SECTION 404113.26 - PROCESS PIPING THERMAL FLUIDS HEAT TRACING

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 glycol heat-tracing systems for freeze protection of process piping, fittings, and valves. System specified in this Section consists of connection to low-pressure (maximum 15 psig steam-supplied or hot-water-supplied heat exchanger, outlet from which supplies piped heat-tracing system using glycol as working fluid.

Steam and hot-water supply systems are specified in Division 23.

Prepackaged glycol heat-tracing systems are available commercially; if used, edit this Section accordingly.

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

Shell-and-tube heat exchangers.

Plate-type heat exchangers.

Glycol piping.

Glycol pumps.

Side-stream filtration systems.

Flow controls.

Accessories.

* + - * 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 033000 - Cast-in-Place Concrete: Equipment bases for pumps.

Section 083113 - Access Doors and Frames: Sizes and locations of access doors.

Section 400506 - Couplings, Adapters, and Specials for Process Piping: Piping components common to process piping systems.

Section 400551 - Common Requirements for Process Valves: Basic materials and methods for valves commonly used for process systems.

Section 400553 - Identification for Process Piping: Pipe identification requirements.

Section 400561 - Gate Valves: Valves for use in piping systems.

Section 400562 - Plug Valves: Valves for use in piping systems.

Section 400563 - Ball Valves: Valves for use in piping systems.

Section 400564 - Butterfly Valves: Valves for use in piping systems.

Section 400565.23 - Swing Check Valves: Valves for use in piping systems.

Section 400593 - Common Motor Requirements for Process Equipment: Electric motors and accessories normally supplied as part of equipment assemblies.

Section 400596 - Vibration and Seismic Controls for Process Equipment: Vibration isolators as required by Work of this Section.

Section 404213 - Process Piping Insulation: Insulation requirements as specified in this Section.

* + - 1. REFERENCE STANDARDS

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

* + - * 1. ASME International:

ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300.

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

ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels.

* + - * 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 A395 - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures.

ASTM A536 - Standard Specification for Ductile Iron Castings.

ASTM B32 - Standard Specification for Solder Metal.

ASTM B88 - Standard Specification for Seamless Copper Water Tube.

ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications.

ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers.

ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications.

* + - * 1. American Water Works Association:

AWWA C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.

AWWA C700 - Cold-Water Meters - Displacement Type, Metal Alloy Main Case.

AWWA C701 - Cold-Water Meters - Turbine Type, for Customer Service.

AWWA C702 - Cold Water Meters - Compound Type.

AWWA C707 - Encoder-Type Remote-Registration Systems for Cold-Water Meters.

* + - * 1. American Welding Society:

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

* + - * 1. FM Global:

FM Approval Guide.

* + - * 1. National Electrical Manufacturers Association:

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

* + - 1. COORDINATION
         1. Coordinate Work of this Section with installation of process piping, installation of piping insulation, and [**trenching**] [**, excavating**] [**, bedding**] [**, and**] [**backfilling**] of buried piping systems.
      2. PREINSTALLATION MEETINGS
         1. Convene minimum [**one week**] [**<\_\_\_\_\_\_\_\_> weeks**] prior to commencing Work of this Section.
      3. 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: Submit manufacturer information regarding system materials and component equipment, including electrical characteristics and connection requirements.
        5. Shop Drawings: Indicate system materials and component equipment.
        6. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

Include separate Paragraphs for additional certifications.

* + - * 1. Test and Evaluation Reports:

Indicate shop test reports of tube bundle and shop pressure tests for shell-and-tube heat exchangers.

Indicate results of glycol piping system pressure test.

* + - * 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. Manufacturer Reports:

Certify that equipment has been installed according to manufacturer instructions.

Furnish completed ASME Section VIII Form U-1 for expansion tanks, air separators, and charging system.

* + - * 1. 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. Project Record Documents: Record actual locations of piping receiving heat tracing and locations of heat exchangers, valves, and controls.
         2. Operation and Maintenance Data: Submit instructions for equipment and accessories.
      2. MAINTENANCE MATERIAL SUBMITTALS
         1. Spare Parts:

Furnish [**two**] <**\_\_\_\_\_\_\_\_**> of <**\_\_\_\_\_\_\_\_**>.

Furnish [**one**] <**\_\_\_\_\_\_\_\_**> set of mechanical seals [**for each pump**].

Furnish [**two**] <**\_\_\_\_\_\_\_\_**> sets of cartridges for each side-stream filter.

* + - 1. QUALITY ASSURANCE

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

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**].
      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.

Protect openings with temporary caps to prevent entry of foreign material.

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 <**\_\_\_\_\_\_\_\_**>.

1. PRODUCTS
   * + 1. PERFORMANCE AND DESIGN CRITERIA
          1. If more than one piping system material is specified, provide compatible system components and joints, and use non-conducting dielectric connections whenever jointing dissimilar metals in open systems.
          2. Connections:

Provide flanges, union, and couplings at locations requiring servicing.

Use unions, flanges, and couplings downstream of valves and at equipment or specialty connections.

Do not use direct welded or threaded connections to valves, equipment, or specialties.

* + - * 1. Valves:

Type:

Gate: As specified in Section 400561 - Gate Valves.

Ball: As specified in Section 400563 - Ball Valves.

Butterfly: As specified in Section 400564 - Butterfly Valves.

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

Plug: As specified in Section 400562 - Plug Valves.

Use [**gate**] [**, ball**] [**, or**] [**butterfly**] valves for shutoff, and to isolate equipment or vertical risers.

Use [**globe**] [**, ball**] [**, or**] [**butterfly**] valves for throttling, bypass, or manual flow-control services.

Use spring-loaded check valves on discharge of pumps.

Plug Valves:

Use plug valves for throttling service.

Use non-lubricated plug valves only if shutoff or isolating valves are also provided.

Butterfly Valves:

Use butterfly valves interchangeably with gate and globe valves.

Use lug-end butterfly valves to isolate equipment.

Drain Valves: Use 3/4-inch [**gate**] [**or**] [**ball**] valves with cap for drains at main shutoff valves, low points of piping, bases of vertical risers, and at equipment.

Relief Valves:

Body: Bronze.

Seat: PTFE.

Stem and Springs: Stainless steel.

Operation: Automatic.

Actuation: Direct pressure.

Capacity: ASME certified and labeled.

* + - * 1. Flexible Connectors:

Use at or near [**pumps**] [**motor-driven equipment**] <**\_\_\_\_\_\_\_\_**> where piping configuration does not absorb vibration.

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

* + - * 1. Insulation: As specified in Section 404213 - Process Piping Insulation.
      1. SHELL-AND-TUBE HEAT EXCHANGERS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=10924&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.

Select type of tube bundle from following Paragraphs; tube bundle specified in first following Paragraph is most commonly used.

* + - * 1. Tubes:

Type: [**U-tube**] [**Straight**].

Material: Seamless [**copper**] [**stainless steel**] [**cupro-nickel**] [**naval brass**] [**steel**].

Minimum OD: 3/4 inch

Working Pressure: [**125**] <**\_\_\_\_\_\_\_\_**> psig

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

* + - * 1. Tubes:

Type: Straight.

Material: Enhanced, spiral-surface, copper.

Working Pressure: 150 psig

* + - * 1. Shell:

Material: [**Steel**] [**Stainless steel**].

Piping Connections: [**Threaded**] [**or**] [**flanged**].

Furnish taps for thermometer wells and drains, steel saddle, and for attaching U-bolts.

Finish: Prime painted.

Select appropriate materials in following Paragraph. Consider iron or steel for heating of non-potable water and brass construction for process as well as critical applications using potable water. Polypropylene (PP) tube sheets are common for some manufacturers of straight-tube exchangers.

* + - * 1. Heads:

Material: [**Cast iron**] [**Fabricated steel**] [**Cast brass**] [**Fabricated stainless steel**].

Tube Sheets: [**Steel**] [**Bronze**] [**Rolled naval brass**] [**Stainless steel**] [**Glass-filled polypropylene (PP)**].

Piping Connections: [**Threaded**] [**or**] [**flanged**].

* + - * 1. Water Chamber and Tube Bundle: Removable for inspection and cleaning.

Consider using following Paragraph for one or more identical heat exchangers. Consider including schedule following END OF SECTION when specifying heat exchangers with different criteria.

* + - * 1. Design and Performance Criteria:

Heat Transfer Rate: <**\_\_\_\_\_\_\_\_**> Btu/h

Heating Capacity: <**\_\_\_\_\_\_\_\_**> gpm from <**\_\_\_\_\_\_\_\_**> to <**\_\_\_\_\_\_\_\_**> deg. F,using [**<\_\_\_\_\_\_\_\_> psig of steam**] [**<\_\_\_\_\_\_\_\_> gpm of hot water at <\_\_\_\_\_\_\_\_> deg. F**].

Fouling Factor:

Shell: <**\_\_\_\_\_\_\_\_**>.

Tubes: <**\_\_\_\_\_\_\_\_**>.

Pressure Drop:

Shell: <**\_\_\_\_\_\_\_\_**> psi

Tubes: <**\_\_\_\_\_\_\_\_**> psi

Working Pressure: <**\_\_\_\_\_\_\_\_**> psig

* + - 1. PLATE-TYPE HEAT EXCHANGERS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=10925&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. Frames:

Material: Carbon steel.

Side Bolts and Shroud: [**Stainless steel**] <**\_\_\_\_\_\_\_\_**>.

Finish: Baked-enamel paint.

* + - * 1. Plates: [**Type 304 stainless steel**] [**Type 316 stainless steel**] [**Titanium**] [**Incoloy 825**] [**Hastelloy**] <**\_\_\_\_\_\_\_\_**>.
        2. Gaskets: [**Nitrile rubber**] [**EPDM**] [**Viton**] [**Neoprene**] [**Hypalon**] [**Resin-cured butyl rubber**] <**\_\_\_\_\_\_\_\_**>.
        3. Nozzles:

Pressure Rating: [**150**] [**300**] psig

Flange: ASA rubber-rated type.

Consider using following Paragraph for one or more identical heat exchangers. Consider including schedule following END OF SECTION when specifying heat exchangers with different criteria.

* + - * 1. Design and Performance Criteria:

Heat Transfer Rate: <**\_\_\_\_\_\_\_\_**> Btu/h

Heating Capacity: <**\_\_\_\_\_\_\_\_**> gpm from <**\_\_\_\_\_\_\_\_**> to <**\_\_\_\_\_\_\_\_**> deg. F, using [**<\_\_\_\_\_\_\_\_> psig of steam**] [**<\_\_\_\_\_\_\_\_> gpm of hot water at <\_\_\_\_\_\_\_\_> deg. F**].

Fouling Factor:

Hot Side: <**\_\_\_\_\_\_\_\_**>.

Cold Side: <**\_\_\_\_\_\_\_\_**>.

Pressure Drop:

Hot Side: <**\_\_\_\_\_\_\_\_**> psi

Cold Side: <**\_\_\_\_\_\_\_\_**> psi

* + - 1. GLYCOL PIPING AND TUBING
         1. Buried Steel Piping:

Pipe:

Type: Black.

Comply with ASTM A53.

Wall Thickness:

Pipe Sizes Smaller Than 12 Inches: Schedule 40.

Pipe Sizes 12 Inches and Greater: 0.375 inch.

Cover: [**PE jacket; AWWA C105**] [**Double layer, half-lapped, 10-mil PE tape**].

Fittings:

Type: Forged steel, welding.

Comply with ASTM A234.

Joints: Welded.

Cover: [**PE jacket; AWWA C105**] [**Double layer, half-lapped, 10-mil PE tape**].

* + - * 1. Buried Copper Tubing:

Tube: Comply with ASTM B88

Type: [**K**] [**L**], annealed.

Fittings:

Material: Wrought copper.

Comply with ASME B16.22.

Joints:

Type: Soldered.

Solder: Lead free; ASTM B32; 95-5 tin-antimony, or tin and silver; melting range 430 to 535 deg. F

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

Joints:

Soldered.

Solder: Lead free; 95-5 tin-antimony, or tin and silver; melting range 430 to 535 deg. F

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

Joints:

Brazed.

Filler: AWS A5.8; BCuP silver/phosphorus/copper alloy; melting range 1,190 to 1,480 deg. F

* + - * 1. Aboveground Steel Piping:

Pipe:

Type: Black.

Comply with ASTM A53.

Wall Thickness:

Pipe Sizes Smaller Than 12 Inches: Schedule 40.

Pipe Sizes 12 Inches and Greater: 0.375 inch.

Fittings:

Material: [**Malleable iron; ASME B16.3**] [**or**] [**Forged-steel, welding type; ASTM A234**].

Joints:

Pipe Sizes 2 Inches and Smaller: Threaded.

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

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

* + - * 1. Aboveground Steel Piping:

Pipe:

Type: Black.

Comply with ASTM A53.

Wall Thickness:

Pipe Sizes Smaller Than 12 Inches: Schedule 40.

Pipe Sizes 12 Inches and Greater: 0.375 inch

End Connections: [**Cut**] [**Rolled**] grooves.

Fittings:

Material: [**Ductile iron; ASTM A395 and ASTM A536**] [**or**] [**carbon steel; ASTM A234**].

Joints:

Grooved mechanical couplings; ASTM F1476.

Housing Clamps: [**Rigid**] [**or**] [**flexible**] type; ductile iron, ASTM A395 and ASTM A536; [**enamel-coated**] [**hot-dip galvanized**] <**\_\_\_\_\_\_\_\_**> finish; compatible with steel piping sizes.

Gaskets: Elastomer composition for operating temperature range from [**minus 30**] <**\_\_\_\_\_\_\_\_**> to [**plus 230**] <**\_\_\_\_\_\_\_\_**> deg. F.

Bolts, Nuts, and Washers: [**Stainless**] steel.

* + - * 1. Aboveground Copper Tubing:

Tube:

Comply with ASTM B88

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

Fittings:

Material: [**Cast brass; ASME B16.18**] [**or**] [**Soldered wrought copper; ASME B16.22**].

Following Subparagraph describes a proprietary fitting method; delete or edit based on Project requirements.

T-Connections: Mechanically extracted collars, with notched and dimpled branch tube.

Joints:

Type: Soldered.

Solder: Lead free; ASTM B32; 95-5 tin-antimony, or tin and silver; melting range 430 to 535 deg. F

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

Joints:

Soldered.

Solder: Lead free; 95-5 tin-antimony, or tin and silver; melting range 430 to 535 deg. F

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

Joints:

Brazed.

Filler: AWS A5.8; BCuP silver/phosphorus/copper alloy; melting range 1,190 to 1,480 deg. F

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

* + - * 1. Aboveground Copper Tubing:

Tube:

Comply with ASTM B88

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

End Connections: Rolled grooves.

Fittings:

Material: [**Cast-copper alloy; ASME B16.18**] [**or**] [**wrought copper and bronze; ASME B16.22**] [**or**] [**bronze sand castings; ASTM B584**].

End Connections: Grooved.

Joints:

Grooved mechanical couplings; ASTM F1476.

Housing Clamps: Ductile iron, ASTM A395 and ASTM A536; [**enamel-coated**] [**hot-dip galvanized**] <**\_\_\_\_\_\_\_\_**> finish; compatible with copper tubing sizes; to engage and lock and designed to permit some angular deflection, contraction, and expansion.

Gaskets: Elastomer composition for operating temperature range from [**minus 30**] <**\_\_\_\_\_\_\_\_**> to [**plus 230**] <**\_\_\_\_\_\_\_\_**> deg. F

Bolts, Nuts, and Washers: [**Stainless**] steel.

* + - 1. GLYCOL PUMPS
         1. System-Lubricated Circulators:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10926&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.

Description:

Horizontal shaft.

Single stage.

Direct connected.

Multiple-speed wet rotor motor for inline mounting.

Maximum Working Pressure: 140 psig

Maximum Water Temperature: 230 deg. F

Casing: [**Cast iron**] [**Bronze**], with flanged pump connections.

Impeller, Shaft, and Rotor: Stainless steel.

Bearings: Metal-impregnated carbon (graphite) and ceramic.

Consider following Subparagraph for one or more identical pumps. If specifying pumps with different criteria, consider using pump schedule following END OF SECTION.

Performance and Design Criteria:

Flow Capacity: <**\_\_\_\_\_\_\_\_**> gpm

Head: <**\_\_\_\_\_\_\_\_**> feet

Operational Performance:

Operate at system fluid temperatures [**as indicated on Drawings**] without vapor binding and cavitation.

Non-overloading in parallel or individual operation.

Operate within 25 percent of midpoint of published maximum efficiency curve.

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.

Control Panel:

Factory mounted.

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

Single-point power connection and grounding lug.

Controls:

[**Multiple**] [**Single**] [**Two**] [**Three**]-speed.

[**Furnish external speed selector.**]

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

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

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

* + - * 1. Inline Circulators:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10927&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.

Description:

Horizontal shaft.

Single stage.

Direct connected.

Resiliently mounted motor for inline mounting.

Oil lubricated.

Maximum Working Pressure: [**125**] [**175**] <**\_\_\_\_\_\_\_\_**> psig

Casing: Cast iron, with flanged pump connections.

Impeller: [**Cadmium-plated steel**] [**Stamped brass or cast bronze**], keyed to shaft.

Bearings: Two oil-lubricated bronze sleeves.

Shaft: Alloy or stainless steel with copper or bronze sleeve, integral thrust collar.

Seal:

Description: Carbon rotating against stationary ceramic seat.

Maximum Continuous Operating Temperature: [**225**] [**212**] <**\_\_\_\_\_\_\_\_**> deg. F

Drive: Flexible coupling.

Consider using following Subparagraph for one or more identical pumps. If specifying pumps with different criteria, consider using pump schedule following END OF SECTION.

Performance and Design Criteria:

Flow Capacity: <**\_\_\_\_\_\_\_\_**> gpm

Head: <**\_\_\_\_\_\_\_\_**> feet

Operation:

Operate at system fluid temperatures [**as indicated on Drawings**] without vapor binding and cavitation.

Non-overloading in parallel or individual operation.

Operate within 25 percent of midpoint of published maximum efficiency curve.

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.

Speed: 1,750 rpm unless indicated otherwise.

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

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

* + - * 1. Vertical Inline Pumps:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10928&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.

Description:

Vertical.

Single stage.

Close coupled.

Radial [**or horizontally**] split casing.

Mounting: Inline.

Maximum Working Pressure: [**175**] [**250**] [**300**] <**\_\_\_\_\_\_\_\_**> psig .

Casing:

Material: [**Cast iron**] [**Cast steel**].

Furnish suction and discharge gage port, casing wear ring, seal flush connection, drain plug, flanged suction, and discharge.

Impeller: Bronze, fully enclosed, and keyed directly to motor shaft or extension.

Shaft: Carbon steel with stainless steel impeller cap screw or nut [**and bronze sleeve**].

Shaft Sleeve: Aluminum bronze.

Consider using one of following two Subparagraphs for desired seal type. If both are required for two different pumps, consider using pump schedule following END OF SECTION. Consider Viton fittings for high temperature applications. Packing gland seals are typically restricted to approximately 100 psig maximum suction head pressure.

Seal:

Description: Carbon rotating against stationary ceramic seat.

Maximum Continuous Operating Temperature: [**225**] [**212**] <**\_\_\_\_\_\_\_\_**> deg. F

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

Seal:

Description: Packing gland with minimum four rings graphite-impregnated packing and lantern ring.

Maximum Continuous Operating Temperature: [**230**] [**250**] <**\_\_\_\_\_\_\_\_**> deg. F Consider using following Subparagraph for one or more identical pumps. If specifying pumps with different criteria, consider using pump schedule following END OF SECTION.

Performance and Design Criteria:

Flow Capacity: <**\_\_\_\_\_\_\_\_**> gpm

Head: <**\_\_\_\_\_\_\_\_**> feet

Operation:

Operate at system fluid temperatures [**as indicated on Drawings**] without vapor binding and cavitation.

Non-overloading in parallel or individual operation.

Operate within 25 percent of midpoint of published maximum efficiency curve.

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.

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

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

* + - * 1. Close-Coupled Pumps:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10929&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.

Description:

Horizontal shaft.

Single stage.

Close coupled.

Radial split casing.

Maximum Working Pressure: [**125**] [**175**] [**250**] <**\_\_\_\_\_\_\_\_**> psig

Casing:

Material: Cast iron.

Furnish suction and discharge gage ports, renewable bronze-casing wearing rings, seal flush connection, drain plug, flanged suction, and discharge.

Impeller: Bronze, fully enclosed, and keyed to motor shaft extension.

Shaft: Stainless steel.

Consider using one of following two Subparagraphs for desired seal type. If both are required for two different pumps, consider using pump schedule following END OF SECTION. Consider Viton fittings for high temperature applications. Packing gland seals are typically restricted to approximately 100 psig maximum suction head pressure.

Seal:

Description: Carbon rotating against stationary ceramic seat.

Maximum Continuous Operating Temperature: [**225**] [**212**] <**\_\_\_\_\_\_\_\_**> deg. F

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

Seal:

Description: Packing gland with minimum four rings graphite-impregnated packing and bronze lantern rings.

Maximum Continuous Operating Temperature: 230 deg. F

Consider using following Subparagraph for one or more identical pumps. If specifying pumps with different criteria, consider using pump schedule following END OF SECTION.

Performance and Design Criteria:

Flow Capacity: <**\_\_\_\_\_\_\_\_**> gpm

Head: <**\_\_\_\_\_\_\_\_**> feet

Operational Performance:

Operate at system fluid temperatures [**as indicated on Drawings**] without vapor binding and cavitation.

Non-overloading in parallel or individual operation.

Operate within 25 percent of midpoint of published maximum efficiency curve.

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.

Speed: 1,750 rpm unless indicated otherwise.

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

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

* + - * 1. Base-Mounted Pumps:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10930&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.

Description:

Pumps to operate at specified system fluid temperatures without vapor binding and cavitation, to be non-overloading in parallel or individual operation, and to operate within 25 percent of midpoint of published maximum efficiency curve.

Horizontal shaft.

Single stage.

Direct connected.

Radial [**or horizontal**] split casing.

Maximum Working Pressure: [**125**] [**275**] [**250**] <**\_\_\_\_\_\_\_\_**> psig.

Casing:

Material: Cast iron.

Furnish suction and discharge gage ports, renewable bronze-casing wearing rings, seal flush connection, drain plug, flanged suction, and discharge.

Impeller: Bronze, fully enclosed, keyed to shaft.

Bearings: [**Oil-**] [**Grease-**] [**Permanently**] lubricated roller or ball bearings.

Shaft: Alloy steel with copper, bronze, or stainless steel shaft sleeve.

Consider using one of following two Subparagraphs for desired seal type. If both are required for two different pumps, consider using pump schedule following END OF SECTION. Consider Viton fittings for high temperature applications. Packing gland seals are typically restricted to approximately 100 psig maximum suction head pressure.

Seal:

Description: Carbon rotating against stationary ceramic seat.

Maximum Continuous Operating Temperature: [**225**] [**212**] <**\_\_\_\_\_\_\_\_**> deg. F.

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

Seal:

Description: Packing gland with minimum four rings graphite-impregnated packing and bronze lantern rings.

Maximum Continuous Operating Temperature: 230 deg. F

Drive: Flexible coupling with coupling guard.

Baseplate: Cast iron or fabricated steel with integral drain rim.

Consider using following Subparagraph for one or more identical pumps. If specifying pumps with different criteria, consider using pump schedule following END OF SECTION.

Performance and Design Criteria:

Flow Capacity: <**\_\_\_\_\_\_\_\_**> gpm

Head: <**\_\_\_\_\_\_\_\_**> feet

Operational Performance:

Operate at system fluid temperatures [**as indicated on Drawings**] without vapor binding and cavitation.

Non-overloading in parallel or individual operation.

Operate within 25 percent of midpoint of published maximum efficiency curve.

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.

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. Pump Suction Fittings:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10931&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.

Description:

Pattern: Angle.

Body: Cast iron.

End Connections:

Piping 2 Inches and Smaller: Threaded.

Piping 2-1/2 Inches and Larger: Flanged.

Working Pressure: 175 psig.

Accessories:

Inlet vanes.

Cylinder strainer, with 3/16-inch diameter opening.

Disposable fine-mesh strainer to fit over cylinder strainer.

Permanent magnet located in flow stream and removable for cleaning.

Adjustable foot support.

Blowdown tap in bottom.

Gage tap in side.

* + - * 1. Combination Pump Discharge Valves:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10932&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.

Valves:

Description: Flanged cast-iron valve body with bolt-on bonnet.

Pattern: Straight or angle.

Operating Pressure: 175 psig

Check Valve: Non-slam type, with spring-loaded bronze disc and seat, stainless steel stem, and calibrated adjustment permitting flow regulation.

* + - 1. ACCESSORIES
         1. Side-Stream Filtration Systems:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10933&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.

Description:

Flow indicator.

Filter housing with cartridge filter.

Shutoff valves.

Flow-control valve.

Performance and Design Criteria:

Design Flow Rate: [**4**] <**\_\_\_\_\_\_\_\_**> gpm

Maximum Pressure Drop: [**3**] <**\_\_\_\_\_\_\_\_**> psi

Filter Housing: Glass-reinforced nylon suitable for 220 deg. F and 200 psig operating conditions.

Chilled Water Filter Housing: Reinforced PP plastic housing suitable for 125 deg. F and 125 psig operating conditions.

Cartridges: 30 micron for startup and 5 micron for system operation.

* + - * 1. Heat-Consumption Meters:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10934&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.

Description:

Type: Turbine.

Body: Brass.

Register: Magnetic drive.

Temperature Sensors: Platinum.

Performance and Design Criteria:

Maximum Service Temperature: 200 deg. F

Nominal Flow Rate: <**\_\_\_\_\_\_\_\_**> gpm

Pressure Drop at Nominal Flow: <**\_\_\_\_\_\_\_\_**> psi

Maximum Flow Rate: <**\_\_\_\_\_\_\_\_**> gpm

Maximum Operating Pressure: <**\_\_\_\_\_\_\_\_**> psig

Accuracy: [**1.5**] <**\_\_\_\_\_\_\_\_**> percent.

Maximum Counter Reading: [**1 million**] <**\_\_\_\_\_\_\_\_**> Btu/h

Pipe Size: [**1/2 inch**] [**3/4 inch**] [**<\_\_\_\_\_\_\_\_> inch**].

Power: [**Alkaline battery**] [**Lithium battery**] [**24 V converter**].

* + - * 1. Pressure Gages:

As specified in Section 407313 - Pressure and Differential Pressure Gauges.

Pressure Gage Taps:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10936&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.

Needle Valve:

Material: [**Brass**] [**Steel**] [**Stainless steel**].

Connections: 1/4 inch, NPT.

Minimum Pressure Rating: 300 psig.

Ball Valve:

Material: [**Brass**] [**Stainless steel**].

Connections: [**1/8**] [**1/4**] inch, NPT.

Pressure Rating: 250 psig.

Pulsation Damper:

Type: Pressure snubber.

Material: Brass.

Connections: 1/4 inch, NPT.

Siphon:

Material: [**Steel, Schedule 40**] [**Brass**] [**Iron**] [**Stainless steel**].

Connections: 1/4 inch, NPT.

Pattern: [**Angle**] [**or**] [**straight**].

* + - * 1. Expansion Tanks:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10938&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.

Description:

Closed, welded steel; and tested and stamped according to ASME Section VIII.

Cleaned, prime coated, and supplied with steel support saddles and taps for installation of accessories.

Pressure Rating: [**100**] [**125**] <**\_\_\_\_\_\_\_\_**> psig.

Consider using following Subparagraph if specifying one tank. If specifying more than one tank, consider using expansion tank schedule following END OF SECTION.

Size:

Diameter: <**\_\_\_\_\_\_\_\_**> inches

Overall Length: <**\_\_\_\_\_\_\_\_**> inches

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

Gage Glass Set:

Brass compression stops.

Guard.

Glass: 3/4 inch [**; red line**].

Length: Maximum 24 inches sufficient to cover tank for 2 inches above bottom to 2 inches below top.

Quick-Connect Air Inlet:

Compressed Air: 75 inches of 1/4-inch diameter braided, reinforced air hose, air chuck, check valve, and shutoff valve on supply from [**control air compressor**] <**\_\_\_\_\_\_\_\_**>.

Expansion Tank: Inlet tire check valve, manual air vent, tank drain, and pressure relief valve.

Automatic Cold-Water Fill Assembly: Pressure-reducing valve; [**reduced-pressure,**] double-check backflow prevention device; test cocks; strainer; vacuum breaker; and bypass valves.

Glycol Heating System:

Expansion Tank Pressure Relief Valve: <**\_\_\_\_\_\_\_\_**> psig maximum.

Pressure-Reducing Valve: <**\_\_\_\_\_\_\_\_**> psig

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

* + - * 1. Diaphragm-Type Expansion Tanks:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10939&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.

Description:

Welded steel; tested and stamped according to ASME Section VIII.

Working Pressure: 125 psig.

Diaphragm: Flexible [**butyl**] [**EPDM**] <**\_\_\_\_\_\_\_\_**>, sealed into tank.

Pre-charge to [**12**] <**\_\_\_\_\_\_\_\_**> psig

[**Mounting: Steel support stand.**]

Consider using following Paragraph if specifying one tank. If specifying more than one tank, consider using expansion tank schedule following END OF SECTION.

Size:

Diameter: <**\_\_\_\_\_\_\_\_**> inches

[**Length**] [**Height**]: <**\_\_\_\_\_\_\_\_**> inches

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

Accessories:

Pressure gage.

Air-charging fitting.

* + - * 1. Air Separators:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10940&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.

Dip Tube Fitting:

Description: Designed to prevent free air collected in boiler from rising into system.

Operating Pressure: 125 psig

Inline Air Separators:

Material:

Sizes 1-1/2 Inches and Smaller: Cast iron.

Sizes 2 Inches and Larger: Steel.

Tested and stamped according to ASME Section VIII.

Operating Pressure: 125 psig

Combination Air Separators/Strainers:

Material: Steel.

Tested and stamped according to ASME Section VIII.

Operating Pressure: 125 psig

Integral Strainer: [**Bronze**] [**Galvanized steel**].

Inlet and Outlet Connections: Tangential.

Internal Air Collector Tube: Stainless steel.

* + - * 1. Strainers:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10941&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.

Sizes 2 Inches and Smaller:

Body: [**Screwed brass**] [**or**] [**iron**].

Working Pressure: 175 psig

Y-pattern, with 1/32-inch, stainless steel, perforated screen.

Sizes 2-1/2 Inches to 4 Inches:

Body: Flanged iron.

Working Pressure: 175 psig.

Y-pattern, with 3/64-inch, stainless steel, perforated screen.

Sizes 5 Inches and Larger:

Body: Flanged iron.

Working Pressure: 175 psig.

Basket pattern, with 1/8-inch, stainless steel, perforated screen.

* + - * 1. Flow Meters:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10942&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.

Description:

Positive-displacement-disc type, suitable for use with glycol solution.

Comply with [**AWWA C700**] [**AWWA C701**] [**AWWA C702**].

Case: Bronze.

Bottom Cap: Cast iron[**, frost proof, breakaway**].

Register: Hermetically sealed[**, remote reading according to AWWA C707**].

Brass-body turbine meter with magnetic drive register.

Performance and Design Criteria:

Service: Glycol solution, 200 deg. F

Nominal Flow Rate: <**\_\_\_\_\_\_\_\_**> gpm

Pressure Drop at Nominal Flow Rate: <**\_\_\_\_\_\_\_\_**> psi

Maximum Flow Rate: <**\_\_\_\_\_\_\_\_**> gpm

Maximum Operating Pressure: <**\_\_\_\_\_\_\_\_**> psig

Accuracy: [**1.5**] <**\_\_\_\_\_\_\_\_**> percent.

Maximum Counter Reading: [**10 million**] [**100 million**] gal

Pipe Size: [**1/2**] [**3/4**] <**\_\_\_\_\_\_\_\_**> inch

Following Article specifies thermostatically operated solenoid-valve controllers to control glycol flow rate. Other less common control systems include self-acting temperature controllers and pressure-reducing valves; if one of these alternative systems is to be used, modify this Article accordingly.

* + - 1. FLOW CONTROLS
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=10943&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:

Body: Brass or bronze.

Union: On inlet [**and outlet**].

Temperature and Pressure Test Plug: On inlet [**and outlet**].

[**Furnish combination blowdown and backflush drain.**]

* + - * 1. Calibration: Control within 5 percent of design flow rate over entire operating pressure.
        2. Control Mechanism: Stainless steel or nickel-plated brass piston or regulator cup, operating against stainless steel helical or wave-formed spring.
        3. Accessories: Inline strainer on inlet and ball valve on outlet.

Consider single thermostat for non-hazardous locations and explosion-proof thermostats for hazardous locations.

* + - * 1. Single Thermostat:

Description: Stainless steel remote bulb with 6-foot capillary encased in flexible stainless steel armor.

Housing: FM-approved; NEMA 4X.

Set-Point Range: 35 to 235 deg. F

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

* + - * 1. Explosion-Proof Thermostat:

Description: 6-foot capillary bulb encased in armored sheathing.

Housing: Cast aluminum, conforming to requirements for Class 1, Divisions 1 and 2, Groups B, C, and D areas.

Set-Point Range: 35 to 235 deg. F

* + - 1. GLYCOL CHARGING SYSTEM
         1. Mixing Tank:

Description: [**55**] <**\_\_\_\_\_\_\_\_**>-gal. steel drum with fittings suitable for filling.

Furnish hand pump for charging and rubber hose for connection of hand pump to system.

* + - * 1. Storage Tank:

Type: Closed.

Welded steel; tested and stamped according to ASME Section VIII.

Pressure Rating: [**100**] [**125**] <**\_\_\_\_\_\_\_\_**> psig

Cleaned, prime coated, and supplied with steel support saddles and taps for installation of accessories.

Consider using air-eliminator fitting with diaphragm tank.

* + - * 1. Expansion Tank: [**Diaphragm**] [**Closed**] type, with vent fitting, air [**separator**] [**eliminator**], and automatic air vent.
        2. Air Pressure-Reducing Station: Pressure-reducing valve with shutoff valves, strainer, check valve, and needle-valve bypass.
      1. GLYCOL SOLUTION
         1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=10944&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:

Inhibited [**ethylene**] [**propylene**] glycol and water solution, mixed [**50**] <**\_\_\_\_\_\_\_\_**> percent glycol and [**50**] <**\_\_\_\_\_\_\_\_**> percent water.

Suitable for operating temperatures from [**minus 40**] <**\_\_\_\_\_\_\_\_**> deg. Fto plus [**250**] [**325**] [**350**] <**\_\_\_\_\_\_\_\_**> deg. F

1. EXECUTION
   * + 1. EXAMINATION
          1. Verify that surfaces of pipes, valves, and fittings are clean and dry.
          2. Verify that excavations are to required grade, dry, and not over-excavated.
          3. Verify that connections [**to existing piping system**] <**\_\_\_\_\_\_\_\_**>, sizes, locations, and inverts are as indicated on Drawings.
          4. Verify that piping has been inspected and is ready for insulation.
       2. INSTALLATION
          1. According to manufacturer instructions.
          2. Buried Piping Systems:

Establish elevations of buried piping with not less than <**\_\_\_\_\_\_\_\_**> feet of cover.

Establish minimum separation of <**\_\_\_\_\_\_\_\_**> feet from [**other services**] [**sanitary sewer piping**] [**<\_\_\_\_\_\_\_\_> piping**], according to <**\_\_\_\_\_\_\_\_**> code.

Edit following Subparagraph based on specified piping material.

Remove scale and dirt on inside of piping before assembly.

Install pipe to elevation [**as indicated on Drawings**] <**\_\_\_\_\_\_\_\_**>.

Bedding:

Place bedding material at trench bottom to provide uniform bedding for piping.

Level bedding materials in one continuous layer not exceeding [**4**] <**\_\_\_\_\_\_\_\_**> inches [**compacted**] [**loose**] depth.

Compact to [**95**] <**\_\_\_\_\_\_\_\_**> percent maximum density.

Install pipe on prepared bedding.

Route pipe in straight line.

Install pipe to allow for expansion and contraction without stressing pipe or joints.

Install [**shutoff**] [**and**] [**drain**] valves at locations as indicated on Drawings.

Install plastic ribbon tape continuous [**over top of pipe**] [**, buried 6 inches below finish grade and above pipeline**] [**, buried <\_\_\_\_\_\_\_\_> inches below finish grade and above pipeline**].

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

Consider using following Subparagraph for nonmetallic pipe.

Install trace wire continuous [**over top of pipe**] [**, buried 6 inches below finish grade and above pipeline**] [**, buried <\_\_\_\_\_\_\_\_> inches below finish grade and above pipeline**].

Pipe Cover and Backfilling:

Maintain optimum moisture content of fill material as required to attain required compaction density.

After hydrostatic test, evenly backfill entire trench width by hand, placing backfill material and hand tamping in [**4**] [**6**]-inch compacted layers to minimum [**6**] [**12**] inches cover over top of jacket, and compact to [**95**] <**\_\_\_\_\_\_\_\_**> percent maximum density.

Evenly and continuously backfill remaining trench depth in uniform layers with backfill material.

Do not use wheeled or tracked vehicles for tamping.

\*\*\*\*\*\* [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. Aboveground Piping Systems:

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 whenever practical at common elevations.

Sleeve pipe passing through partitions, walls, and floors.

Install firestopping at fire-rated construction perimeters and at openings containing penetrating sleeves and piping.

Install pipe identification as specified in Section 400553 - Identification 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.

Access:

Provide access where valves and fittings are not exposed.

[**Coordinate sizes and locations of access doors with Section 083113 - Access Doors and Frames**].

Slope hydronic piping and arrange systems to drain at low points, using eccentric reducers to maintain alignment of top of pipe.

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

Install valves with stems upright or horizontal, not inverted.

Insulation: As specified in Section 404213 - Process Piping 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. Glycol 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.

For close-coupled and base-mounted pumps, install supports under elbows on pump suction, and discharge line sizes 4 inches and larger.

Install flexible connectors at or near [**pumps**] [**compressors**] [**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**] [**pump suction fitting**] <**\_\_\_\_\_\_\_\_**> on pump suction and line-sized [**soft-seat check valve, balancing valve, and shutoff valve**] [**combination pump discharge valve**] on pump discharge.

Provide air cock and drain connection on horizontal pump casings.

Provide drains for bases and seals.

Check, align, and certify alignment of base-mounted pumps prior to startup.

Housekeeping Base:

Install [**close-coupled and**] base-mounted pumps on concrete housekeeping base with anchor bolts set, level, and grouted in place.

Base: Minimum 3-1/2 inches high and 6 inches larger than pump base on each side, as specified in Section 033000 - Cast-in-Place Concrete.

Install side-stream filtration system.

\*\*\*\*\*\* [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. After installation, inspect for proper operation.
         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. Furnish installation certificate from equipment manufacturer's representative attesting that equipment has been properly installed and is ready for startup and testing.
      1. ADJUSTING
         1. Check and adjust control functions.
      2. DEMONSTRATION
         1. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Director’s Representative

END OF SECTION 404113.26