SECTION 402414 - LIQUID CHLORINE AND SODIUM HYPOCHLORITE 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 process piping and tubing for chlorine solution and sodium hypochlorite solution in a water or wastewater treatment plant; valves 2 inches and smaller are also specified in this Section.

Consult piping manufacturer and select materials based on specific application.

Sodium hypochlorite generating equipment is specified in Section 463313.

Piping for Site utilities is specified in Division 33, plumbing piping and appurtenances are specified in Division 22, and process piping and valves are specified in Division 40.

In process industries such as water and wastewater treatment, piping is typically specified by pipe material. Individual piping systems (such as sanitary, raw water, and drainage) may be defined on Drawings via a pipe schedule, which describes piping components required for that system and provides other relevant data such as pressure testing requirements and applicable valve types (refer to Section 400506).

Piping, as well as fittings, joints, accessories, and other appurtenances, should be indicated in a pipe schedule and specified by pipe material in Division 40 - Process Integration.

Valving, including appurtenances and accessories, should be indicated in a valve schedule and specified by valve type. Common items applicable to process valving are specified in Section 400551.

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

Pipes and tubes for conveying chlorine solution or sodium hypochlorite solution.

Valves for conveying chlorine solution or sodium hypochlorite solution.

* + - * 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: Components common to process piping systems.

Section 400531 - Thermoplastic Process Pipe: Requirements for plastic piping and tubing as specified by this Section.

Section 400551 - Common Requirements for Process Valves: Basic materials and methods related to valves as specified in this Section.

Section 400563 - Ball Valves: Requirements for ball valves as specified by this Section.

Section 400574.13 - Diaphragm Valves: Requirements for plastic diaphragm valves.

Section 463313 - Sodium Hypochlorite Generating Equipment: Potential source of sodium hypochlorite for connection to piping system as specified in this Section.

* + - 1. DEFINITIONS

Limit list of definitions to terms unique to this Section and not provided elsewhere.

* + - * 1. PE: Polyethylene.
				2. PVDF: Polyvinylidene fluoride.
			1. REFERENCE STANDARDS

List reference standards included within text of this Section, with designations, numbers, and complete document titles.

* + - * 1. ASME International:

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

ASME B1.1 - Unified Inch Screw Threads (UN and UNR Thread Form).

ASME B31.3 - Process Piping.

ASME B31.9 - Building Services Piping.

* + - * 1. ASTM International:

ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.

ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

ASTM D2467 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.

ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.

ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets.

ASTM D3222 - Standard Specification for Unmodified Poly(Vinylidene Fluoride) (PVDF) Molding Extrusion and Coating Materials.

ASTM F439 - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.

ASTM F441

ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.

* + - * 1. Manufacturers Standardization Society of the Valve and Fittings Industry:

MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

* + - * 1. NSF International:

NSF 61 - Drinking Water System Components - Health Effects.

NSF 372 - Drinking Water System Components - Lead Content.

* + - 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. Manufacturer’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.

* + - * 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 [**, and**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

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.

* + - 1. CLOSEOUT SUBMITTALS
				1. Architect Project Record Documents: Record actual locations of piping and valves.
			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.

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.
			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

Consult piping manufacturer to confirm correct application of materials. Maximum product temperatures vary with concentration; consult piping manufacturer based on application.

Select one of following two Paragraphs to specify PVC piping and tubing by reference to Section 400531 or pipe schedule, or to include specification in this Section.

* + - * 1. PVC Piping and Tubing:

Maximum Product Temperature: [**140**] <**\_\_\_\_\_\_\_\_**> degrees F

Pipe, Tube, and Fittings: [**As specified in Section 400531 - Thermoplastic Process Pipe**] [**As indicated in pipe schedule**].

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

* + - * 1. PVC Piping and Tubing:

Maximum Product Temperature: [**140**] <**\_\_\_\_\_\_\_\_**> degrees F

Piping:

Pipe: Comply with ASTM D1785, Schedule 80.

Materials:

Comply with ASTM D1784.

[**Minimum**] Cell Classification: [**12545-C**] <**\_\_\_\_\_\_\_\_**>.

Fittings:

Material: PVC, Schedule 80.

Comply with ASTM D2467.

Joints: Socket type, solvent welded; comply with ASTM D2855.

Solvent Cement: Comply with ASTM D2564.

Tubing:

Tube:

Type: [**Clear**] <**\_\_\_\_\_\_\_\_**>.

Size and Wall Thickness: [**As indicated in piping schedule**] <**\_\_\_\_\_\_\_\_**>.

Pressure Rating: As indicated [**on Drawings**] [**in piping schedule**].

Fittings:

Type: Compression.

Materials in Contact with Chlorinated Solution: [**Titanium**] [**PVC**] [**CPVC**] [**PTFE**] [**PVDF**] <**\_\_\_\_\_\_\_\_**>.

Threads: Straight; ASME B1.1.

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

Select one of following two Paragraphs to specify CPVC piping by reference to Section 400531 or pipe schedule, or to include specification in this Section.

* + - * 1. CPVC Piping:

Maximum Product Temperature: [**180**] <**\_\_\_\_\_\_\_\_**> degrees F

Pipe and Fittings: [**As specified in Section 400531 - Thermoplastic Process Pipe**] [**and**] [**as indicated in pipe schedule**].

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

* + - * 1. CPVC Piping:

Maximum Product Temperature: [**180**] <**\_\_\_\_\_\_\_\_**> degrees F

Materials:

Comply with ASTM D1784, Schedule 80.

[**Minimum**] Cell Classification: [**23447**] <**\_\_\_\_\_\_\_\_**>.

Pipe: Comply with ASTM F441, Schedule 80.

Fittings:

Comply with ASTM F439.

Schedule 80.

Joints:

Type: Socket.

Solvent welded.

Solvent Cement: Comply with ASTM F493.

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

Select one of following two Paragraphs to specify PVDF piping and tubing by reference to Section 400531 or pipe schedule, or to include specification in this Section.

* + - * 1. PVDF Piping and Tubing:

Maximum Product Temperature: [**212**] <**\_\_\_\_\_\_\_\_**> degrees F

Pipe and Fittings: [**As specified in Section 400531 - Thermoplastic Process Pipe**] [**and**] [**as indicated in pipe schedule**].

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

* + - * 1. PVDF Piping and Tubing:

Maximum Product Temperature: [**212**] <**\_\_\_\_\_\_\_\_**> degrees F

Piping:

Pipe: Comply with ASTM D3222, Schedule 80.

Fittings:

Type: Molded.

Comply with ASTM D3222.

Schedule 80.

Joints: [**Butt**] [**Socket**] welded.

Tubing:

Tube:

Size and Wall Thickness: [**As indicated in piping schedule**] <**\_\_\_\_\_\_\_\_**>.

Pressure Rating: As indicated [**on Drawings**] [**in piping schedule**].

Fittings:

Type: Compression.

Materials in Contact with Chlorinated Solution: [**Titanium**] [**PVC**] [**CPVC**] [**PTFE**] [**PVDF**] <**\_\_\_\_\_\_\_\_**>.

Threads: Straight; ASME B1.1.

* + - 1. VALVES

Consult piping manufacturer to confirm correct application of materials.

* + - * 1. Materials in Contact with Chlorinated Solution: [**Titanium**] [**PVC**] [**CPVC**] [**Chlorosulfonated PE**] [**Fluoroelastomer**] [**PTFE**] [**PVDF**]<**\_\_\_\_\_\_\_\_**>.

Sodium hypochlorite is unstable, and may decompose to form crystalline salts and oxygen gas. Operating and safety issues due to decomposition are considered more likely in infrequently operated valves greater than 2 inches in size, but consult valve manufacturer for consideration of this issue. For valves smaller than 2 inches, a diaphragm valve rather than a ball valve may help mitigate this issue.

Select one of following two Paragraphs to specify ball valves by reference to Section 400563 or pipe schedule, or to include specification in this Section.

* + - * 1. Ball Valves 2 Inches and Smaller: [**As specified in Section 400563 - Ball Valves**] [**and**] [**as indicated in pipe schedule**].

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

* + - * 1. Ball Valves 2 Inches and Smaller:

Comply with MSS SP-110.

Class: [**150**] <**\_\_\_\_\_\_\_\_**>.

Body: [**Two**] [**Three**] piece.

Port: [**Full**] <**\_\_\_\_\_\_\_\_**>.

Seats: [**PTFE**] <**\_\_\_\_\_\_\_\_**>.

Stem: Blowout proof.

Operation: [**Lever**] [**Wing or tee**] [**Locking lever**] [**Extended lever**] [**Round**] [**Oval**] handle [**with balancing stops**].

End Connections: <**\_\_\_\_\_\_\_\_**> [**, with union**].

Section 400574.13 includes EPDM as an optional seal material. EPDM is rated only as "fair" to "good" for contact with chlorinated solutions.

* + - * 1. Plastic Diaphragm Valves: As specified in Section 400574.13 - Diaphragm Valves.
1. EXECUTION
	* + 1. EXAMINATION
				1. Verify that field dimensions are as indicated on [**Shop**] Drawings.
				2. Inspect existing flanges for nonstandard bolt hole configurations or design, and verify that new pipe and flanges mate properly.
				3. Verify that openings are ready to receive sleeves [**and firestopping**].
			2. PREPARATION
				1. Thoroughly clean end connections before installation.
				2. Close pipe and equipment openings with caps or plugs during installation.
				3. Clean surfaces to remove foreign substances.
			3. INSTALLATION
				1. Piping and Appurtenances:

As indicated on [**Shop**] Drawings.

According to [**ASME B31.3**] [**ASME B31.9**] [**and manufacturer instructions**].

In locations where pipe expansion joints are indicated, install pipe alignment guides adjacent to and within [**four**] <**\_\_\_\_\_\_\_\_**> pipe diameters of joint.

Field Fabrication: According to manufacturer instructions.

Provide flexible couplings and expansion joints at connections to equipment and where indicated on [**Shop**] Drawings.

Install couplings, service saddles, and anchors according to manufacturer instructions.

Provide upstream and downstream clearances [**as indicated on Drawings**] [**according to manufacturer instructions**].

Local Indicators:

Install direct-reading indicator devices, such as thermometers and pressure gages, to be read at floor level and accessible for maintenance and service.

Install according to manufacturer instructions.

* + - * 1. Valving:

As specified in Section 400551 - Common Requirements for Process Valves.

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. Inspect for proper supports and interferences.
				2. Pressure Testing: Air test as indicated in pipe schedule.

\*\*\*\*\*\* [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 test piping according to <**\_\_\_\_\_\_\_\_**> standards.
			1. ADJUSTING
				1. Field-calibrate local indicators at time of piping installation.

END OF SECTION 402414