SECTION 402323 - POTABLE WATER PROCESS PIPING

Note that this section has only been edited for NYSOGS standardization and has not been technically edited. The designer shall make all technical edits specific to the project for this section.

This Section specifies requirements for plant process piping systems transporting potable (domestic) water in a water treatment plant.

Piping for Site utilities are specified in applicable Division 33 site utilities Sections, and plumbing piping and appurtenances are specified in Division 22.

In process industries such as water and wastewater treatment, piping is typically specified by pipe material. Individual piping systems (for example, sanitary, raw water, and drainage) may be defined on Drawings by way of a piping schedule, which describes the piping components required for that system as well as provides other relevant data such as pressure testing requirements and applicable valve types.

Piping, as well as valve type, fittings, joints, accessories, and other appurtenances, should be indicated in the piping schedule and referenced by pipe material to appropriate Division 40 Section, based on service.

Consult piping and valve manufacturers to select materials based on specific application.

1. GENERAL
   * + 1. SUMMARY
          1. Section Includes:

Pipes and tubes for conveying potable process water.

Valves for conveying potable process water.

* + - * 1. Related Requirements:

List other Sections directly related to or affecting Work of this Section. Include Sections specifying information expected to be found in this Section as well as Sections required to describe complete system or assembly requirements.

Section 055000 - Metal Fabrications: Miscellaneous metalwork and fasteners as required by this Section.

Section 400506 - Couplings, Adapters, and Specials for Process Piping: Pipe penetrations, restrained joints, flexible connections, expansion joints and loops, and sleeve-type couplings.

Section 400517 - Copper Process Pipe and Tubing: Copper pipe, tube, fittings, joints, and appurtenances.

Section 400519 - Ductile Iron Process Pipe: Ductile-iron pipe, fittings, joints, and appurtenances.

Section 400524 - Steel Process Pipe: Steel pipe, linings, coatings, fittings, joints, and appurtenances.

Section 400531 - Thermoplastic Process Pipe: PVC pipe, fittings, joints, and appurtenances.

Section 400551 - Common Requirements for Process Valves: Common product requirements for valves for placement by this Section.

Section 400561 - Gate Valves: Valves and accessories.

Section 400565.16 - Globe Valves: Valves and accessories.

Section 400565.23 - Swing Check Valves: Valves and accessories.

Section 404213 - Process Piping Insulation: Insulation requirements for pipe, fittings, and appurtenances.

* + - 1. REFERENCE STANDARDS

List reference standards included within text of this Section, with designations, numbers, and complete document titles. Edit following for Project conditions.

* + - * 1. American Water Works Association:

AWWA C651 - Disinfecting Water Mains.

* + - * 1. American Welding Society:

AWS D1.1 - Structural Welding Code - Steel.

* + - * 1. ASME International:

ASME A13.1 - Scheme for the Identification of Piping Systems.

ASME B31.3 - Process Piping.

* + - * 1. ASTM International:

ASTM A780 - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

* + - * 1. NSF International:

NSF 61 - Drinking Water System Components - Health Effects.

NSF 372 - Drinking Water System Components - Lead Content.

* + - * 1. SSPC: Society for Protective Coatings:

SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic and Type II - Organic).

* + - 1. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
        2. Manufacture’s installation instructions shall be provided along with product data.
        3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
        4. Product Data:

Piping: Submit manufacturer information on pipe materials, fittings, and accessories.

Hangers and Supports: Submit manufacturer catalog information, including load capacity.

System Components: Submit manufacturer catalog information including capacity, component sizes, rough-in requirements, and service sizes.

Valves: Submit manufacturer information for actuators with model number and size indicated.

USE PARAGRAPH BELOW WITH EPD REQUIREMENT WHEN PROJECT ESTIMATE IS $1M OR MORE.

* + - * 1. Submit an Environmental Product Declaration (EPD) from the manufacturer for steel pipe within this specification section, if available. A statement of the contractor’s good faith effort to obtain the EPD shall be provided if not available.

Manufacturer-provided EPDs must be Product Specific Type III (Third-Party Reviewed), in adherence with ISO 14025 *Environmental labels and declarations*, ISO 14044 *Environmental management – Life cycle assessment*, and ISO 21930 *Core rules for environmental product declarations of construction products and services.*

* + - * 1. Shop Drawings:

Piping:

Indicate piping system schematic with general assembly of components and mounting and installation details.

Submit list of wording, symbols, letter size, and color-coding for pipe identification; comply with ASME A13.1.

Submit layout drawings showing piece numbers and location.

Valves: Submit assembly drawings indicating parts list, materials, sizes, position indicators, limit switches, [**control system,**] actuator mounting, wiring diagrams, control system schematics[**, and**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
        2. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.

Include separate Paragraphs for additional certifications.

* + - * 1. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
        2. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
        3. Qualifications Statements:

Coordinate following Subparagraphs with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer and installer.

Submit manufacturer's approval of installer.

Welders: Qualify procedures and personnel according to AWS D1.1.

* + - 1. CLOSEOUT SUBMITTALS
         1. Project Record Documents: Record actual locations of piping and valves.
         2. Operation and Maintenance Data: Submit assembly views and replacement part numbers and availability.
      2. QUALITY ASSURANCE

Include this Article to specify compliance with overall reference standards affecting products and installation included in this Section.

* + - * 1. Materials in Contact with Potable Water: Certified to NSF 61 and 372.
        2. Perform Work according to [**applicable authority**] [**AWS D1.1**] for welding of hanger and support attachments to building structure.

In following Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

* + - * 1. Perform Work according to <**\_\_\_\_\_\_\_\_**> standards.

Include following Paragraph only when cost of acquiring specified standards is justified.

* + - * 1. Maintain <**\_\_\_\_\_\_\_\_**> [**copy**] [**copies**] of each standard affecting Work of this Section on Site.
      1. QUALIFICATIONS

Coordinate following Paragraphs with requirements specified in SUBMITTALS Article.

* + - * 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
        2. Installer: Company specializing in performing Work of this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience [**and approved by manufacturer**].
        3. Welders: AWS qualified within previous 12 months for employed weld types.
      1. DELIVERY, STORAGE, AND HANDLING
         1. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
         2. Store materials according to manufacturer instructions.
         3. Protection:

Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

Provide additional protection according to manufacturer instructions.

* + - 1. EXISTING CONDITIONS
         1. Field Measurements:

Verify field measurements prior to fabrication.

Indicate field measurements on Shop Drawings.

* + - 1. WARRANTY

This Article extends warranty period beyond one year. Extended warranties may increase construction costs and State enforcement responsibilities. Specify warranties with caution.

* + - * 1. Furnish [**five**] <**\_\_\_\_\_\_\_\_**>-year manufacturer's warranty for piping and valves.

1. PRODUCTS
   * + 1. PIPING AND VALVES FOR CONVEYING POTABLE PROCESS WATER
          1. Piping: [**Copper as specified in Section 400517 - Copper Process Pipe and Tubing**] [**, ductile iron as specified in Section 400519 - Ductile Iron Process Pipe**] [**, steel as specified in Section 400524 - Steel Process Pipe**] [**, PVC as specified in Section 400531 - Thermoplastic Process Pipe**] [**, and**] [**<\_\_\_\_\_\_\_\_> as specified in Section <\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_>**].

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Piping: As indicated [**in piping schedule**] [**on Drawings**].
        2. Tubing: Copper as specified in Section 400517 - Copper Process Pipe and Tubing.
        3. Valves: [**Gate as specified in Section 400561 - Gate Valves**] [**, globe as specified in Section 400565.16 - Globe Valves**] [**, swing check as specified in Section 400565.23 - Swing Check Valves**] [**, and**] [**<\_\_\_\_\_\_\_\_> as specified in Section <\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_>**].

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Valves: As indicated [**in piping schedule**] [**in valve schedule**] [**on Drawings**].
        2. Valve Service:

Shutoff, Drain, and Isolation:

Isolation, drainage of equipment, and vertical risers.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

As indicated on Drawings.

Valve Type for Shutoff Service: [**Globe**] [**Gate**] [**As indicated on Drawings**].

Bypass: As indicated on Drawings.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

In following Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

* + - * 1. Furnish materials according to <**\_\_\_\_\_\_\_\_**> standards.

1. EXECUTION
   * + 1. EXAMINATION
          1. Verify that field dimensions are as indicated on [**Shop**] Drawings.
       2. PREPARATION
          1. Protect materials and equipment from damage and intrusion of water and other materials.
       3. INSTALLATION
          1. As indicated on [**Shop**] Drawings, according to manufacturer instructions, and ASME B31.3.
          2. Use minimum number of joints.
          3. Expansion Joints: In locations where pipe expansion joints are indicated, install pipe alignment guides adjacent to and within [**four**] <**\_\_\_\_\_\_\_\_**> pipe diameters of joint.
          4. Field Fabrication of Fittings: According to manufacturer instructions.
          5. Provide thrust restraints as required.
          6. Flexible Couplings and Expansion Joints:

At connections to equipment and where indicated on [**Shop**] Drawings.

As specified in Section 400506 - Couplings, Adapters, and Specials for Process Piping.

* + - * 1. Couplings, Service Saddles, and Anchors: According to manufacturer instructions.
        2. Provide upstream and downstream clearances [**as indicated on Drawings**] [**according to component manufacturer instructions**].
        3. Insulation: As specified in Section 404213 - Process Piping Insulation.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Insulation: As indicated [**on Drawings**] [**on Shop Drawings**] [**in piping schedule**].
        2. Local Indicators:

Install direct-reading indicator devices such as thermometers and pressure gages as indicated on Drawings and according to manufacturer instructions.

Location: Capable of being read from floor level and accessible for maintenance.

* + - * 1. Orientate valves to permit operation and maintenance access to valve operator and to avoid interferences with other equipment.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

In following Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

* + - * 1. Installation Standards: Install Work according to <**\_\_\_\_\_\_\_\_**> standards.
      1. FIELD QUALITY CONTROL
         1. Inspection:

Inspect for damage to pipe lining or coating and for other defects that may be detrimental as determined by Director’s Representative.

Repair damaged piping, or provide new, undamaged pipe.

After installation, inspect for proper supports and interferences.

* + - * 1. Pressure Testing:

As indicated on pipe schedule.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

* + - * 1. Pressure Testing:

Test Pressure: Not less than 200 psig or 50 psi in excess of maximum static pressure, whichever is greater.

Conduct hydrostatic test for at least two hours.

Fill section to be tested with water slowly; expel air from piping at high points. Install corporation cocks at high points. Close air vents and corporation cocks after air is expelled. Raise pressure to specified test pressure.

Observe joints, fittings, and valves under test. Remove and renew cracked pipe, joints, fittings, and valves showing visible leakage. Retest.

Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate. Maintain pressure within plus or minus 5 psi of test pressure. Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.

Compute maximum allowable leakage by following formula:

L = SD x sqrt (P)/C.

L = testing allowance, in gallons per hour

S = length of pipe tested, in feet

D = nominal diameter of pipe, in inches

P = average test pressure during hydrostatic test, in psig

C = 148,000

When pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

If test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.

Correct visible leaks regardless of quantity of leakage.

Director’s Representative will witness testing.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

In following Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

* + - * 1. Pressure Testing: According to <**\_\_\_\_\_\_\_\_**> standards.
        2. Disinfection, Flushing, and Sampling:

Disinfect pipeline installation according to AWWA C651.

[**Use of liquid chlorine is not permitted.**]

Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.

Disposal:

Legally dispose of chlorinated water.

If chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.

After final flushing and before pipeline is connected to existing system or placed in service, employ an approved independent testing laboratory to sample, test, and certify that water quality meets quality standards of [**authority having jurisdiction**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Equipment Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.
        2. Damaged Coatings:

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Both organic and inorganic zinc-rich paints are available from major coatings manufacturers. Inorganic (zinc-silicate) zinc-rich primers offer marginally better corrosion protection (as a single layer), but manufacturers caution that painters must be especially qualified for this task, and that proper surface preparation and ambient application conditions are important considerations.

Organic (zinc-rich epoxy) primers have the advantage of being easier to apply, with less likelihood of experiencing curing problems, especially in cold, dry conditions. They also have improved resistance under high-humidity conditions and chemical environments, better top-coatability, and less possibility of adhesion and blistering problems.

Caution: Inorganic zinc-rich primers should not be used to touch up galvanized metal or previously coated metals having shop-primed organic and inorganic primers.

Touchup Primer for Galvanized Surfaces:

[**SSPC-Paint 20, Type I - Inorganic**] [**SSPC-Paint 20, Type II - Organic**] <**\_\_\_\_\_\_\_\_**>.

Comply with ASTM A780

* + - 1. ADJUSTING
         1. Field-calibrate local indicators at time of piping installation.
      2. CLEANING
         1. Keep piping and valve interiors clean as installation progresses.
      3. DEMONSTRATION
         1. Demonstrate valve operation, routine maintenance, and emergency repair procedures to Director’s Representative.

END OF SECTION 402323