SECTION 404123.26 - PROCESS EQUIPMENT 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 includes glycol heat-tracing systems for freeze protection of process equipment. System described in this Section consists of a connection to low-pressure (maximum 15 psig steam-supplied or hot-water-supplied heat exchanger, whose outlet supplies a piped heat tracing system using glycol as the process fluid. Steam and hot-water supply systems are specified in Division 23.

Prepackaged glycol heat tracing systems are also available commercially; if used, modify 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.

Glycol solution.

* + - * 1. Related Requirements:

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

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

Section 055000 - Metal Fabrications: Fasteners, brackets, and other miscellaneous metal fabrications as required by this Section.

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

Section 400523 - Stainless Steel Process Pipe and Tubing: Pipe and tubing commonly used for process systems.

Section 400529 - Hangers and Supports for Process Piping and Equipment: Supports, hangers, anchors, and guides for piping systems and equipment.

Section 404223 - Process Equipment Insulation: Insulation requirements as specified in this Section.

Section 430548 - Vibration and Seismic Controls for Process Gas and Liquid Handling Equipment: Vibration isolators as required by Work of this Section.

Section 460513 - Common Motor Requirements for Water and Wastewater Equipment: Electric motors and accessories normally supplied as part of equipment assemblies.

* + - 1. DEFINITIONS

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

* + - * 1. PP: Polypropylene.
			1. REFERENCE STANDARDS

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

* + - * 1. American Society of Mechanical Engineers:

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

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

ASME B40.100 - Pressure Gauges and Gauge Attachments.

* + - * 1. American Water Works Association:

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

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

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

AWWA C702 - Cold Water Meters - Compound Type.

AWWA C706 - Direct-Reading, Remote-Registration Systems for Cold-Water Meters.

* + - * 1. American Welding Society:

AWS D1.1 - Structural Welding Code - Steel.

* + - * 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. FM Global:

The Approval Guide.

* + - * 1. National Electrical Manufacturers Association:

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

* + - * 1. UL:

UL 393 - Indicating Pressure Gauges for Fire-Protection Service.

UL 404 - Gauges, Indicating Pressure, for Compressed Gas Service.

* + - 1. COORDINATION
				1. Coordinate Work of this Section with installation of process equipment, insulation [**, and**] <**\_\_\_\_\_\_\_\_**>.
			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 for system materials and component equipment, including electrical characteristics and connection requirements.
				5. Shop Drawings: Indicate system materials, component equipment, and wiring diagrams.
				6. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
				7. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.

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.
				4. Qualifications Statements:

Coordinate following Subparagraphs with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer and installer.

Welder Certificates: Submit welder certification of compliance with AWS D1.1.

* + - 1. CLOSEOUT SUBMITTALS
				1. Project Record Documents: Record actual locations of equipment receiving heat tracing and locations of heat exchangers, valving, and controls.
			2. MAINTENANCE MATERIAL SUBMITTALS
				1. Spare Parts:

Furnish [**one set**] [**two sets**] of manufacturer's recommended spare parts.

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

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

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

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

* + - * 1. Tools: Furnish special [**wrenches**] <**\_\_\_\_\_\_\_\_**> and other devices required for Director’s Representative to maintain heat tracing.
			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**].
				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. Store heat tracing and components according to manufacturer instructions.
				3. Protection:

Protect heat tracing from water and wet weather.

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. SHELL-AND-TUBE-TYPE 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 Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

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

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

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

* + - * 1. Tubes:

Type: U-tube.

Minimum Outside Diameter: 3/4 inch

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

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

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

* + - * 1. Tubes:

Type: Straight.

Minimum Outside Diameter: 3/4 inch

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

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

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

* + - * 1. Tubes:

Type: Straight.

Material: Copper with spiral surface.

Working Pressure: 150 psig

* + - * 1. Shell:

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

End Connections: [**Threaded**] [**or**] [**Flanged**].

Accessories: Taps for thermometer wells and drains, steel saddle, and 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 of potable water. PP tube sheets are common from some manufacturers of straight-tube exchangers.

* + - * 1. Heads:

Description: [**Cast iron**] [**Fabricated steel**] [**Cast brass**] [**Fabricated stainless steel**] with [**steel**] [**bronze**] [**rolled naval-brass**] [**stainless-steel**] [**glass-filled PP**] tube sheets.

End Connections: [**Threaded**] [**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 if specifying heat exchangers with different criteria.

* + - * 1. Design and Performance Criteria:

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

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

Fouling Factors: <**\_\_\_\_\_\_\_\_**> shell; <**\_\_\_\_\_\_\_\_**> tubes.

Pressure Drops: <**\_\_\_\_\_\_\_\_**> psi shell; <**\_\_\_\_\_\_\_\_**> psi tubes.

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

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

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

* + - * 1. Frames:

Description: Carbon steel with baked epoxy-enamel paint.

[**Stainless steel**] <**\_\_\_\_\_\_\_\_**> side bolts and shroud.

* + - * 1. Plates:

Material: [**Type 304 stainless steel**] [**Type 316 stainless steel**] [**Titanium**] [**Incoloy 825**] [**Hastelloy**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Gaskets: [**Nitrile rubber**] [**EPDM**] [**Viton**] [**Neoprene**] [**Hypalon**] [**Resin-cured butyl rubber**] <**\_\_\_\_\_\_\_\_**>.
				2. Nozzles:

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

Flanges: Rubber type.

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

* + - * 1. Design and Performance Criteria:

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

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

Fouling Factors: <**\_\_\_\_\_\_\_\_**> hot side; <**\_\_\_\_\_\_\_\_**> cold side.

Pressure Drops: <**\_\_\_\_\_\_\_\_**> psi hot side; <**\_\_\_\_\_\_\_\_**> psi cold side.

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

Pipe:

Consider using greater wall thickness for pipe sizes 12 inches and larger.

Description: Black; [**Schedule 40**] [**0.375-inch wall**].

Comply with ASTM A53

Covering: [**AWWA C105, polyethylene (PE) jacket**] [**Double-layer, half-lapped 10-mil PE tape**].

Fittings:

Type: Forged steel welding.

Comply with ASTM A234

Covering: Double-layer, half-lapped 10-mil PE tape.

Joints: Welded.

* + - * 1. Buried Copper Tubing:

Tube:

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

Comply with ASTM B88

Fittings:

Material: Wrought copper.

Comply with ASME B16.22.

Joints: [**Solder, lead free, ASTM B32, 95-5 tin-antimony or tin and silver, with melting range 430 to 535 degrees F]** [**Solder, lead free, 95-5 tin-antimony or tin and silver, with melting range 430 to 535 degrees F]** [**Braze, AWS A5.8, BCuP silver/phosphorus/copper alloy with melting range 1,190 to 1,480 degrees F** ].

* + - * 1. Aboveground Steel Piping:

Pipe:

Consider using greater wall thickness for pipe sizes 12 inches and larger.

Description: Black; [**Schedule 40**] [**0.375-inch wall**].

Comply with ASTM A53

Fittings Type: [**ASME B16.3, malleable-iron**] [**or**] [**ASTM A234, forged-steel welding**].

Joints:

Piping 2 Inches and Smaller: Threaded.

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

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

* + - * 1. Aboveground Steel Piping:

Pipe:

Consider using greater wall thickness for pipe sizes 12 inches and larger.

Description: Black; [**Schedule 40**] [**0.375-inch wall**].

Comply with ASTM A53

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

Fittings:

Material: [**ASTM A395 and ASTM A536, ductile iron**] [**or**] [**ASTM A234, carbon steel**].

End Connections: Grooved.

Joints:

Description: Grooved mechanical couplings.

Comply with ASTM F1476.

Housing Clamps:

Material: Ductile iron.

Comply with ASTM A395 and ASTM A536.

Type: [**Rigid**] [**or**] [**Flexible**].

Sizes: Compatible with steel piping.

Finish: [**Enamel coated**] [**Hot-dip galvanized**] <**\_\_\_\_\_\_\_\_**>.

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

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

* + - * 1. Aboveground Copper Tubing:

Tube:

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

Comply with ASTM B88

Fittings: [**ASME B16.18, cast brass**] [**or**] [**ASME B16.22, solder wrought copper**].

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

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

Joints: [**Solder, lead free, ASTM B32, 95-5 tin-antimony or tin and silver, with melting range 430 to 535 degrees F** ] [**Solder, lead free, 95-5 tin-antimony or tin and silver, with melting range 430 to 535 degrees F** ] [**Braze, AWS A5.8, BCuP silver/phosphorus/copper alloy with melting range 1,190 to 1,480 degrees F** ].

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

* + - * 1. Aboveground Copper Tubing:

Tube:

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

Comply with ASTM B88

End Connections: Rolled grooved.

Fittings:

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

End Connections: Grooved.

Joints:

Description: Grooved mechanical couplings.

Comply with ASTM F1476.

Housing Clamps:

Material: Ductile iron.

Comply with ASTM A395 and ASTM A536.

Type: Engage-and-lock design to permit some angular deflection, contraction, and expansion.

Sizes: Compatible with copper tubing.

Finish: Enamel coated.

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

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

* + - * 1. Performance and Design Criteria:

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.

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.

Provide pipe hangers and supports as specified in Section 400529 - Hangers and Supports for Process Piping and Equipment.

Use [**gate**] [**ball**] [**or**] [**butterfly**] valves for shutoff and to isolate equipment, part of systems, 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 nonlubricated plug valves only if shutoff or isolating valves are also provided.

Use butterfly valves interchangeably with gate and globe valves.

Use lug-end butterfly valves to isolate equipment.

Drain Valves:

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

[**Pipe to nearest floor drain.**]

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

Relief Valves:

Body: Bronze.

Seat: PTFE.

Stem and Springs: Stainless steel.

Operation: Automatic.

Actuation: Direct pressure.

Capacity: ASME-certified and -labeled.

Insulation: As specified in Section 404223 - Process Equipment Insulation.

* + - 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 degrees F

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

Impeller, Shaft, Rotor: Stainless steel.

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

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:

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

Non-overloading in parallel or individual operation.

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:

Impedance protected.

[**Multiple**] [**Single**] [**Two**] [**Three**]-speed[**, with external speed selector**].

\*\*\*\*\*\* [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 psig**] [**175 psig** ] [**<\_\_\_\_\_\_\_\_> 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: Carbon rotating against stationary ceramic seat, [**225**] [**212**] <**\_\_\_\_\_\_\_\_**> degrees F maximum continuous operating temperature.

Drive: Flexible coupling.

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

Performance and Design Criteria:

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

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

Operation:

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

Non-overloading in parallel or individual operation.

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:

Speed: 1,750 rpm unless otherwise indicated.

\*\*\*\*\*\* [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 psig** ] [**250 psig**] [**300 psig** ] [**<\_\_\_\_\_\_\_\_> psig**].

Casing: Cast [**iron**] [**steel**], with suction and discharge gage port, casing wear ring, seal flush connection, drain plug, flanged suction, and discharge.

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

Gage Ports: Suction and discharge.

Wearing Rings: Bronze casing.

Connection Type: Seal flush.

End Connections: Flanged suction and discharge.

Accessories: Drain plug.

Impeller: Bronze, fully enclosed, 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 seal type desired. 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**] <**\_\_\_\_\_\_\_\_**> degrees F.

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

Seal:

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

Maximum Continuous Operating Temperature: [**230**] [**250**] <**\_\_\_\_\_\_\_\_**> degrees 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:

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

Non-overloading in parallel or individual operation.

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.

\*\*\*\*\*\* [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 psig** ] [**175 psig** ] [**250 psig** ] [**<\_\_\_\_\_\_\_\_> psig**].

Casing:

Material: Cast iron.

Gage Ports: Suction and discharge.

Wearing Rings: Bronze casing.

Connection Type: Seal flush.

End Connections: Flanged suction and discharge.

Accessories: Drain plug.

Impeller:

Description: Fully enclosed and keyed to motor shaft extension.

Material: Bronze.

Shaft: Stainless steel.

Consider one of following two Subparagraphs for seal type. If both types 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**] <**\_\_\_\_\_\_\_\_**> degrees F.

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

Seal:

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

Maximum Continuous Operating Temperature: 230 degrees 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:

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

Non-overloading in parallel or individual operation.

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:

Speed: 1,750 rpm unless indicated otherwise.

\*\*\*\*\*\* [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:

Horizontal shaft.

Single stage.

Direct connected.

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

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

Casing:

Material: Cast iron.

Gage Ports: Suction and discharge.

Wearing Rings: Renewable bronze casing.

Connection Type: Seal flush.

End Connections: Flanged suction and discharge.

Accessories: Drain plug.

Impeller:

Description: Fully enclosed and keyed to shaft.

Material: Bronze.

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 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**] <**\_\_\_\_\_\_\_\_**> degrees F.

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

Seal:

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

Maximum Continuous Operating Temperature: 230 degrees 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.

Operation:

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

Non-overloading in parallel or individual operation.

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.

* + - * 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.

Fittings:

Pattern: Angle.

Body: Cast iron.

End Connections:

2 Inches and Smaller: Threaded.

2-1/2 Inches and Larger: Flanged.

Working Pressure: 175 psig.

Strainer:

Cylindrical.

Diameter: 3/16 inch

Furnish disposable fine-mesh strainer to fit over cylindrical strainer.

Permanent Magnet: Located in flow stream and removable for cleaning.

Accessories:

Inlet vanes.

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.

Description:

Pattern: Straight or angle.

Body: Flanged cast iron.

Bonnet: Bolt-on type.

Operating Pressure: 175 psig

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

* + - 1. SIDE-STREAM FILTRATION SYSTEMS
				1. [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 Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

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

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

* + - * 1. Description:

Flow indicator.

Filter housing with cartridge filter.

Shutoff valves.

Flow-control valve.

* + - * 1. Performance and Design Criteria:

Design Flow Rate: [**4**] <**\_\_\_\_\_\_\_\_**> gpm with maximum pressure drop of [**3**] <**\_\_\_\_\_\_\_\_**> psi.

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

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

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

* + - 1. FLOW CONTROLS

This Article describes 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. [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 Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

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

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**].

[**Drain: Combination blowdown and backflush.**]

* + - * 1. Calibration: Control within five 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:

Inlet: Inline strainer.

Outlet: Ball valve.

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

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 degrees F

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

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 degrees F

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

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

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**] <**\_\_\_\_\_\_\_\_**> degrees F to plus [**250**] [**325**] [**350**] <**\_\_\_\_\_\_\_\_**> degrees F.

* + - 1. ACCESSORIES
				1. Glycol Charging System:

Mixing Tank:

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

Hand pump for charging.

Rubber hose for connection of hand pump to system.

Storage Tank:

Configuration: Closed.

Material: 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.

Expansion Tank: [**Diaphragm**] [**Closed**] type with vent fitting, with air [**separator**] [**eliminator**] and automatic air vent.

Air Pressure-Reducing Station: Pressure-reducing valve with shutoff valves, strainer, check valve, and needle valve bypass.

* + - * 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:

Turbine meter.

Body: Brass.

Register: Magnetic drive.

Temperature Sensors: Platinum.

Performance and Design Criteria:

Maximum Service Temperature: 200 degrees 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:

Taps:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=8027&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**].

End Connections: 1/4-inch NPT.

Minimum Pressure Rating: 300 psig.

Ball Valve:

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

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

Pressure Rating: 250 psig.

Pulsation Damper:

Type: Pressure snubber.

Material: Brass.

End Connections: 1/4-inch NPT.

Siphon:

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

End Connections: 1/4-inch NPT.

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

* + - * 1. Thermometers:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=10937&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: Stem.

Red-appearing mercury.

Lens front tube.

Cast-aluminum case with enamel finish.

Scale Size: [**7 inches]** [**9 inches]** [**12 inches]**.

Window: Clear [**glass**] [**Lexan**].

Stem:

Material: Brass.

Connection and Length: 3/4-inch NPT, [**3-1/2 inches]** [**<\_\_\_\_\_\_\_\_> inch**].

Accuracy:

[**Comply with ASTM E77.**]

Two percent.

Calibration: [**Degrees F**] [**Degrees C**] [**Both degrees F and degrees C**].

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

Description:

Adjustable angle.

Red-appearing mercury.

Lens front tube.

Cast-aluminum case with enamel finish.

Cast-aluminum adjustable joint with positive locking device.

Scale Size: [**7 inches]** [**9 inches]** [**12 inches**].

Window: Clear [**glass**] [**Lexan**].

Stem:

Material: Brass.

Connection and Length: 3/4-inch NPT, [**3-1/2 inches]** [**<\_\_\_\_\_\_\_\_> inch**].

Accuracy:

[**Comply with ASTM E77.**]

Two percent.

Calibration: [**Degrees F**] [**Degrees C**] [**Both degrees F and degrees C**].

* + - * 1. Thermometer Supports:

Socket: Brass separable sockets for thermometer stems, with or without extensions[**, and with cap and chain**].

Flange:

Type: Reversible.

Outside Diameter: 3 inches

Design: To fasten to sheet metal air ducts, with brass perforated stem.

* + - * 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, 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 for one tank. If specifying more than one tank, consider using expansion tank schedule following END OF SECTION.

Size:

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

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

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

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.

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.

Furnish National Board Form U-1.

Working Pressure: 125 psig

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

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

[**Steel support stand.**]

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

Size:

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

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

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

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:

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

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=8023&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.

2 Inches and Smaller:

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

Working Pressure: 175 psig

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

2-1/2 Inches to 4 Inches:

Body: Flanged iron.

Working Pressure: 175 psig

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

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**] [**C701**] [**C702**].

Case: Bronze.

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

Register: Hermetically sealed[**, remote reading according to AWWA C706**].

Brass-body turbine meter with magnetic drive register.

Performance and Design Criteria:

Service: Glycol solution, 200 degrees 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: [**10 million**] [**100 million**] gal

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

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. Pipe Hangers and Supports: As specified in Section 400529 - Hangers and Supports for Process Piping and Equipment.
				3. 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 based on piping material used.

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 indicated on Drawings and as specified in this Section.

In following Subparagraph consider using tape for ferrous piping and trace wire for nonferrous piping.

Install [**plastic ribbon tape**] [**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.

Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

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.

Prepare unfinished pipe, fittings, supports, and accessories, ready for finish painting as specified in 099000 - Painting and Coating.

Install valves with stems upright or horizontal, not inverted.

Insulate piping [**and equipment**] 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.

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.

Provide 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 on Site for installation, inspection, field testing, and instructing Director’s Representative in 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 control functions and adjust as required.
			2. DEMONSTRATION
				1. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Director’s Representative.

END OF SECTION 404123.26