SECTION 402329 - RECIRCULATED WATER PROCESS PIPING

Note that this section has only been edited for NYSOGS standardization and has not been technically edited. The designer shall make all technical edits specific to the project for this section.

This Section specifies requirements for plant process piping systems transporting recirculated water in a water- or wastewater-treatment plant. Piping for Site utilities is specified in applicable Site utilities Sections in Division 33, and plumbing piping and appurtenances are specified Division 22.

In process industries such as water and wastewater treatment, individual piping systems (for example, sanitary, raw water, and drainage) may be defined on Drawings via a pipe schedule, which describes piping components required for that system as well as providing other relevant data such as pressure testing requirements and applicable valve types.

Pipe, fittings, joints, accessories, and other appurtenances, should be indicated on pipe schedule and specified by pipe material in Division 40 based on service. Common items applicable to process piping systems are specified in Section 400506.

Valving, including appurtenances and accessories, should also be indicated on pipe schedule and specified by valve type in Division 40. Common items applicable to process valving are specified in Section 400551.

Consult with piping manufacturer, and select materials based on specific application.

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

Pipes and tubes for conveying recirculated process water.

Valves for conveying recirculated process water.

* + - * 1. Related Requirements:

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

Section 055000 - Metal Fabrications: Miscellaneous metalwork and fasteners as required by this Section.

Section 400506 - Couplings, Adapters, and Specials for Process Piping: Basic materials and methods related to piping commonly used for process systems.

Section 400517 - Copper Process Pipe and Tubing: Requirements for piping and tubing as specified in this Section.

Section 400519 - Ductile Iron Process Pipe: Requirements for piping as specified in this Section.

Section 400524 - Steel Process Pipe: Requirements for piping and tubing as specified in this Section.

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

Section 400536 - Fiberglass-Reinforced Plastic Process Pipe: Requirements for piping as specified in this Section.

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

Section 400561 - Gate Valves: Requirements for valves as specified in this Section.

Section 400562 - Plug Valves: Requirements for valves as specified in this Section.

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

Section 400564 - Butterfly Valves: Requirements for valves as specified in this Section.

Section 400565.23 - Swing Check Valves: Requirements for valves as specified in this Section.

Section 400565.26 - Tilting Disc Check Valves: Requirements for valves as specified in this Section.

Section 400565.29 - Double-Disk Check Valves: Requirements for valves as specified in this Section.

Section 404213 - Process Piping Insulation: Product and installation requirements for piping insulation.

* + - 1. DEFINITIONS

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

* + - * 1. FRP: Fiberglass-reinforced plastic.
			1. REFERENCE STANDARDS

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

* + - * 1. American Welding Society:

AWS D1.1 - Structural Welding Code - Steel.

* + - * 1. ASME International:

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

ASME B31.3 - Process Piping.

* + - 1. PREINSTALLATION MEETINGS
				1. Convene minimum [**one week**] [**<\_\_\_\_\_\_\_\_> weeks**] prior to commencing Work of this Section.
			2. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
				2. Manufacturer’s installation instructions shall be provided along with product data.
				3. Submittals shall be provided in the order in the which they are specified and tabbed (for combined submittals).
				4. Product Data:

Piping: Submit manufacturer information on pipe materials, fittings, and accessories.

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

System Components: Submit manufacturer catalog information including capacity, component sizes, rough-in requirements, and service sizes.

Valves: Submit manufacturer information for actuators with model number and size indicated.

USE PARAGRAPH BELOW WITH EPD REQUIREMENT WHEN PROJECT ESTIMATE IS $1M OR MORE.

* + - * 1. Submit an Environmental Product Declaration (EPD) from the manufacturer for steel pipe within this specification section, if available. A statement of the contractor’s good faith effort to obtain the EPD shall be provided if not available.

Manufacturer-provided EPDs must be Product Specific Type III (Third-Party Reviewed), in adherence with ISO 14025 *Environmental labels and declarations*, ISO 14044 *Environmental management – Life cycle assessment*, and ISO 21930 *Core rules for environmental product declarations of construction products and services.*

* + - * 1. Shop Drawings:

Piping:

Indicate piping system schematic with general assembly of components and mounting and installation details.

Submit list of wording, symbols, letter size, and color coding for pipe identification; comply with ASME A13.1.

Submit layout drawings showing piece numbers and location.

Valves: Submit assembly drawings indicating parts list, materials, sizes, position indicators, limit switches, [**control system,**] actuator mounting, wiring diagrams, control system schematics[**, and**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
				2. Welder Certificates: Certify welders and welding procedures employed on Work, verifying AWS qualification within previous 12 months.

Include separate Paragraphs for additional certifications.

* + - * 1. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
				2. Source Quality-Control Submittals: Indicate results of [**shop**] [**factory**] tests and inspections.
				3. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
				4. Qualifications Statements:

Coordinate following Subparagraphs with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer and installer.

Submit manufacturer's approval of installer.

Welders: Qualify procedures and personnel according to AWS D1.1.

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

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

* + - * 1. Perform Work according to ASME B31.3 for installation of piping systems.
				2. Perform Work according to [**applicable authority**] [**AWS D1.1**] for welding of hanger and support attachments to building structure.

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 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 materials according to manufacturer instructions.
				3. Protection:

Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

Provide additional protection according to manufacturer instructions.

* + - 1. EXISTING CONDITIONS
				1. Field Measurements:

Verify field measurements prior to fabrication.

Indicate field measurements on Shop Drawings.

* + - 1. WARRANTY

This Article extends warranty period beyond one year. Extended warranties may increase construction costs and State enforcement responsibilities. Specify warranties with caution.

* + - * 1. Furnish [**five**] <**\_\_\_\_\_\_\_\_**>-year manufacturer's warranty for piping and valves.
1. PRODUCTS
	* + 1. PIPING AND TUBING FOR CONVEYING RECIRCULATED WATER
				1. Piping: [**Copper, as specified in Section 400517 - Copper Process Pipe and Tubing**] [**Ductile iron, as specified in Section 400519 - Ductile Iron Process Pipe**] [**Steel, as specified in Section 400524 - Steel Process Pipe**] [**PVC, as specified in Section 400531 - Thermoplastic Process Pipe**] [**CPVC, as specified in Section 400531 - Thermoplastic Process Pipe**] [**Polyethylene, as specified in Section 400531 - Thermoplastic Process Pipe**] [**FRP, as specified in Section 400536 - Fiberglass-Reinforced Plastic Process Pipe**] [**Section <\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_>**].
				2. Tubing: [**Copper, as specified in Section 400517 - Copper Process Pipe and Tubing**] [**Section <\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_>**].
			2. VALVES FOR CONVEYING RECIRCULATED WATER
				1. Description:

Type: [**Gate as specified in Section 400561 - Gate Valves**] [**, plug as specified in Section 400562 - Plug Valves**] [**, ball as specified in Section 400563 - Ball Valves**] [**, butterfly as specified in Section 400564 - Butterfly Valves**] [**, swing check as specified in Section 400565.23 - Swing Check Valves**] [**, tilting disk check as specified in Section 400565.26 - Tilting Disc Check Valves**] [**, and**] [**double-disk check as specified in Section 400565.29 - Double-Disk Check Valves**].

* + - * 1. Service:

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

Furnish valves to isolate equipment, parts of systems, or vertical risers as indicated on Drawings.

Furnish valves for throttling, bypass, or manual flow control services as indicated on Drawings.

* + - 1. PIPE HANGERS AND SUPPORTS

\*\*\*\*\*\* [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.
1. EXECUTION
	* + 1. EXAMINATION
				1. Verify that field dimensions are as indicated on [**Shop**] Drawings.
				2. Inspect existing flanges for nonstandard bolt hole configurations, or design and verify that new pipe and flanges mate properly.
				3. Verify that openings are ready to receive sleeves [**and firestopping**].
				4. Verify that piping system is ready for valve installation.
			2. PREPARATION
				1. Thoroughly clean end connections before installation.
				2. Close pipe and equipment openings with caps or plugs during installation.
				3. Surface Preparation: Clean surfaces to remove foreign substances.
			3. INSTALLATION
				1. As specified in Section 400506 - Couplings, Adapters, and Specials for Process Piping and Section 400551 - Common Requirements for Process Valves.
				2. Inserts:

Provide for placement in concrete forms.

Provide for suspending hangers from reinforced concrete slabs and for sides of reinforced concrete beams.

Carrying Pipe 4 Inches and Larger: Provide hooked rod to concrete reinforcement section.

Concrete Slabs Forming Finished Ceiling: Locate inserts flush with slab surface.

If inserts are omitted, drill through concrete slab from below and provide through bolt with recessed square steel plate and nut [**above**] [**flush with top of**] [**recessed into and grouted flush with**] slab.

* + - * 1. Hangers and Supports:

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. Buried Piping:

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

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

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

Bedding Material:

Install pipe on prepared bedding.

Place at trench bottom to provide uniform bedding for piping.

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

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

Route pipe in straight line.

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

Pipe Markers:

Coordinate installation of pipe markers with backfilling operations.

Ribbon Tape: Install above buried piping at depth of 8 to 12 inches below finish grade.

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

Trace Wire:

Install continuous over top of piping system.

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

Bury [**6**] <**\_\_\_\_\_\_\_\_**> inches below finish grade and above piping system.

Pipe Cover and Backfilling:

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

After pressure testing, evenly backfill entire trench width by hand placing backfill material and hand tamping in [**4**] [**6**]-inch compacted layers to [**6**] [**12**]-inch minimum cover over top of pipe.

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:

Take-offs:

Furnish take-off to outlets from top of main, with shutoff valve after take-off.

Slope take-off piping to outlets.

Changes in Direction:

Furnish tees instead of elbows at changes in direction of piping.

Fit open end of each tee with plug.

Cut pipe and tubing accurately and install without springing or forcing.

Slope piping in direction of flow.

Pipe Sleeves:

Furnish pipe sleeves where pipes and tubing pass through walls, floors, roofs, and partitions.

Pipe Identification: Comply with ASME A13.1.

Except where indicated, furnish manual shutoff valves with stem vertical and accessible for operation and maintenance.

\*\*\*\*\*\* [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.

Select and edit following Subparagraph to suit type of firestopping material specified and for Project requirements.

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

* + - * 1. Firestopping:

Install at fire-rated construction perimeters and openings containing penetrating sleeves, piping, and other items requiring firestopping.

Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

Apply firestopping material in sufficient thickness [**and to uniform density and texture**] to achieve required fire and smoke rating.

Placement: Compress fibered material to maximum 40 percent of its uncompressed size.

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

Placement:

Place foamed material in layers to ensure homogenous density, filling cavities and spaces.

Place sealant to completely seal junctions with adjacent dissimilar materials.

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

Placement: Place intumescent coating in sufficient coats to achieve required rating.

[**Remove dam material after firestopping material has cured**] [**Dam material to remain**].

Fire-Rated Surfaces:

Seal opening at [**floor**] [**wall**] [**partition**] [**ceiling**] [**and**] [**roof**].

Install sleeve through opening and extend beyond minimum of 1 inch on both sides of building element.

Size sleeve, allowing minimum of 1 inch void between sleeve and building element.

Pack void with backing material.

Seal ends of sleeve with fire-resistive silicone compound to meet fire rating of structure penetrated.

Non-Rated Surfaces:

Seal opening through non-fire-rated [**wall**] [**partition**] [**floor**] [**ceiling**] [**and**] [**roof**].

Install sleeve through opening and extend beyond minimum of 1 inch on both sides of building element.

Size sleeve to allow minimum of a 1-inch void between sleeve and building element.

Install type of firestopping material recommended by manufacturer.

Occupied Spaces:

Install [**escutcheons**] [**floor plates**] [**or**] [**ceiling plates**] where conduit penetrates non-fire-rated surfaces in occupied spaces.

Occupied spaces include rooms with finished ceilings and rooms where penetration occurs below finished ceiling.

Exterior Wall Openings below Grade: Assemble rubber links of mechanical sealing device to size of piping and tighten in place, according to manufacturer instructions.

Interior Partitions:

Seal pipe penetrations at [**clean rooms**] [**, laboratories**] [**, computer rooms**] [**, telecommunication rooms**] [**, data rooms**] [**, and**] <**\_\_\_\_\_\_\_\_**>.

Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

* + - * 1. Insulation: As specified in Section 404213 - Process Piping Insulation.

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

* + - * 1. Install insulation as indicated on [**Drawings**] [**Shop Drawings**] [**pipe schedule**].
			1. FIELD QUALITY CONTROL
				1. Inspection:

Inspect for damage to pipe lining or coating and for other defects that may be detrimental as determined by the Director’s Representative.

Repair damaged piping, or provide new, undamaged pipe.

After installation, inspect for proper supports and interferences.

* + - * 1. Pressure Testing:

As indicated on pipe schedule.

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

* + - * 1. Pressure Testing:

Test Pressure: Not less than 200 psig or 50 psi in excess of maximum static pressure, whichever is greater.

Conduct hydrostatic test for at least two hours.

Slowly fill with water section to be tested; expel air from piping at high points through corporation cocks.

Close air vents and corporation cocks after air is expelled and raise pressure to specified test pressure.

Observe joints, fittings, and valves under test.

Remove and renew cracked pipe, joints, fittings, and valves showing visible leakage and retest.

Correct visible deficiencies and continue testing at same test pressure for additional two hours to determine leakage rate.

Maintain pressure within plus or minus 5 psi of test pressure.

Leakage is defined as quantity of water supplied to piping necessary to maintain test pressure during period of test.

Compute maximum allowable leakage by following formula:

L = SD x sqrt (P)/C.

L = testing allowance, in gph

S = length of pipe tested, in feet

D = nominal diameter of pipe, in inches

P = average test pressure during hydrostatic test, in psig

C = 148,000

When pipe under test contains sections of various diameters, calculate allowable leakage from sum of computed leakage for each size.

If test of pipe indicates leakage greater than allowed, locate source of leakage, make corrections, and retest until leakage is within allowable limits.

Correct visible leaks regardless of quantity of leakage.

Director’s Representative will witness testing.

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

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

* + - * 1. Pressure Testing: According to <**\_\_\_\_\_\_\_\_**> standards.
				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. ADJUSTING
				1. Field calibrate local indicators at time of piping installation.
			2. CLEANING
				1. Keep piping and valve interiors clean as installation progresses.
			3. DEMONSTRATION
				1. Demonstrate valve operation, routine maintenance, and emergency repair procedures to Director’s Representative.
			4. ATTACHMENTS

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

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

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

* + - * 1. Pipe Hanger Spacing:

Pipe Size 1/2 Inch

Maximum Hanger Spacing: 7 feet

Hanger Rod Diameter: 3/8 inch

Pipe Size 3/4 Inch

Maximum Hanger Spacing: 7 feet

Hanger Rod Diameter: 3/8 inch

Pipe Size 1 Inch

Maximum Hanger Spacing: 7 feet

Hanger Rod Diameter: 3/8 inch

Pipe Size 1-1/4 Inches

Maximum Hanger Spacing: 7 feet

Hanger Rod Diameter: 3/8 inch

Pipe Size 1-1/2 Inches

Maximum Hanger Spacing: 9 feet

Hanger Rod Diameter: 3/8 inch

Pipe Size 2 Inches

Maximum Hanger Spacing: 10 feet

Hanger Rod Diameter: 3/8 inch

Pipe Size 2-1/2 Inches

Maximum Hanger Spacing: 11 feet

Hanger Rod Diameter: 1/2 inch

Pipe Size 3 Inches

Maximum Hanger Spacing: 12 feet

Hanger Rod Diameter: 1/2 inch

Pipe Size 4 Inches

Maximum Hanger Spacing: 14 feet

Hanger Rod Diameter: 5/8 inch

Pipe Size 5 Inches

Maximum Hanger Spacing: 16 feet

Hanger Rod Diameter: 5/8 inch

Pipe Size 6 Inches

Maximum Hanger Spacing: 17 feet

Hanger Rod Diameter: 3/4 inch

Pipe Size 8 Inches

Maximum Hanger Spacing: 19 feet

Hanger Rod Diameter: 3/4 inch

Pipe Size 10 Inches

Maximum Hanger Spacing: 22 feet

Hanger Rod Diameter: 7/8 inch

Pipe Size 12 Inches

Maximum Hanger Spacing: 23 feet

Hanger Rod Diameter: 7/8 inch

Pipe Size 14 Inches

Maximum Hanger Spacing: 25 feet

Hanger Rod Diameter: 1 inch

Pipe Size 16 Inches

Maximum Hanger Spacing: 27 feet

Hanger Rod Diameter: 1 inch

Pipe Size 18 Inches

Maximum Hanger Spacing: 28 feet

Hanger Rod Diameter: 1 inch

Pipe Size 20 Inches

Maximum Hanger Spacing: 30 feet

Hanger Rod Diameter: 1-1/4 inches

Pipe Size 24 Inches

Maximum Hanger Spacing: 32 feet

Hanger Rod Diameter: 1-1/4 inches

PVC Pipe:

Maximum Hanger Spacing: 6 feet

Hanger Rod Diameter: 3/8 inch

END OF SECTION 402329