SECTION 400519 - DUCTILE IRON PROCESS PIPE

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 ductile-iron piping materials, and ductile-iron, malleable-iron, and cast-iron fitting materials, normally encountered in plant process piping systems and common to more than one Section in this Division. Common piping components, including penetrations, restrained joints, flexible connections, expansion joints, and loops, are specified in Section 400506. Specialized fittings, joints, accessories, and other appurtenances are specified in detail in appropriate piping Sections based on service requirements.

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

Piping for site utilities is specified in applicable site utilities Sections in Division 33.

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

Ductile-iron pipe.

Ductile-iron, malleable-iron, and cast-iron fittings.

Accessories.

* + - * 1. Related Requirements:

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

Section 400506 - Couplings, Adapters, and Specials for Process Piping: Piping appurtenances.

Section 400551 - Common Requirements for Process Valves: Common product requirements for valves for placement by this Section.

Section 404642 - Cathodic Process Corrosion Protection: Passive cathodic protection for buried ferrous piping.

* + - 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 C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.

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. ASME International:

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

ASME B31.3 - Process Piping.

* + - * 1. ASTM International:

ASTM A48 - Standard Specification for Gray Iron Castings.

* + - * 1. NSF International:

NSF 61 - Drinking Water System Components - Health Effects.

NSF 372 - Drinking Water System Components - Lead Content.

* + - * 1. Society for Protective Coatings:

SSPC SP 6 - Commercial Blast Cleaning.

* + - 1. COORDINATION
         1. Coordinate Work of this Section with piping and equipment connections specified in other Sections [**and indicated on Drawings**].
      2. PREINSTALLATION MEETINGS
         1. Convene minimum [**one**] <**\_\_\_\_\_\_\_\_**> week prior to commencing Work of this Section.
      3. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
        2. Manufacturer’s installation instructions shall be provided along with product data.
        3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
        4. Product Data: Submit manufacturer information regarding pipe and fittings.
        5. Shop Drawings: Indicate layout of piping systems, including equipment, critical dimensions, sizes, and materials lists.
        6. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

Include separate Paragraphs for additional certifications.

Include following Paragraph when Contractor is responsible for designing products or assemblies. List affected products when Section specifies more than one product.

* + - * 1. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for pipe sizing methods and calculations used.
        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, installer, and licensed professional.

Submit manufacturer's approval of installer.

* + - 1. CLOSEOUT SUBMITTALS
         1. Project Record Documents: Record actual locations of piping, valves and other appurtenances, connections, and [**invert**] [**centerline**] elevations.
         2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
      2. QUALITY ASSURANCE

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

* + - * 1. Permanently mark each length of pipe with manufacturer's name or trademark and indicate conformance to standards.
        2. Materials in Contact with Potable Water: Certified according to NSF 61 and NSF 372.

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. Licensed Professional: [**Professional engineer**] <**\_\_\_\_\_\_\_\_**> experienced in design of specified Work and licensed in New York State.
      1. DELIVERY, STORAGE, AND HANDLING
         1. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
         2. Store materials according to manufacturer instructions.
         3. Protection:

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

Protect piping and appurtenances by storing off ground.

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. PRODUCTS
   * + 1. DUCTILE IRON PIPE AND FITTINGS
          1. Piping:

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

[**Class**] [**Pressure Rating**]: As indicated on [**Drawings**] [**piping schedule**].

* + - * 1. Fittings:

Material: [**ASTM A48, gray iron**] [**AWWA C110, ductile iron**] [**AWWA C153, ductile iron**].

[**Class**] [**Pressure Rating**]: [**Same as that of connected piping**] [**As indicated on Drawings**] [**As indicated on piping schedule**].

Mechanical Joints:

Comply with AWWA C110 and AWWA C111.

Glands: [**Ductile**] [**Gray**] iron with [**asphaltic**] <**\_\_\_\_\_\_\_\_**> coating.

Push-on Joints: Comply with AWWA C111.

Restrained Joints: Comply with AWWA C111.

Flanged Fittings: Comply with [**AWWA C110**] [**ASME B16.1**].

* + - * 1. Cement-Mortar Lining:

Comply with AWWA C104.

Thickness: [**Standard**] [**Double**].

* + - * 1. Outside Coating:

Buried Service:

Type: Asphaltic.

Thickness: [**0.04**] <**\_\_\_\_\_\_\_\_**> inch.

* + - 1. ACCESSORIES
         1. Jackets:

Description:

Material: Polyethylene.

Comply with AWWA C105.

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

Description:

Double-layer, half-lapped polyethylene tape.

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

* + - * 1. Gaskets: [**Rubber**] <**\_\_\_\_\_\_\_\_**>.
      1. SOURCE QUALITY CONTROL
         1. Provide shop inspection and testing of completed assembly.

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

* + - * 1. Director’s Inspection:

Make completed piping components available for inspection at manufacturer's factory prior to packaging for shipment.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspection is allowed.

* + - * 1. Director’s Witnessing:

Allow witnessing of factory inspections and test at manufacturer's test facility.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspections and tests are scheduled.

Include following Paragraph if reliance on manufacturer's approved quality-control program is sufficient for Project requirements.

* + - * 1. Certificate of Compliance:

If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

Specified shop tests are not required for Work performed by approved manufacturer.

1. EXECUTION
   * + 1. 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 flange mate properly.
       2. PREPARATION
          1. Thoroughly clean pipe and fittings before installation.
          2. Surface Preparation:

Clean surfaces to remove loose rust, mill scale, and other foreign substances by [**power wire brushing**] [**commercial sand blasting; SSPC SP 6**].

Solvent-clean surfaces that are not shop primed.

* + - 1. INSTALLATION
         1. Exposed Service Piping:

According to ASME B31.3.

Run piping straight along alignment as indicated on [**Shop**] Drawings, with minimum number of joints.

* + - * 1. Fittings:

According to manufacturer instructions.

Clean gasket seats thoroughly, and wipe gaskets clean prior to installation.

Tighten bolts progressively, drawing up bolts on opposite sides until bolts are uniformly tight; use torque wrench to tighten bolts to manufacturer instructions.

Provide required upstream and downstream clearances from devices as indicated on Drawings.

* + - * 1. Make taps to ductile iron piping only with service saddle, tapping boss of a fitting or valve body, or equipment casting.
        2. Install piping with sufficient slopes for venting or draining liquids and condensate to low points.
        3. Provide expansion joints as specified in Section 400506 - Couplings, Adapters, and Specials for Process Piping to compensate for pipe expansion due to temperature differences.
        4. Dielectric Fittings: Provide between dissimilar metals.
        5. Field Cuts: According to pipe manufacturer instructions.
        6. Provide cathodic protection [**where indicated on Drawings**] for buried ferrous piping systems, as specified in Section [**404642 - Cathodic Process Corrosion Protection**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

\*\*\*\*\*\* [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.
      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 piping 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 minimum [**two**] <**\_\_\_\_\_\_\_\_**> hours.

Filling:

Fill section to be tested with water slowly and 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 and retest.

Leakage:

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.

\*\*\*\*\*\* [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.
      1. CLEANING
         1. Keep pipe interior clean as installation progresses.
         2. After installation, clean pipe interior of soil, grit, and other debris.

END OF SECTION 400519