

SECTION 226700 - PROCESSED WATER SYSTEMS FOR LABORATORY FACILITIES

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.

1.2 SUMMARY

Retain one or more of the options in paragraph below.

- A. Section includes deionized-water, distilled-water and reverse-osmosis-water piping.

1.3 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure Ratings:

Retain one or more of three subparagraphs below for specific reagent-water piping systems.

1. Deionized-Water Piping: 50 psig (345 kPa) unless otherwise indicated.
2. Distilled-Water Piping: 50 psig (345 kPa) unless otherwise indicated.
3. Reverse-Osmosis-Water Piping: 60 psig unless otherwise indicated.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. LEED Submittals:

Retain subparagraph below if low-emitting materials are required for LEED-CI, LEED-CS, or LEED-NC Credit EQ 4.1; coordinate with requirements retained in Part 2 for solvent cements and adhesive primers.

1. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, documentation including printed statement of VOC content and chemical components.

- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. ASME Compliance: Comply with ASME B31.3, "Process Piping," for piping conveying fluid at a pressure of 15 psig (105 kPa) or greater.

PART 2 - PRODUCTS

2.1 PLASTIC PIPE AND FITTINGS

PP pipe and fittings for heat-fusion joints in first paragraph below are available in NPS 1/2 to NPS 4 (DN 15 to DN 100) for socket-type, heat-fusion joining and to at least NPS 12 (DN 300) for butt-type, heat-fusion joining.

- A. PP Pipe and Fittings for Heat-Fusion Joints: Made from ASTM D 4101, PP resin.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. PProseal.
 - b. Spears LXT.
 - c. Orion Fittings; a division of Watts Water Technologies Inc.
 2. Schedule 80, Pipe and Fittings: Pipe made to ASTM D 2447, Schedule 80 dimensions; with socket fittings matching pipe dimensions.

2.2 TRANSITION FITTINGS

- A. Transition Fittings: Couplings, flanges, or other manufactured fittings; same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.3 PP VALVES

Valves in first paragraph below are available in NPS 1/4 to NPS 2 (DN 8 to DN 50) and NPS 2-1/2 to NPS 4 (DN 65 to DN 100) from some manufacturers. Verify that valve selections are available from manufacturers retained.

- A. PP Ball Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. PProseal.
 - b. Spears LXT.
 - c. Orion Fittings; a division of Watts Water Technologies Inc.
 2. Description:
 - a. Standard: MSS SP-122.
 - b. Pressure Rating: 150 psig (1035 kPa) at 73 deg F (23 deg C).
 - c. Body Material: ASTM D 4101, PP resin.
 - d. Body Design: Union type.
 - e. End Connections: Detachable, butt or socket.
 - f. Ball: ASTM D 4101, PP resin.
 - g. Port: Full.

- h. Seats: PTFE.
- i. Stem: ASTM D 4101, PP resin.
- j. Stem Seals: FKM-rubber O-rings.
- k. Handle: Tee shaped.

Valves in first paragraph below are available in at least NPS 2 (DN 50) and larger.

B. PP Butterfly Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. PProseal.
 - b. Orion.
 - c. Spears Manufacturing Company.
2. Description:
 - a. Pressure Rating: 150 psig (1035 kPa) at 73 deg F (23 deg C).
 - b. Body Material: ASTM D 4101, PP resin.
 - c. Body Design: Lug or wafer type.
 - d. Seat: FKM rubber.
 - e. Disc: ASTM D 4101, PP resin.
 - f. Stem: Stainless steel.
 - g. Stem Seals: FKM-rubber O-rings.
 - h. Handle: Lever type with locking device.

Valves in first paragraph below are available in NPS 2 (DN 50) and smaller.

C. PP Ball-Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. PProseal.
 - b. Spears LXT
 - c. Orion Fittings; a division of Watts Water Technologies Inc.
2. Description:
 - a. Pressure Rating: 150 psig (1035 kPa) at 73 deg F (23 deg C).
 - b. Body Material: ASTM D 4101, PP resin.
 - c. Body Design: Union type.
 - d. End Connections: Detachable, socket.
 - e. Ball: ASTM D 4101, PP resin.
 - f. Seat and Seals: FKM-rubber O-rings.

Valves in first paragraph below are available in at least NPS 2 (DN 50) and larger.

D. PP Swing-Check Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Spears Manufacturing Company.
 - b. PProseal.
 - c. Orion.
2. Description:
 - a. Pressure Rating: 150 psig (1035 kPa) at 73 deg F (23 deg C).
 - b. Body Material: ASTM D 4101, PP resin.
 - c. Body Design: Bolted-bonnet type.
 - d. End Connections: Flanged.
 - e. Shaft: ASTM D 4101, PP resin.
 - f. Disc and Arm: ASTM D 4101, PP resin.
 - g. Gasket and Seals: FKM rubber.

Valves in paragraph below are available in at least NPS 3/4 to NPS 4 (DN 20 to DN 100).

E. PP Diaphragm Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. PProseal.
 - b. Orion.
 - c. Spears Manufacturing Company.
2. Description:
 - a. Pressure Rating: 150 psig (1035 kPa) at 73 deg F (23 deg C).
 - b. Body Material: ASTM D 4101, PP resin.
 - c. Body Design: Bolted-bonnet type.
 - d. End Connections for NPS 2 (DN 50) and Smaller: Detachable, socket.
 - e. End Connections for NPS 2-1/2 and NPS 3 (DN 65 and DN 80): Flanged.
 - f. Diaphragm: FKM rubber.
 - g. Seals: FKM-rubber O-rings.
 - h. Handle: Wheel type.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Refer to Division 22 Section "Common Work Results for Plumbing" for basic installation requirements.
- B. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of water piping. Location and arrangement of piping layout take design

considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

- C. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure ratings unless otherwise indicated.

3.2 JOINT CONSTRUCTION

- A. Where specific joint construction is not indicated, follow piping manufacturer's written instructions.
- B. PP Piping Heat-Fusion Joints: Make according to ASTM D 2657.
- C. Join dissimilar pipe materials with transition fittings compatible with pipe materials being joined.

3.3 VALVE INSTALLATION

- A. Install sectional valves close to mains on each branch and riser serving equipment.
- B. Install shutoff valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- C. Locate valves for easy access and provide separate support where necessary.
- D. Install valves of same size as the pipe or tube in which they are installed unless otherwise indicated.
- E. Install plastic valves of the same material as the plastic pipe in which they are installed.
- F. Install valves in horizontal piping with stem at or above center of pipe.
- G. Install valves in position to allow full movement of stem and lever handle.
- H. Install ball-check valves in horizontal or vertical position so ball will unseat during normal flow.
- I. Install swing-check valves in horizontal position with the hinge pin level.

3.4 HANGER AND SUPPORT INSTALLATION

- A. Comply with requirements for pipe hanger and support devices and installation specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."
 - 1. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
 - 2. Install stainless-steel pipe hangers for horizontal piping in corrosive environments.
 - 3. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.
 - 4. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.

5. Clamps for Vertical Piping: MSS Type 8 or Type 42.
 6. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet (30 m) and Less: MSS Type 1, adjustable clevis hangers.
 - b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
 - c. Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cushion rolls.
 7. Multiple, Straight, Horizontal Piping Runs, 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 8. Base of Vertical Piping: MSS Type 52, spring hangers.
- B. Support horizontal piping and tubing within 12 inches (300 mm) of each fitting, valve, and coupling.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced one size for double-rod hangers, to minimum 3/8 inch (10 mm).

Maximum spans in remaining paragraphs were taken from MSS SP-69 for water service and from model plumbing codes. The most restrictive piping and spacing dimensions allowed are shown. Larger spans may be appropriate for plastic piping at room temperature if not restricted by plumbing codes. See manufacturers' literature.

- E. Install padded hangers for PP piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1 (DN 25) and Smaller: 32 inches (813 mm) with 3/8-inch (10-mm) rod.
 2. NPS 1-1/4 to NPS 2 (DN 32 to DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
 3. NPS 2-1/2 and NPS 3 (DN 65 and DN 80): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.
- F. Install padded supports for vertical PP piping NPS 2-1/2 (DN 65) and larger every 120 inches (3000 mm) and midstory for NPS 2 (DN 50) and smaller.
- G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
- C. Connect reagent-water piping to equipment and service outlets with unions or flanges.

3.6 IDENTIFICATION

- A. Comply with requirements for identification specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.7 FIELD QUALITY CONTROL

- A. Test new piping, and parts of existing piping that have been altered, extended, or repaired, for leaks and defects.
 - 1. Schedule tests and their inspections by Owner, with at least 24 hours' advance notice.
 - 2. Do not cover piping or put into service before inspection and approval.
 - 3. Test completed piping according to Owner. If Owner does not have published procedures, perform tests as follows:
 - a. Hydrostatic Tests: Test piping at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than 100 psig (690 kPa).
 - 1) Exception: Do not subject glass piping to pressure above manufacturer's pressure rating for size.
 - 4. Replace leaking joints with new materials and retest until no leaks exist.
 - 5. Submit separate reports for each test.

3.8 CLEANING

- A. Use procedures prescribed by Owner or, if not prescribed, use procedures described below:
 - 1. Before using, purge new piping and parts of existing piping that have been altered, extended, or repaired.
 - 2. Clean piping by flushing with reagent water.

3.9 PIPING SCHEDULE

This Section includes piping, valves, and other components for processed-water systems NPS 3 (DN 80) and smaller. Most systems typically are NPS 2 (DN 50) or smaller.

- A. Transition and special fittings with pressure ratings at least equal to piping, and of same or compatible material, may be used in applications below.

- B. Deionized-Water Piping: Use the following piping materials for each pipe size range:

Piping in first subparagraph below is available in NPS 1/2 to NPS 4 (DN 15 to DN 100).

- 1. NPS 3 (DN 80) and Smaller: PP pipe and fittings and heat-fusion joints.

- C. Distilled-Water Piping: Use the following piping materials for each pipe size range:

Piping in first subparagraph below is available in NPS 1/2 to NPS 4 (DN 15 to DN 100).

1. NPS 3 (DN 80) and Smaller: PP pipe and fittings and heat-fusion joints.

D. Reverse-Osmosis-Water Piping: Use the following piping materials for each pipe size range:

Piping in first subparagraph below is available in NPS 1/2 to NPS 4 (DN 15 to DN 100).

1. NPS 3 (DN 80) and Smaller: PP pipe and fittings and heat-fusion joints.

3.10 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Install ball valves in piping NPS 2 (DN 50) and smaller. Install butterfly valves for NPS 3 (DN 80) piping and larger.
2. Throttling Duty: Install ball valves in piping NPS 2 (DN 50) and smaller. Install diaphragm valves for NPS 3 (DN 80) piping and larger.

END OF SECTION 226700