SECTION 401113 - LOW-PRESSURE STEAM 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 pipe materials, fittings, and valves for aboveground steam and steam condensate piping systems. Refer to Section 401116 for intermediate-pressure steam process piping; Section 401119 for high-pressure steam process piping. Refer to Section 401123 for condensate piping and pumps.

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

Low-pressure steam piping.

Equipment drains and overflows.

Unions and flanges.

Pipe hangers and supports.

Valves.

* + - * 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 083113 - Access Doors and Frames: Product requirements for access doors for placement by this Section.

Section 400506 - Couplings, Adapters, and Specials for Process Piping: Sleeve pipes and expansion joints.

Section 400507 - Pipe Hangers and Supports for Process Piping: Hangers, supports, and accessories.

Section 400561 - Gate Valves: Steam system valves.

Section 400563 - Ball Valves: Steam system valves.

Section 400565.23 - Swing Check Valves: Steam system valves.

Section 404213 - Process Pipe Insulation: Insulation as required by this Section.

Section 404223 - Process Equipment Insulation: Insulation as required by this Section.

* + - 1. REFERENCE STANDARDS

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

* + - * 1. American Welding Society:

AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.

AWS D1.1 - Structural Welding Code - Steel.

* + - * 1. ASME International:

ASME B16.3 - Malleable Iron Threaded Fittings.

ASME B16.4 - Gray Iron Threaded Fittings.

ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.

ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

ASME B31.1 - Power Piping.

ASME B31.9 - Building Services Piping.

ASME Boiler and Pressure Vessel Code - Section IX - Welding and Brazing Qualifications.

* + - * 1. ASTM International:

ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

ASTM A234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

ASTM B32 - Standard Specification for Solder Metal.

ASTM B88 - Standard Specification for Seamless Copper Water Tube.

ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

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

MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.

MSS SP 69 - Pipe Hangers and Supports - Selection and Application.

MSS SP 70 - Cast Iron Gate Valves, Flanged and Threaded Ends.

MSS SP 71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends.

MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.

MSS SP 85 - Cast Iron Globe and Angle Valves, Flanged and Threaded.

MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

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

* + - 1. PREINSTALLATION MEETINGS
				1. Convene minimum [**one week**] <**\_\_\_\_\_\_\_\_**> [**weeks**] prior to commencing Work of this Section.
			2. SUBMITTALS
				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 regarding pipe materials, fittings, and accessories.

Valves: Submit manufacturer information regarding valves, including rating for each service.

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

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: Indicate schematic layout of piping system, including equipment, critical dimensions, and sizes.
				2. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
				3. Welder Certificates: Certify welders and welding procedures employed on Work, verifying [**AWS**] [**ASME**] qualification within previous 12 months.

Include separate Paragraphs for additional certifications.

* + - * 1. Manufacturer Instructions: Submit joining and isolation procedures.
				2. Source Quality-Control Submittals: Indicate results of [**shop**] [**factory**] tests and inspections.
				3. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
				4. 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 [**ASME BPVC-IX**] [**AWS D1.1**].

* + - 1. CLOSEOUT SUBMITTALS
				1. Project Record Documents: Record actual locations of piping, valves, pimps[**, and**] <**\_\_\_\_\_\_\_\_**>.
			2. MAINTENANCE MATERIAL SUBMITTALS
				1. Extra Stock Materials: Furnish [**two**] <**\_\_\_\_\_\_\_\_**> packing kits for each size and type of valve.
			3. QUALITY ASSURANCE

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

* + - * 1. Piping: Perform Work according to ASME [**B31.1**] [**B31.9**].
				2. Welding Materials and Procedures: Comply with [**ASME BPVC-IX**] [**AWS D1.1**].

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**] [**ASME**] 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. Storage:

Provide temporary end caps and closures on piping and fittings, and maintain in place until installation.

Store materials according to manufacturer instructions.

* + - * 1. 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 valves, excluding packing.
1. PRODUCTS
	* + 1. LOW-PRESSURE STEAM PIPING.
				1. Maximum Working Pressure: [**15**] <**\_\_\_\_\_\_\_\_**> psig
				2. Piping:

Pipe:

Material: Black steel.

Comply with ASTM A53.

Wall Thickness:

Pipes 12 Inches and Larger: 0.375 inch

Pipes Smaller Than 12 Inches : Schedule 40.

Fittings: [**Malleable iron, ASME B16.3**] [**Forged steel, ASTM A234**], Class 125.

Joints:

Pipe 2 Inches and Smaller: Threaded.

Pipe 2-1/2 Inches and Larger: Welded.

* + - * 1. Copper Tubing:

Tube:

Type: [**M**] [**L**], drawn.

Comply with ASTM B88

Fittings: [**Cast brass, ASME B16.18**] [**Wrought copper, ASME B16.22**].

Joints: [**ASTM B32, Alloy Grade Sb5 tin-antimony, or Alloy Grade Sn95 tin-silver, lead-free solder**] [**AWS A5.8, Classification BCuP-3 or BCuP-4 silver braze**].

* + - 1. DRAINS AND OVERFLOWS
				1. Pipe:

Material: Galvanized steel.

Comply with ASTM A53.

Schedule 40.

* + - * 1. Fittings: [**Malleable iron, ASME B16.3**] [**or**] [**cast iron, ASME B16.4**].
				2. Joints:

Pipe 2 Inches and Smaller: Threaded.

Pipe 2-1/2 Inches and Larger: Welded.

* + - 1. UNIONS AND FLANGES
				1. Unions for Pipe 2 Inches and Smaller:

Ferrous Piping:

Material: Malleable iron.

Class: [**150**] [**250**] [**300**].

End Connections: Threaded.

Copper Piping:

Material: Bronze.

Class: 150.

End Connections: [**Soldered**] [**Brazed**] joints.

Dielectric Connections:

Threaded End: [**Galvanized**] [**Plated**] steel.

Soldered End: Copper.

Isolation Barrier: Impervious to water.

* + - * 1. Flanges for Pipe 2-1/2 Inches and Larger:

Ferrous Piping:

Material: Forged steel.

Class: [**150**] [**250**] [**300**].

Type: Slip on.

Copper Piping:

Material: Bronze.

Class: 150.

Type: Slip on.

Gaskets:

Material: Thick, preformed neoprene.

Thickness: 1/16 inch

* + - 1. VALVES
				1. Gate: As specified in Section 400561 - Gate Valves.

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

* + - * 1. Gate:

2 Inches and Smaller:

Comply with MSS SP 80, Class [**125**] [**150**] <**\_\_\_\_\_\_\_\_**>.

Body and Trim: Bronze.

Bonnet: [**Threaded**] [**Union**].

Disc: [**Solid**] [**Split**] wedge with alloy seat rings.

Stem: [**Nonrising**] [**Rising**].

Operator: [**Handwheel**] <**\_\_\_\_\_\_\_\_**>.

End Connections: [**Soldered**] [**or**] [**threaded**].

2-1/2 Inches and Larger:

Comply with MSS SP 70, Class [**125**] <**\_\_\_\_\_\_\_\_**>.

Body: Cast iron.

Trim: Bronze trim.

Bonnet: Bolted.

Disc: Solid wedge with bronze seat rings.

Stem: [**Nonrising**] [**Rising**].

Operator: Handwheel; outside screw and yoke.

End Connections: Flanged.

Furnish chainwheel operators for valves 6 inches or larger and mounted more than 8 feet above operating floor.

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

* + - * 1. Globe: As specified in Section 400565.16 - Globe Valves.

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

* + - * 1. Globe:

2 Inches and Smaller:

Comply with MSS SP 80, Class [**125**] [**150**] <**\_\_\_\_\_\_\_\_**>.

Body and Trim: Bronze.

Bonnet: [**Threaded**] [**Union**].

Disc: PTFE composition.

Operator: Handwheel.

End Connections: [**Soldered**] [**or**] [**threaded**].

2-1/2 Inches and Larger:

Comply with MSS SP 85, Class [**125**] <**\_\_\_\_\_\_\_\_**>.

Body: Cast iron.

Trim: Bronze.

Operator: Handwheel; outside screw and yoke.

End Connections: Flanged.

Furnish chainwheel operators for valves 6 inches or larger and mounted more than 8 feet above operating floor.

* + - * 1. Ball: As specified in Section 400563 - Ball Valves.

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

* + - * 1. Ball:

2 Inches and Smaller:

Comply with MSS SP 110, Class [**150**] <**\_\_\_\_\_\_\_\_**>.

Body:

Material: Bronze.

Type: [**Two**] [**Three**] piece; full port.

Ball: Type 316 stainless steel, with vent hole.

Seats: Reinforced PTFE.

Stem: Stainless steel.

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

End Connections: Threaded.

* + - * 1. Check:

Horizontal-Swing Check Valves: As specified in Section 400565.23 - Swing Check Valves.

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

Horizontal-Swing Check Valves:

2 Inches and Smaller:

Comply with MSS SP 80, Class [**150**] <**\_\_\_\_\_\_\_\_**>.

Body, Cap, and Seat: Bronze.

Disc: PTFE.

End Connections: [**Soldered**] [**or**] [**threaded**].

2-1/2 Inches and Larger:

Comply with MSS SP 71, Class [**125**] <**\_\_\_\_\_\_\_\_**>.

Body: Cast iron.

Cap: Bolted.

Disc: [**Bronze**] [**or**] [**cast iron**].

[**Seal and Seat: Renewable.**]

End Connections: Flanged.

Spring-Loaded Check Valves: As specified in Section 400565.23 - Swing Check Valves.

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

Spring-Loaded Check Valves:

Description: Inline spring lift check, integral seat, and silent closing.

2 Inches and Smaller:

Comply with MSS SP 80, Class [**250**] <**\_\_\_\_\_\_\_\_**>.

Body: Bronze.

Disc: PTFE.

End Connections: [**Soldered**] [**or**] [**threaded**].

2-1/2 Inches and Larger:

Comply with MSS SP 71, Class [**125**] <**\_\_\_\_\_\_\_\_**>.

Style: [**Wafer**] [**Globe**].

Body: Cast iron.

Seat: Bronze.

Disc: Bronze, center guided.

Spring and Screws: Stainless steel.

End Connections: Flanged.

* + - * 1. Hangers and Supports: As specified in Section 400507 - Hangers and Supports for Process Piping.

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

* + - * 1. Hangers and Supports:

Comply with [**ASME B31.1**] [**, ASME 31.9**] [**, ASTM F708**] [**, MSS SP 58**] [**, MSS SP 69**] [**, and**] [**MSS SP 89**].

Performance and Design Criteria: Design hangers for pipe movement without disengagement of supported pipe.

Pipe Sizes 1/2 to 1-1/2 Inches

Description: Adjustable swivel; split ring.

Material: [**Malleable iron**] [**Carbon steel**].

Hot Pipe Sizes 2 to 4 Inches:

Description: Adjustable; clevis.

Material: Carbon steel.

Hot Pipe Sizes 6 Inches and Larger:

Adjustable steel yoke.

Cast-iron roll.

Double hanger.

Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Larger: Steel channels with welded spacers and hanger rods and cast-iron roll.

Vertical Supports: Steel riser clamps.

Floor Supports:

Hot Pipe 4 Inches and Smaller:

Description: Cast-iron adjustable pipe saddle.

Furnish lock nut, nipple, floor flange, and concrete pier or steel support.

Hot Pipe Sizes 6 Inches and Larger:

Description: Adjustable cast-iron roll and stand.

Furnish steel screws and concrete pier or steel support.

Copper Pipe Supports:

Description: Adjustable; copper plated.

Rings: Carbon steel.

Hanger Rods: Mild steel, threaded [**at both ends**] [**at one end**] [**continuously**].

Inserts:

Description: Malleable-iron case of [**galvanized-**]steel shell and expander plug for threaded connection with lateral adjustment.

Furnish top slot for reinforcing rods, and lugs for attaching to forms.

Size: To suit threaded hanger rods.

* + - 1. SOURCE QUALITY CONTROL
				1. Valve Testing: According to manufacturer's standard testing protocol, including hydrostatic, seal, and performance testing.

Include one or both of following Paragraphs to require Director’s inspection or witnessing of test at factory.

* + - * 1. Director’s Inspection:

Make completed valves available for inspection at manufacturer's factory prior to packaging for shipment.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspection is allowed.

* + - * 1. Director’s Witnessing:

Allow witnessing of factory inspections and tests at manufacturer's test facility.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspections and tests are scheduled.

Include following Paragraph if reliance on manufacturer's approved quality-control program is sufficient for Project requirements.

* + - * 1. Certificate of Compliance:

If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

Specified shop tests are not required for Work performed by approved manufacturer.

1. EXECUTION
	* + 1. PREPARATION
				1. Ream pipe and tube ends, remove burrs [**, and bevel plain end ferrous pipe**].
				2. Remove scale and dirt on inside and outside of pipes and valves before assembly.
				3. Prepare piping connections to match equipment end connections.
				4. Keep open ends of pipe free from scale and dirt by protecting open ends with temporary plugs or caps.
			2. INSTALLATION
				1. Pipe Hangers and Supports: As specified in Section 400507 - Pipe Hangers and Supports for Process Piping.
				2. Piping:

Comply with ASME [**B31.1**] [**B31.9**].

Route piping parallel to building structure and maintain gradient.

Install piping to conserve building space, and to not interfere with use of space.

Group piping if practical at common elevations.

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

Sleeve pipe passing through partitions, walls, and floors as specified in Section 400506 - Couplings, Adapters, and Specials for Process Piping.

Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment as specified in Section 400506 - Couplings, Adapters, and Specials for Process Piping.

Provide access where valves and fittings are not exposed.

Slope: 1 inch in 40 feet in direction of flow.

Provide drip trap assembly at low points, risers, changes in elevation, and before control valves.

If pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welds.

After completion, fill, clean, and treat systems as specified in CLEANING Article.

Install valves with stems upright or horizontal, not inverted.

Insulate piping [**and equipment**] as specified in Section 404213 - Process Pipe Insulation [**and Section 404223 - Process Equipment Insulation**].

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

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

Installation Standards: Install Work according to <**\_\_\_\_\_\_\_\_**> standards.

* + - 1. FIELD QUALITY CONTROL
				1. Testing: Comply with ASME [**B31.9**] [**B31.1**].
				2. Manufacturer Services: Furnish services of manufacturer's representative experienced in installation of products furnished under this Section for not less than <**\_\_\_\_\_\_\_\_**> [**days**] [**hours**] on Site for installation, inspection, startup, field testing, and instructing Director’s Representative in operation and maintenance of equipment.
				3. Equipment Acceptance:

Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.

Make final adjustments to equipment under direction of manufacturer's representative.

* + - 1. CLEANING
				1. Provide system to treat water available at Project site to maintain following characteristics of water in steam system:

Hardness: <**\_\_\_\_\_\_\_\_**>.

Iron: <**\_\_\_\_\_\_\_\_**>.

Total Dissolved Solids: <**\_\_\_\_\_\_\_\_**>.

Total Alkalinity: <**\_\_\_\_\_\_\_\_**>.

Silica: <**\_\_\_\_\_\_\_\_**>.

pH: <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Agents:

Sequestering Agent:

Description: To reduce hardness and to prevent feed line congestion.

Material: [**Phosphate**] <**\_\_\_\_\_\_\_\_**>.

Base:

Description: To provide alkalinity.

Material: [**Hydroxide**] <**\_\_\_\_\_\_\_\_**>.

Oxygen Scavenger: [**Sodium sulfite**] [**Hydrazine**] <**\_\_\_\_\_\_\_\_**>.

Carbon Dioxide Neutralizer: [**Volatile amines with morpholine or cyclohexylamine**] <**\_\_\_\_\_\_\_\_**>.

Filming Amines [**Octadecylamine**] <**\_\_\_\_\_\_\_\_**>.

Neutralizer: Comply with recommendation of system cleaner supplier and acceptance of Director’s Representative.

END OF SECTION 401113