SECTION 22 7000 - DI WATER PIPING

Maintain Section format, including the UH master spec designation and version date in bold in the center columns of the header and footer. Complete the header and footer with Project information.

Edit and finalize this Section, where prompted by Editor's notes, to suit Project specific requirements. Make selections for the Project at text identified **in bold**.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

Delete hidden text after this Section has been edited for the Project.

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

B. The Contractor's attention is specifically directed, but not limited, to the following documents for additional requirements:

1. The current version of the *Uniform General Conditions for Construction Contracts*, State of Texas, available on the web site of the Texas Facilities Commission.
2. The University of Houston's *Supplemental General Conditions and special Conditions for Construction*.

1.2 SCOPE OF WORK:

A. Work Included: Provide all labor, materials, equipment, tools and services, and perform all operations required in connection with or properly incidental to the construction of a complete **[and fully recirculated]** deionized water distribution system with outlets as indicated on the Drawings, as required for a complete and functional system and capable of delivering **[ ]** Megohm deionized treated water to locations shown on the Drawings. **[Extend all treated water piping to the point of the wall stub-out to serve treated water faucets and equipment.]**

1.3 QUALITY ASSURANCE:

A. Acceptable Manufacturers: Provide products complying with these specifications and produced by one of the following. Use DI piping system products by a single manufacturer.

1. Polyvinyl Chloride (PVC) and Fittings:

a. Corr Tech, Incorporated.

b. Plastic Piping Systems (PPS).

2. Polypropylene (PP) Pipe and Fittings:
   a. Corr Tech, Incorporated.
   b. Plastic Piping Systems (PPS).
3. Polyvinylidene Fluoride (PVDF) Pipe and Fittings:
   a. Corr Tech, Incorporated.
   b. Plastic Piping Systems (PPS).
4. Treated Water Faucets:
   a. Corr Tech, Incorporated.
   b. Plastic Piping Systems (PPS).

1.4 SUBMITTALS

A. Shop Drawing submittals shall include, but not be limited to, the following:
   1. Cut sheets of treated water pipe, valves, faucets, fittings and other required accessories clearly indicating all features, options, materials and dimensions.
   2. Additional information as required in Section 23 0100 “Mechanical General Provisions.”

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver treated water piping system components in factory-fabricated water-resistant wrapping.

B. Handle treated water piping system components carefully to avoid damage to material component, enclosure and finish.

C. Store treated water piping system components in a clean, dry space and protect from the weather.

PART 2 - PRODUCTS

2.1 TREATED WATER PIPE, FITTINGS AND VALVES

A. Pipe and Fittings: Pipe and fittings shall be
   1. **[Schedule 80 Polyvinyl Chloride (PVC) conforming to ASTM D-1785, Type 1 (normal impact), Grade 1 (high chemical resistance) with solvent welded ASTM D-2467 fittings.]**
   2. **[Schedule 80 natural polypropylene pipe conforming to ASTM D-2146 for Type II copolymer, cell class 2690B with Fuseal fittings.]**
   3. **[SYGEF or approved equal 100% pure virgin natural PVDF polymer piping and heat fusion welded fittings.]**

4. Connections at valves and other serviceable devices shall be threaded. All pipe and fittings shall be rated for a minimum of **[150] [232]** psi at 73³F.

B. Valves: Valves shall be ball type and manufactured of the same material as fittings to assure compatibility. All ball valves shall have Viton seals and PTFE seats. Ball valves shall have a pressure rating **of [150] [225]** psi at 68³F and shall be a true union design.

C. Flow Control Valves: Provide a 3/8-inch flow control valve in each and every **[Type TW-1]** treated water outlet that limits the flow to 1/2 GPM. Furnish and install a 4 GPM flow control valve in each treated water connection to washers. Flow control valves shall maintain a constant flow regardless of inlet pressure changes between 15 and 100 psig. No metal shall be in contact with the liquid.

1. Flow control valves shall be as manufactured by Continental Water Conditioning Corporation or an approved substitution and shall be constructed of the same material as the piping system in which they are installed.

D. Pressure Regulating Valves: Provide, where shown on the Drawings, pressure regulator valves, using the no lube design as manufactured by R-K Industries, of Ontario, CA. Valves shall be constructed of the same material as the piping system in which they are installed. Regulators shall be Model "NLF", no lube fluid pressure with adjustable screw and locknut. Units shall have a Teflon diaphragm and shall have no metallic contact with the fluid regulated and shall be of the entry design for inline maintenance.

E. Pressure Gages: Treated water system pressure gages shall be 4-inch diameter with 316 stainless steel bourdon tubes and provide a readout of 6 to **[100] [250]** psi. Gages installed in pipe shall be supplied with standard polypropylene body, Teflon diaphragm, liquid filled gage guards.

1. Treated water system pressure gage guards shall be manufactured by PLAST-O-MATIC or an approved substitution.

2.2 HANGERS AND SUPPORTS

A. Horizontal Piping: All horizontal piping shall be supported on clevis-type hangers as specified in Sections 23 0300 “Basic Materials and Methods” and 22 0000 “Plumbing Piping Systems.” Piping supports shall include "U" shaped galvanized sheetmetal trays/shields spanning between hangers and supports to continuously support piping and prevent sagging. Non-metallic piping system hangers and supports shall be provided on maximum 5-foot centers.

B. Vertical/Riser Piping: All vertical/riser piping shall be supported using riser clamps as specified in Sections 23 0300 “Basic Materials and Methods” and 22 0000 “Plumbing Piping Systems.”

C. Wall Chase Piping: All wall chase piping shall be supported using the wall/chase support system specified in Section 22 0000 “Plumbing Piping Systems.”

2.3 DE-IONIZED WATER SOURCE

A. [General: Refer to Section 22 1313 “Water Treatment Equipment” for water treatment equipment.]

B. [General: The deionized water system shall be located in the [ ], where shown on the Drawings. The entire system, including connections to piping stub-outs provided under this contract, and system balancing shall be provided under a separate contract.]

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: All piping, fittings, hangers, connections and accessories shall be installed in strict accordance with the manufacturer's written installation instructions and applicable codes. Do not use air chambers and shock-stops on treated water systems.

B. Damaged Piping: Remove and replace any damaged piping at the Contractor's expense.

C. [Fusion Joints: Piping joints and connections shall be made using socket type fittings and the manufacturer's interference fit fusion joint system. Pipe shall be cut and chamfered using the manufacturer's recommended tools, methods and requirements. Pipe ends and fitting sockets shall be thoroughly cleaned using isopropyl alcohol or acetone and clean absorbent paper or cloth, prior to joining. Joints shall be fused using the manufacturer's recommended fusion tools, heater bushings and Tempil sticks and strictly following the manufacturer's recommended fusion procedure.]

D. [Solvent Welded Joints: Piping joints shall be made using socket welded fusion joints per the manufacturer's written joining instructions.]

E. Expansion Provisions: All piping systems shall be installed with adequate provisions taken where the installation temperature is outside the range of 65 °F to 85 °F. Provide vertical expansion joint assemblies, offsets and restraints as recommended by the piping system manufacturer wherever the installation temperature is more than 10 °F different from the normal water temperature.

F. Hangers and Supports: Install the entire piping system and related hangers and supports such that the piping system is properly aligned and free of stress.

1. Support vertical stacks at each floor using riser clamps. The lowest riser support shall be located below the lowest coupling/hub on the stack and shall restrict sideways as well as downward motion.

2. Support horizontal piping using Clevis-type hangers with maximum five feet on center hanger spacing.

3. Include "U" shaped galvanized sheetmetal trays/shields spanning between hangers and supports to continuously support piping and prevent sagging. Provide non-metallic piping system hangers and supports on maximum 5-foot centers.

4. Also locate hangers at each offset, bend or fitting.

G. Training: Contractor shall instruct the Owner's maintenance staff in the proper procedure for fusing pipe joints and shall provide the Owner with all special tools and fusing equipment required to properly fuse pipe joints.

3.2 TESTING AND BALANCING

A. Test treated water piping as specified in Section 23 0593 “Testing, Adjusting and Balancing” and Section 22 0000 “Plumbing Piping Systems” for domestic water piping.

B. After installation, **[sterilize the entire piping system using low pressure steam (PVDF systems only) and]** flush the entire system with treated water to obtain delivered water quality acceptable to the Owner.

C. Balance the flow in each leg of the treated water system to assure equal recirculation volumes in each leg of the treated water distribution system.

3.3 IDENTIFICATION

A. Refer to Section 23 0300 “Basic Materials and Methods” for applicable painting, nameplate and labeling requirements.

END OF SECTION 22 7000