SECTION 402346 - WASTE SLUDGE 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.

In process industries such as water and wastewater treatment, piping is typically specified by pipe material. Individual piping systems (e.g., sanitary, raw water, drainage) may be defined in Drawings via a pipe schedule, which describes the piping components required for that system and provides other relevant data such as pressure-testing requirements and applicable valve types.

Piping, fittings, joints, accessories, and other appurtenances should be indicated on the pipe schedule and specified by pipe material in Division 40 - Process Integration 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 the pipe schedule and specified by valve type in Division 40 - Process Integration. 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:

Ductile-iron pipe and fittings.

Valves.

Pipe hangers and supports.

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

Section 400507 - Hangers and Supports for Process Piping: Requirements for hanging and supporting piping.

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

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

* + - 1. REFERENCE STANDARDS

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

* + - * 1. American Water Works Association:

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

AWWA C110 - Ductile-Iron and Gray-Iron Fittings.

AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

AWWA C115 - Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges.

AWWA C150 - Thickness Design of Ductile-Iron Pipe.

AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast.

AWWA C153 - Ductile-Iron Compact Fittings.

* + - * 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 B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.

ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard.

ASME B16.42 - Ductile Iron Pipe Flanges and Flanged Fittings: Classes 150 and 300.

ASME B31.3 - Process Piping.

* + - * 1. ASTM International:

ASTM A48 - Standard Specification for Gray Iron Castings.

ASTM A105 - Standard Specification for Carbon Steel Forgings for Piping Applications.

ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.

ASTM A536 - Standard Specification for Ductile Iron Castings.

ASTM D1784 - Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.

ASTM F1545 - Standard Specification for Plastic-Lined Ferrous Metal Pipe, Fittings, and Flanges.

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

MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

* + - 1. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

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

Piping: Submit manufacturer information 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.

* + - * 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. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
        3. 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. Operation and Maintenance Data: Submit assembly views and replacement part numbers and availability.
      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. DUCTILE-IRON PIPE AND FITTINGS

Reference standards in the following Paragraph include specific material and fabrication requirements. Ensure that other statements in this Section do not conflict with those requirements.

* + - * 1. Pipe:

Comply with AWWA [**C115**] [**C150**] [**C151**].

Diameter and Class: As indicated on [**Drawings**] [**piping schedule**].

* + - * 1. Fittings:

[**Gray iron, ASTM A48**] [**Ductile iron, AWWA C110**] [**Ductile iron, AWWA C153**].

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

* + - * 1. End Connections:

Mechanical Joint:

Comply with AWWA C110 and AWWA C111.

Glands: [**Ductile**] [**Gray**] iron [**with asphaltic coating**].

Bell and Spigot: Comply with AWWA C110 and AWWA C111.

Flanged: Comply with AWWA C110, AWWA C111 [**, and ASME B16.1**].

* + - * 1. Finishes:

Outside Coating:

Buried Piping:

Type: Asphaltic.

Thickness: [**40**] <**\_\_\_\_\_\_\_\_**> mils

* + - * 1. Accessories:

Encasement:

Material: Polyethylene.

Comply with AWWA C105.

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

Encasement:

Material: Double-layer polyethylene tape.

Thickness: [**10**] <**\_\_\_\_\_\_\_\_**> mils

Configuration: Half-lapped.

Plastic-lined (PTFE or polyvinylidene fluoride [PVDF]) piping is often recommended for abrasive slurry piping applications. Some references indicate that polypropylene (PP) wears up to twice as fast as PTFE or PVDF and that carbon steel wears up to 6.5 times faster.

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

Pinch valves are perhaps the simplest design of any valve and are well-suited for handling slurries and liquids with large amounts of suspended solids. The operating mechanism (the "pincher") is completely isolated from process fluids; therefore, these valves may be applicable to potentially corrosive service conditions.

Pinch valves are generally recommended for following service conditions:

Handling slurries and liquids with large amounts of suspended solids.

Open-close and throttling.

Low maintenance cost.

Low pressure drop through valve.

Moderate temperatures.

[Manufacturers](http://www.specagent.com/LookUp/?ulid=12822&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:

As specified in Section 400551 - Common Requirements for Process Valves.

[**Minimum**] Working Pressure: [**<\_\_\_\_\_\_\_\_> psig at <\_\_\_\_\_\_\_\_> deg. F**] [**As indicated on valve schedule**].

Maximum Fluid Temperature: [**<\_\_\_\_\_\_\_\_> deg. F**] [**As indicated on valve schedule**].

Sleeves: [**Full port**] [**Double wall**] [**Reduced port**] [**Cone**] [**Variable orifice**] <**\_\_\_\_\_\_\_\_**>.

[**Upper**] [**and**] [**Lower**] Pinch Bar Actuation: [**Manual**] [**Electric motor**] [**Pneumatic**] <**\_\_\_\_\_\_\_\_**>.

End Connections:

Type: [**Flanged**] <**\_\_\_\_\_\_\_\_**>.

Comply with ASME [**B16.1**] [**, B16.5, Class 125**] [**, B16.5, Class 150**] [**, B16.5, Class <\_\_\_\_\_\_\_\_>**] [**, or**] <**\_\_\_\_\_\_\_\_**>.

Materials:

Body: [**Cast iron, ASTM A126**] [**Ductile iron, ASTM A536**] [**Carbon steel**] [**Stainless steel**] <**\_\_\_\_\_\_\_\_**>.

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

Seats: [**EPDM**] <**\_\_\_\_\_\_\_\_**>.

Diaphragm valves (also referred to as "membrane valves") consist of a valve body, diaphragm, and seat upon which the diaphragm closes the valve.

Diaphragm valves are generally recommended for following service conditions:

Fully open, fully closed, and throttling.

Handling of slurries, highly corrosive fluids, fluids to be protected from contamination.

Low pressures.

* + - * 1. Diaphragm Valves:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=12823&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:

[**Minimum**] Working Pressure: [**<\_\_\_\_\_\_\_\_> psig at <\_\_\_\_\_\_\_\_> deg. F**] [**As indicated on valve schedule**].

Maximum Fluid Temperature: [**<\_\_\_\_\_\_\_\_> deg. F**] [**As indicated on valve schedule**].

Actuation: [**Manual**] [**Pneumatic, fail closed**] [**Pneumatic, fail open**] [**Pneumatic, double acting**] <**\_\_\_\_\_\_\_\_**>.

Furnish diaphragm position indicator.

End Connections:

Type: [**Flanged**] <**\_\_\_\_\_\_\_\_**>.

Comply with ASME [**B16.1**] [**, B16.5, Class 125**] [**, B16.5, Class 150**] [**, B16.5, Class <\_\_\_\_\_\_\_\_>**] [**, B16.42**] [**, or**] <**\_\_\_\_\_\_\_\_**>.

Materials:

Body: [**Cast iron, ASTM A126**] [**Ductile iron, ASTM A536**] [**Carbon steel**] [**Type 316 stainless steel**] <**\_\_\_\_\_\_\_\_**>.

Seals: [**Natural rubber**] [**Elastomer**] <**\_\_\_\_\_\_\_\_**>.

* + - * 1. Plastic Diaphragm Valves:

[Manufacturers](http://www.specagent.com/LookUp/?ulid=12824&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:

[**Minimum**] Working Pressure: [**<\_\_\_\_\_\_\_\_> psig at <\_\_\_\_\_\_\_\_> deg. F**] [**As indicated on valve schedule**].

Maximum Fluid Temperature: [**<\_\_\_\_\_\_\_\_> deg. F**] [**As indicated on valve schedule**].

Actuation: [**Manual**] [**Pneumatic, fail closed**] [**Pneumatic, fail open**] [**Pneumatic, double acting**] <**\_\_\_\_\_\_\_\_**>.

Furnish diaphragm position indicator.

End Connections:

Type: [**Flanged**] <**\_\_\_\_\_\_\_\_**>.

Comply with ASME [**B16.1**] [**, B16.5, Class 125**] [**, B16.5, Class 150**] [**, B16.5, Class <\_\_\_\_\_\_\_\_>**] [**, B16.42**] [**, or**] <**\_\_\_\_\_\_\_\_**>.

Materials:

Body: [**PVC, ASTM D1784**] [**PP**] [**PTFE**] <**\_\_\_\_\_\_\_\_**>.

Seals: [**EPDM**] [**PTFE**] <**\_\_\_\_\_\_\_\_**>.

\*\*\*\*\*\* [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 valves according to <**\_\_\_\_\_\_\_\_**> standards.
      1. PIPE HANGERS AND SUPPORTS
         1. As specified in Section 400507 - Hangers and Supports for Process Piping.
         2. Firestopping: As specified in Section [**400507 - Hangers and Supports for Process Piping**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

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. Cleaning: 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: As specified in Section 400507 - Hangers and Supports for Process Piping.

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

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

* + - * 1. Installation Standards: Install Work according to <**\_\_\_\_\_\_\_\_**> standards.
        2. 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**] inches 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:

Takeoffs:

Install takeoff to outlets from top of main with shutoff valve after takeoff.

Slope takeoff piping to outlets.

Changes in Direction:

Install 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:

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

As specified in Section 400507 - Hangers and Supports for Process Piping.

Pipe Identification: Comply with ASME A13.1.

Except where indicated, install 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.

* + - * 1. Firestopping:

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

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 [**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 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 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.

Director’s Representative will witness testing.

\*\*\*\*\*\* [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. Install corporation cocks at high points. Close air vents and corporation cocks after air is expelled. 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. 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

If 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 Subparagraph 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 402346