SECTION 22 10 00.1
DEIONIZED WATER PIPING AND VALVES

PART 1 GENERAL

1.1 SUBMITTALS

A. Submit product data for each pipe, valve and fitting that complies with specification.

B. Submit butt fusion certifications.

C. Submit pressure testing plan.

1.2 DELIVERY, STORAGE, AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

D. Material shall be stored in original packaging and protected from environmental damage until installation. Pipe shall be supported sufficiently to prevent sagging. Care shall be taken not to gouge or otherwise notch the pipe in excess of 10% of the wall thickness.

PART 2 PRODUCTS

2.1 PURE WATER PIPE AND FITTINGS

A. Polyproplyene Pipe shall be manufactured from a Group 1, Class 2 Beta Polypropylene Homopolymer material manufactured to SDR 11 dimensions with a pressure rating of 150 psi when measured at 68° F (20° C). Pipe internal surface finish shall be Ra ≤ 39.4µin. Pipe shall be manufactured in sizes from 16mm through 500mm (3/8” through 20”).

B. Polypropylene Fittings shall be manufactured from a Group I, Class 2 Beta Polypropylene Homopolypmer material manufactured to SDR 11 dimensions with a pressure rating of 150 psi when measured at 63° F (20° C). Fittings shall be available in sizes from16mm through 500mm (3/8" through 20”).

C. All components of the pipe and fitting system shall conform to the following applicable ASTM Standards, D4101, D 638, D2837, D2122, and shall conform to FDA CFR 21 177.1520, USP 25 Class VI and ASME-BPE. All pipe shall be marked with manufacturer’s name, pipe size, wall thickness, type, quality control mark and pressure rating information.

D. Shall be PROGEF® Standard PP Piping System as manufactured by GF Piping Systems LLC, Irvine CA.

2.2 VALVES

A. Polyproplyene Pipe shall be manufactured from a Group 1, Class 2 Beta Polypropylene Homopolymer material manufactured to SDR 11 dimensions with a pressure rating of 150 psi when measured at 68° F (20° C). Pipe internal surface finish shall be Ra ≤ 39.4µin. Pipe shall be manufactured in sizes from 16mm through 500mm (3/8” through 20”).

B. Ball Valves: Ball valves shall be full port, true union end constructed of polypropylene with EPDM or FPM seals available, manufactured for installation in PROGEF® Standard Piping system, Type 546 as manufactured by GF Piping Systems LLC.

C. Diaphragm Valves: Diaphragm valves shall be constructed of polypropylene with EPDM or PTFE Seal configurations, manufactured for installation in PROGEF® Standard Piping system, Type 515, 517 or 519 (zero static) as manufactured by GF Piping Systems LLC.

D. Three Way Ball Valves: Ball valves shall be L-Port/T-Port type constructed of polypropylene with EPDM or FPM seats available, manufactured for installation in PROGEF® Standard Piping system, Type 543 as manufactured by GF Piping Systems LLC.

E. Butterfly Valves: Butterfly valves shall be constructed of polypropylene with EPDM or FPM seats available, manufactured for installation in PROGEF® Standard Piping system, Type 578 (lug style) or Type 567 (wafer style) as manufactured by GF Piping Systems LLC.

F. Pressure Retaining Valves: Pressure Retaining valves shall be constructed of polypropylene with EPDM coated seals, manufactured for installation in PROGEF® Standard Piping system. Type 586. Stainless Steel Pressure Gauges shall be installed in conjunction with Type 586 Pressure Retaining Valve.

G. Pressure Reducing Valves: Pressure Reducing valves shall be constructed of polypropylene with EPDM coated seals, manufactured for installation in PROGEF® Standard Piping system. Type 582. Stainless Steel Pressure Gauges shall be installed in conjunction with Type 582 Pressure Retaining Valve.

2.3 RECIRCULATING LABORATORY FAUCET

A. Recirculating Laboratory Faucet: Shall be constructed of polyvinylidene fluoride and designed to provide a constant fluid flow to the point of use to eliminate dead legs. Faucet shall be Type 530 “AquaTap” as manufactured by GF Piping Systems LLC, Irvine CA.

B. Faucet to be manufactured with needle type flow control for precise metering.

C. Faucet to be manufactured for deck or wall mounting options.

D. Where required and shown on the drawings, install AquaTap Point of Use (POU) fixtures.

E. Recirculating laboratory faucet shall be installed in conjunction with an inline flow diverter (IFD) manufactured of PROGEF® PP by GF Piping Systems LLC. The inline flow diverter shall be designed to provide high flow from the distribution main through the faucet for constant water movement. An orifice installed within the inline flow diverter is used to create a differential pressure imbalance which forces water through the faucet with minimal pressure loss. The inline flow diverter(s) shall be installed in the distribution main where shown on the drawings and may serve up to three faucets. The diverters shall be manufactured and catalogued for IR® (Infrared) or sanitary clamp joining methods.

F. Faucet shall have a pressure rating of 100 psi (7 bar).

Recirculating laboratory faucet(s) shall be connected to the inline flow diverter using smooth bore 5/8” PFA or PE tubing for design flexibility and simplified piping installations. Tubing shall be connected to faucet(s) and inline flow diverter connection points using easy flare style connection method. Installer shall use GF Piping Systems LLC isolation ball valves installed inline (tubing) or optional emergency shut-off clamps, to facilitate segregation of faucets from the pure water system if required for maintenance or other purposes. Only catalogued AquaTap adaptors, accessories and tools shall be used by the installer.

2.4 PIPE/VALVE HANGERS AND SUPPORTS

A. Non-Restrictive Horizontal Pipe Clamps

1. Plastic pipes shall be supported at distances recommended by the manufacturer according to load, material, temperature, pipe wall thickness and diameter.

2. Plastic pipe supports shall be constructed of an exterior metal supporting bracket of gauge 7 or gauge 11 thickness, depending on size, and an independent plastic insert sleeve sized to allow not more than ¼" annular space between supported pipe and sleeve. Only insert sleeves of the indicated size shall be used for the corresponding supported pipe and sleeve. Only insert sleeves of the indicated size shall be used for the corresponding supported pipe. Supports shall be affixed using appropriate mounting bolts, nuts and washers to 12 gauge rolled structural steel channel, 1 5/8" inch by 1 5/8" minimum, or mounted to structurally sound surfaces suitable to accept mounting hardware.

B. Non-Restrictive Saddle Hangers Pipe Supports

1. Saddle type hangers shall be constructed from 12 gauge rolled structural steel channel, 1 5/8 inch x 1 5/8 inch minimum, strut or stronger as required suitable to support an exterior metal supporting bracket and an independent plastic insert sleeve sized to allow not more than 1/4 inch annular space between supported pipe and sleeve.

C. Non-Restrictive Clevis Hangers Pipe Supports

1. Clevis type hangers shall be constructed of an exterior metal supporting bracket and an independent plastic insert sleeve sized to allow not more than ¼ inch annular space between supported pipe and sleeve. Only insert sleeves of the indicated size shall be affixed to an independent clevis hanger bracket with means to be mounted using all thread rod with appropriate nuts and washers and sized per MSS-SP-58.

D. Non-Restrictive Vertical Pipe Supports

1. Vertical supports shall be mounted similarly to horizontal support with the addition of 35 durometer cushion strips mounted to both sides of plastic insert sleeve.

E. Thermal Compensating Valve Supports

1. Valves shall be supported at distances as recommended by manufacturers and/or according to load, material, temperature, pipe wall thickness and diameter.

2. Plastic valve supports shall be a two piece construction, with a primary supporting mounting bracket designed to be structurally attached to a flat surface or a steel strut support of 40mm (1 5/8 inches) width with slots to accept mounting hardware and a second, interlocking valve sliding bracket with suitable slots to affix and mount the valve. When assembled, the valve sliding bracket shall be interlocked with the mounting bracket to allow linear movement along a plane that is in-line with the installed pipe.

3. Location of the sliding valve support along the mounting bracket shall take into consideration the installation and operating system temperatures to gain maximum valve support throughout an anticipated temperature cycle of the piping system. If equal temperature changes are anticipated (above and below installation temperature) or if conditions are unknown, sliding valve support shall be mounted midway along mountain bracket.

4. All valve supports shall be of a two-piece, interlocking construction, manufactured of UV resistant materials and designed to provide full valve support while allowing for linear movement when subjected to thermal expansion or contraction forces acting on the installed piping system. The valve mounting bracket shall provide means of valve attachment without restricting valve movement when affixed to valve mounting support bracket.

F. Manufacturer

1. All supports and hangers specified above shall be Stress Less® Pipe and Valve Support system as manufactured by GF Piping Systems LLC.

PART 3 - EXECUTION

3.1 INSTALLATION

A. System components shall be installed using the IR® (Infrared) Butt Fusion joining method according to current installation instructions as delivered in print or documented online at www.gfpiping.com. An on-site installation seminar shall be conducted by GF personnel who are certified to conduct said seminar. Seminar topics shall include all aspects of product installation (storage, set up, support spacing, fusion process, machine care, testing procedure, etc.). At the conclusion of the seminar, all installers will be given a written certification test and will be required to prepare and complete one fusion joint of the type being implemented on the project. Upon successful completion of said test, the installer will be issued a certification card verifying that they have met the requirements of the manufacturer with regards to knowledge of proper product installation and testing methods.

B. Only the following GF Piping Systems fusion units may be used to install the PROGEF® Standard piping system for this project:

For Socket Fusion Installation – SG 125 Socket Fusion Machine or MSE hand tool

For IR Fusion Installation – IR-63 Plus®, IR-110 Plus®, IR-225 Plus®, IR-315 Plus®, Infrared Butt Fusion Machines, or the IR-110 A or IR-315 A Automatic Infrared Butt Fusion Machines.

C. Under this specification, the contractor shall be responsible for the purchase or rental of the proper machine required to meet the intent of the specification and be used for installation of the product on site.

D. Installer shall ensure that all pipe and fittings used for the process water piping are components of the same system. No mixing of various manufacturers' pipe and/or fittings shall be allowed.

3.2 TESTING

A. The following is a general test procedure for GF plastic piping. It applies to most applications. Certain applications may require additional consideration. For further questions regarding your application, please contact a GF representative.

B. All piping systems should be pressure tested prior to being put into operational service.

C. All pressure tests should be conducted in accordance with the appropriate building, plumbing, mechanical, and safety codes for the area where the piping is being installed.

D. When testing plastic piping systems, all tests should be conducted hydrostatically and should not exceed the pressure rating of the lowest rated component in the piping system (often a valve). Test the system at 150% of the designed operational pressure. For example, if the system is designed to operate at 80 psi, then the test will be done at 120 psi.

E. When hydrostatic pressure is introduced to the system, it should be done gradually through a low point in the piping system with care taken to eliminate any entrapped air by bleeding at high points within the system. This should be done in four stages, waiting ten minutes at each stage (adding ¼ the total desired pressure at each stage).

F. Allow one hour for system to stabilize after reaching desired pressure. After the hour, in case of pressure drop, increase pressure back to desired amount and hold for 30 minutes. If pressure drops by more than 6%, check system for leaks. (Note that some pressure loss is normal the first time a piping system is pressurized,

due to expansion of the material as described earlier.) If ambient temperature changes by more than 10°F during the test, a retest may be necessary.

END OF SECTION 22 10 00.1