SECTION 401123 - CONDENSATE PROCESS PIPING FOR PROCESS APPLICATIONS

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 and fittings for aboveground steam and steam condensate piping systems. Refer to Section 401113 for low-pressure steam process piping, Section 401116 for intermediate-pressure steam process piping, and Section 401119 for high-pressure steam process piping; these Sections also specify steam system drains and overflows, unions and flanges, pipe hangers and supports, and valves.

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

Low-pressure steam condensate piping.

Intermediate- and high-pressure steam condensate piping.

Low-pressure condensate return units.

High-pressure condensate return units.

Condensate pumps.

Receivers.

Vacuum pumping units.

* + - * 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, expansion joints, and flexible piping connectors at pumps.

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

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

Section 400593 - Common Motor Requirements for Process Equipment: Condensate pump motors.

Section 400596 - Vibration and Seismic Controls for Process Equipment: Vibration isolators for condensate pumps.

* + - 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 B16.18 - 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 VIII - Pressure Vessels.

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.

* + - * 1. National Electrical Manufacturers Association:

NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

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

Condensate Pumps:

Submit certified pump curves showing performance characteristics with pump and system operating point plotted.

Submit NPSH curve if applicable.

Submit electrical characteristics and connection requirements.

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, pumps[**, and**] <**\_\_\_\_\_\_\_\_**>.
      2. MAINTENANCE MATERIAL SUBMITTALS
         1. Extra Stock Materials: Furnish [**one**] <**\_\_\_\_\_\_\_\_**> set of mechanical seals for each pump.
      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 condensate pumps.

1. PRODUCTS
   * + 1. LOW-PRESSURE STEAM CONDENSATE PIPING
          1. Piping:

Material: Black steel.

Comply with ASTM A53.

Wall Thickness:

Pipes 12 Inches and Larger: 0.375 inch

Pipes Smaller than 12 Inches Schedule 80.

Fittings: [**Malleable iron, ASME B16.3**] [**or**] [**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: L, drawn.

Comply with ASTM B88

Fittings: [**Cast brass, ASME B16.18**] [**or**] [**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. INTERMEDIATE- AND HIGH-PRESSURE STEAM CONDENSATE PIPING
         1. Piping:

Material: Black steel.

Comply with ASTM A53.

Wall Thickness:

Pipes 12 Inches and Larger: 0.375 inch

Pipes Smaller than 12 Inches Schedule 80.

Fittings: [**Malleable iron, ASME B16.3, Class 250**] [**or**] [**forged steel, ASTM A234, Class 300**].

* + - * 1. Joints:

Pipe 2 Inches and Smaller: Threaded.

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

* + - 1. LOW-PRESSURE CONDENSATE RETURN UNITS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=13342&mf=04&src=wd):

designer to provide two manufacturers and approved equivalent for all listed products.

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

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

Furnish materials according to <**\_\_\_\_\_\_\_\_**> standards.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Pumps, receiver, inlet strainer, pumps, float switches, control panel, and accessories.

Operate without vapor binding and cavitation, non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of manufacturer's maximum efficiency curve.

Type: [**One**] [**Two**] stage.

Configuration: [**Vertical**] [**Horizontal**].

Materials: Bronze fitted with stainless-steel shaft and bronze impeller.

Shaft:

Seal: Mechanical type.

Close coupled to motor.

* + - * 1. Performance and Design Criteria:

Number of Pumps: [**One**] [**Two**].

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

Number of Pumps: As indicated on Drawings.

Flow Rate, Each: <**\_\_\_\_\_\_\_\_**> gpm

Head: <**\_\_\_\_\_\_\_\_**> psig

* + - * 1. Operation:

Electrical Characteristics:

[**\_\_\_\_\_\_\_\_ hp ]**[**\_\_\_\_\_\_\_\_ RLA].**

Voltage: <**\_\_\_\_\_\_\_\_**> V, [**single**] [**three**] phase, 60 Hz.

Maximum [**Fuse Size**] [**Circuit Breaker Size**] [**Overcurrent Protection**]: <**\_\_\_\_\_\_\_\_**> A.

Minimum Circuit Ampacity: <**\_\_\_\_\_\_\_\_**>.

Minimum Power Factor: <**\_\_\_\_\_\_\_\_**> percent at rated load.

Motors:

As specified in Section 400593 - Common Motor Requirements for Process Equipment.

Configuration: Close coupled.

Speed: [**1750**] [**3500**] rpm.

Control Panel:

Factory mounted.

NEMA 250 Type [**1**] [**4**] <**\_\_\_\_\_\_\_\_**>.

Furnish test button, high-level alarm light, acknowledge button, and alarm horn.

Single-point power connection and grounding lug.

Controls:

Electric alternator.

Selector Switch: HAND-OFF-AUTO.

Disconnect Switch: Factory mounted [**in control panel**] [**on equipment**].

Operation Sequences:

Energize lead pump on HIGH LEVEL, alternating pumps after each cycle.

Energize lag pump upon failure of lead pump and annunciate alarm.

* + - * 1. Accessories:

Receiver:

Material: Cast iron.

Capacity: <**\_\_\_\_\_\_\_\_**> gal

Float Switches: Externally adjustable.

Furnish water level gage and dial thermometer.

Furnish pressure gages on pump discharge, bronze isolation valves and strainer between pumps and receiver, and lifting eyebolts.

Inlet Strainer:

Material: Cast iron.

Screen: Removable; vertical; self-cleaning; bronze.

Mounting: On receiver.

* + - 1. HIGH-PRESSURE CONDENSATE RETURN UNITS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=13343&mf=04&src=wd):

designer to provide two manufacturers and approved equivalent for all listed products.

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

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

Furnish materials according to <**\_\_\_\_\_\_\_\_**> standards.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description: Receiver, pumps, float switches, control panel, and accessories.
        2. Performance and Design Criteria:

Makeup-Water Supply Pressure: <**\_\_\_\_\_\_\_\_**> psig

* + - * 1. Receiver:

Material:

Welded steel.

Construction: ASME BPVC-VIII stamped.

Capacity: <**\_\_\_\_\_\_\_\_**> gal

Size: <**\_\_\_\_\_\_\_\_**> inches diameter by <**\_\_\_\_\_\_\_\_**> inches long.

Configuration: Horizontal.

Working Pressure: 125 psig

Base:

Configuration: Elevated.

Material: Fabricated steel.

* + - * 1. Pumps:

Type: [**One**] [**Two**] stage.

Quantity: [**Two**] <**\_\_\_\_\_\_\_\_**>.

Configuration: [**Vertical**] [**Horizontal**].

Performance and Design Criteria:

Flow Rate, Each: <**\_\_\_\_\_\_\_\_**> gpm

Head: <**\_\_\_\_\_\_\_\_**> psig

Materials: Bronze fitted, with stainless-steel shaft, bronze impeller [**, and**] [**renewable bronze case ring**].

Shaft:

Seal: Mechanical type.

Close coupled to motor.

* + - * 1. Operation:

Electrical Characteristics:

[**\_\_\_\_\_\_\_\_ hp ]**[**\_\_\_\_\_\_\_\_ RLA].**

Voltage: <**\_\_\_\_\_\_\_\_**> V, [**single**] [**three**] phase, 60 Hz.

Maximum [**Fuse Size**] [**Circuit Breaker Size**] [**Overcurrent Protection**]: <**\_\_\_\_\_\_\_\_**> A.

Minimum Circuit Ampacity: <**\_\_\_\_\_\_\_\_**>.

Minimum Power Factor: <**\_\_\_\_\_\_\_\_**> percent at rated load.

Motors:

As specified in Section 400593 - Common Motor Requirements for Process Equipment.

Configuration: Close coupled.

Speed: 3,500 rpm.

Control Panel:

Factory mounted.

NEMA 250 Type [**1**] [**4**] <**\_\_\_\_\_\_\_\_**>.

Single-point power connection and grounding lug.

Controls:

Selector Switches: AUTO-OFF; LEAD-OFF-LAG for each pump.

Test buttons, HIGH LEVEL alarm light, acknowledge button, and alarm horn.

Disconnect Switch: Factory mounted [**in control panel**] [**on equipment**].

Operation Sequences:

Electric alternator.

Energize lead pump on HIGH LEVEL, alternating after each cycle.

Energize lag pump if pump fails and alarm.

* + - * 1. Accessories:

Air vent valve.

Water level gage.

Pressure-relief valve.

Dial thermometer.

Corrosion inhibitor anode.

Inlet baffle.

Drain valve.

Pressure gages on pump discharge.

Bronze isolation valves between pumps and receiver.

Double-pole float switches.

* + - 1. CONDENSATE PUMPS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=13344&mf=04&src=wd):

designer to provide two manufacturers and approved equivalent for all listed products.

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

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

Furnish materials according to <**\_\_\_\_\_\_\_\_**> standards.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Operate without vapor binding and cavitation, non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of manufacturer's maximum efficiency curve.

Configuration: [**Vertical**] [**Horizontal**].

Materials: Bronze fitted with stainless-steel shaft, enclosed bronze impeller, and renewable bronze case ring.

Shaft:

Seal: Mechanical type.

Close coupled to motor.

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

* + - * 1. Description:

Type: [**One**] [**Two**] stage.

Configuration: [**Vertical**] [**Horizontal**].

Materials: Bronze fitted with stainless-steel shaft, bronze impeller [**, and**] [**renewable bronze case ring**].

Shaft:

Seal: Mechanical type.

Close coupled to motor.

* + - * 1. Performance and Design Criteria:

Quantity: [**One**] [**Two**] [**Three**].

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

Quantity: As indicated on Drawings.

Flow Rate, Each: <**\_\_\_\_\_\_\_\_**> gpm

Head: <**\_\_\_\_\_\_\_\_**> psig

* + - * 1. Operation:

Electrical Characteristics:

[**\_\_\_\_\_\_\_\_ hp**] [**\_\_\_\_\_\_\_\_ RLA**].

Voltage: <**\_\_\_\_\_\_\_\_**> V, [**single**] [**three**] phase, 60 Hz.

Maximum [**Fuse Size**] [**Circuit Breaker Size**] [**Overcurrent Protection**]: <**\_\_\_\_\_\_\_\_**> A.

Minimum Circuit Ampacity: <**\_\_\_\_\_\_\_\_**>.

Minimum Power Factor: <**\_\_\_\_\_\_\_\_**> percent at rated load.

Motors:

As specified in Section 400593 - Common Motor Requirements for Process Equipment.

Configuration: Close coupled.

Speed: 3,500 rpm.

Control Panel:

Factory mounted.

NEMA 250 Type [**1**] [**4**] <**\_\_\_\_\_\_\_\_**>.

Single-point power connection and grounding lug.

Controls: <**\_\_\_\_\_\_\_\_**>.

Disconnect Switch: Factory mounted [**in control panel**] [**on equipment**].

Operation Sequences: <**\_\_\_\_\_\_\_\_**>.

* + - 1. RECEIVERS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=13345&mf=04&src=wd):

designer to provide two manufacturers and approved equivalent for all listed products.

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

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

Furnish materials according to <**\_\_\_\_\_\_\_\_**> standards.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Material: Cast iron.

Furnish taps for mounting float switches, water level gage, thermometers, pump suction fittings, condensate inlet, and lifting eyebolts.

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

* + - * 1. Description:

Material: Horizontal welded steel.

Comply with ASME BPVC-VIII stamped construction for 125-psig working pressure.

Base: Elevated, fabricated steel.

Furnish taps for mounting float switches, water level gage, thermometers, pump suction fittings, condensate inlet, and lifting eyebolts.

* + - 1. VACUUM PUMPING UNITS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=13346&mf=04&src=wd):

designer to provide two manufacturers and approved equivalent for all listed products.

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

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

Furnish materials according to <**\_\_\_\_\_\_\_\_**> standards.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description: Receiver on which are mounted inlet strainer, pumps, discharge valve assemblies, vacuum and float controls, electric controls, and accessories.
        2. Receiver:

Material: Cast iron.

Capacity: <**\_\_\_\_\_\_\_\_**> gal.

Configuration: Two compartments.

Vacuum Producers:

Type: Multi-jet.

Location: Centerline of inlet and not higher than 8 inches above operating floor.

* + - * 1. Inlet Strainer:

Material: Cast iron.

Screen:

Material: Bronze.

Configuration: Vertical.

Type: Self-cleaning; removable.

Mounting: On receiver.

* + - * 1. Condensate Discharge:

Control: Hydraulically operated, positive-acting discharge valves.

Bellows: Bronze.

Pilot Valves: Float operated.

* + - * 1. Pumps:

Description:

Configuration: Vertical.

Mounting: Flange.

Materials: Bronze fitted with stainless-steel shaft, enclosed bronze impeller, and renewable bronze case ring.

Shaft:

Seal: Mechanical type.

Close coupled to motor.

Quantity: [**One**] [**Two**].

Airflow Rate, Each: <**\_\_\_\_\_\_\_\_**> gpm with <**\_\_\_\_\_\_\_\_**>-inch Hg vacuum.

Water Flow Rate: <**\_\_\_\_\_\_\_\_**> gpm with <**\_\_\_\_\_\_\_\_**>-psig head.

* + - * 1. Operation:

Electrical Characteristics:

[**\_\_\_\_\_\_\_\_ hp]** [**\_\_\_\_\_\_\_\_ RLA**].

Voltage: <**\_\_\_\_\_\_\_\_**> V, [**single**] [**three**] phase, 60 Hz.

Maximum [**Fuse Size**] [**Circuit Breaker Size**] [**Overcurrent Protection**]: <**\_\_\_\_\_\_\_\_**> A.

Minimum Circuit Ampacity: <**\_\_\_\_\_\_\_\_**>.

Minimum Power Factor: <**\_\_\_\_\_\_\_\_**> percent at rated load.

Motors:

As specified in Section 400593 - Common Motor Requirements for Process Equipment.

Configuration: Close coupled.

Speed: 3,500 rpm.

Control Panel:

Factory mounted.

NEMA 250 Type [**1**] [**4**] <**\_\_\_\_\_\_\_\_**>.

Single-point power connection and grounding lug.

Controls:

Selector Switch: OFF, FLOAT ONLY, FLOAT AND VACUUM, and CONTINUOUS.

Pump test buttons.

Disconnect Switch: Factory mounted [**in control panel**] [**on equipment**].

Operation Sequences: Electric alternator.

* + - * 1. Accessories:

Vacuum gage.

Thermometer.

Water level gage.

Lifting eyebolts.

Vacuum breaker.

* + - 1. SOURCE QUALITY CONTROL
         1. Provide shop inspection and testing of completed assembly.

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

* + - * 1. Director’s Inspection:

Make complete [**condensate return units**] [**, condensate pumps**] [**, receivers**] [**, and**] [**vacuum pumping units**] 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 - 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.

Run condensate lines from trap to nearest condensate receiver, and provide loop vents over trapped sections.

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. Pumps:

Install long-radius reducing elbows or reducers between pump and piping.

Support piping adjacent to pump such that no weight is carried on pump casings.

Install pumps on vibration isolators as specified in Section 400596 - Vibration and Seismic Controls for Process Equipment.

Install flexible connectors at or near [**pumps**] [**motorized equipment**] <**\_\_\_\_\_\_\_\_**> where piping configuration does not absorb vibration, as specified in Section 400506 - Couplings, Adapters, and Specials for Process Piping.

Provide line-sized shutoff valve [**and strainer**] on pump suction, and line-sized [**check valve**] [**, balancing valve**] [**, and**] shutoff valve on pump discharge.

Provide drains for bases and seals.

Install pumps on concrete pad as specified in Section 033000 - Cast-in-Place Concrete, with anchor bolts grouted in place.

Lubricate pumps before startup.

\*\*\*\*\*\* [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 personnel 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. ADJUSTING
         1. Align base-mounted pumps prior to startup.
      2. 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.

* + - 1. ATTACHMENTS

When relying on separate schedules, tables, illustrations, or forms to specify product requirements, include list of each attachment. Include identical list of attachments in Project Manual table of contents.

Consider including schedule if pipe hanger spacing and size is not defined by code.

Insert attachments following END OF SECTION. Consider following examples when developing Project schedule.

* + - * 1. Condensate Return Pumps:

CR-1:

[**Manufacturer:**] <**\_\_\_\_\_\_\_\_**>.

[**Model:**] <**\_\_\_\_\_\_\_\_**>.

Receiver Capacity: <**\_\_\_\_\_\_\_\_**>.

Number of Pumps: <**\_\_\_\_\_\_\_\_**>.

Pump Capacity: <**\_\_\_\_\_\_\_\_**>.

Pump Head: <**\_\_\_\_\_\_\_\_**>.

Motor Size: <**\_\_\_\_\_\_\_\_**>.

CR-2:

[**Manufacturer:**] <**\_\_\_\_\_\_\_\_**>.

[**Model:**] <**\_\_\_\_\_\_\_\_**>.

Receiver Capacity: <**\_\_\_\_\_\_\_\_**>.

Number of Pumps: <**\_\_\_\_\_\_\_\_**>.

Pump Capacity: <**\_\_\_\_\_\_\_\_**>.

Pump Head: <**\_\_\_\_\_\_\_\_**>.

Motor Size: <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Receivers:

R-1:

[**Manufacturer:**] <**\_\_\_\_\_\_\_\_**>.

[**Model:**] <**\_\_\_\_\_\_\_\_**>.

Location: <**\_\_\_\_\_\_\_\_**>.

Capacity: <**\_\_\_\_\_\_\_\_**>.

Diameter: <**\_\_\_\_\_\_\_\_**>.

Length: <**\_\_\_\_\_\_\_\_**>.

R-2:

[**Manufacturer:**] <**\_\_\_\_\_\_\_\_**>.

[**Model:**] <**\_\_\_\_\_\_\_\_**>.

Location: <**\_\_\_\_\_\_\_\_**>.

Capacity: <**\_\_\_\_\_\_\_\_**>.

Diameter: <**\_\_\_\_\_\_\_\_**>.

Length: <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Vacuum Pumping Units:

VP-1:

[**Manufacturer:**] <**\_\_\_\_\_\_\_\_**>.

[**Model:**] <**\_\_\_\_\_\_\_\_**>.

Receiver Capacity: <**\_\_\_\_\_\_\_\_**>.

Number of Pumps: <**\_\_\_\_\_\_\_\_**>.

Air Capacity: <**\_\_\_\_\_\_\_\_**>.

Vacuum: <**\_\_\_\_\_\_\_\_**>.

Water Capacity: <**\_\_\_\_\_\_\_\_**>.

Head: <**\_\_\_\_\_\_\_\_**>.

Motor Size: <**\_\_\_\_\_\_\_\_**>.

VP-2:

[**Manufacturer:**] <**\_\_\_\_\_\_\_\_**>.

[**Model:**] <**\_\_\_\_\_\_\_\_**>.

Receiver Capacity: <**\_\_\_\_\_\_\_\_**>.

Number of Pumps: <**\_\_\_\_\_\_\_\_**>.

Air Capacity: <**\_\_\_\_\_\_\_\_**>.

Vacuum: <**\_\_\_\_\_\_\_\_**>.

Water Capacity: <**\_\_\_\_\_\_\_\_**>.

Head: <**\_\_\_\_\_\_\_\_**>.

Motor Size: <**\_\_\_\_\_\_\_\_**>.

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