hours and up to a recommended 12 hours. Check pressure gauge after one hour. Due to natural creep effects on plastic piping the pressure will have decreased. If drop is less than 10% pump the pressure back up. At this time the system may be fully pressurized to desired test pressure.
 4. If after one hour the pressure has decreased more than 10%, consider the test a failure. Note the 10% value may need to be greater for larger systems, or systems experiencing significant thermal changes.
5. Test is to be witnessed by Quality Control Engineer and certified by the contractor.
 6. In obvious leaks can be found by emptying the system and placing a 10 psi charge of clean, dry nitrogen on the system. Each joint should then be individually checked using a soapy water solution or an Ultrasonic leak detection gun. Leak detection guns should be available from the pipe manufacturer.

3.2 Hanging

Pipe shall be hung in accordance with manufacturers' recommendations to avoid damage to the pipe.
Proper support spacing is required in order to avoid sagging of the material. Support spacing is temperature dependent and shall be based on manufacturer recommendations.