CITY OF FORT WAYNE MASTER UPDATED: 1/5/15

SECTION

Ductile Iron Non-Pressure Utility Piping

NTS: This section covers non-pressurized ductile iron pipe for open cut excavation for gravity sanitary and storm applications. If project requires restraint joint pipe and mechanical joints use Section 33 05 33 Ductile Iron Utility Piping.

Coordinate this section with applicable requirements of Division 33 installation. Installation and jointing methods are included in the applicable utility piping installation section. Trenching and backfill information is in 31 00 05 Trenching and Earthwork.

Portions of this section contain detailed descriptive requirements of the product(s) of the named manufacturer(s). If the product of another manufacturer is to be included (where named) as acceptable, this section may require editing.

1. GENERAL
	1. DESCRIPTION
		1. Scope:
			1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install ductile iron pipe and fittings as shown and specified.
		2. Coordination:
			1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with, or before, the ductile iron utility pipe Work.
			2. As required, notify other contractors in advance of installing ductile iron pipe Work to provide other contractors with sufficient time for installing items included in their contracts that are to be installed, with or before, ductile iron utility pipe Work.
		3. Related Sections:

NTS: List below only sections covering products, construction, and equipment specifically identified in this section and specified in another section and directly referenced in this specification. Do not list administrative and procedural Division 01 sections. Insert at (--1--) the number and name of the Division 33 installation section or any other referenced sections.

* + - 1. Section 31 00 05, Trenching and Earthwork.
			2. Section (--1--).

NTS: Section “1.2” is to be included if project is bid on unit price basis. Section to be deleted or revised if project is to be bid on lump sum basis.

* 1. MEASUREMENT AND PAYMENT

NTS: Insert at (--1--), (--2--) and (--3--) below the various ductile iron pipe types and diameters to be used for project. Adjust Section “1.2” below for additional work item numbers as needed. In extreme cases consider separating the work items by diameter and depth.

* + 1. Ductile Iron Utility Piping
			1. Work Item Number and Title

**33 05 33.13-A (--1--) Ductile Iron Non-Pressure Utility Piping**

**33 05 33.13-B (--2--) Ductile Iron Non-Pressure Utility Piping**

**33 05 33.13-C (--3--) Ductile Iron Non-Pressure Utility Piping**

* + - 1. The quantity of ductile iron pipe installed shall be the number of linear feet actually installed, backfilled and tested, as measured from outside wall of structure to structure, as measured along the centerline of the pipe.
			2. The payment of ductile iron pipe shall be based on the unit price per linear foot as listed on the submitted Bid schedule for each pipe size successfully installed. Payment for any associated restoration shall be paid for under its respective Work item.
			3. These Work items shall include all costs to furnish all labor, materials, tools, and equipment, both permanent and temporary, to install the non-pressure ductile iron pipe as shown and specified. The Work includes, but is not limited to, trench excavation, dewatering, furnishing and placement of bedding, pipe, polyethylene encasement, placement of required backfill, disposing of excess excavated material, required fittings, testing of materials, compaction of bedding and backfill, temporary sheeting, shoring and bracing, restoration/replacement of all disturbed items not included under other Work items, protection of existing utilities and structures, pressure testing and incidentals for performing all Work as specified unless otherwise provided for as a separate Work item.
	1. REFERENCES

NTS: Retain applicable standards and add/delete as required for materials.

* + 1. Standards referenced in this Section are listed below:
			1. ASTM International.
				1. ASTM D5162, Practice for Discontinuity (Holiday) Testing of Non-Conductive Protective Coating on Metallic Substrates.
				2. ASTM G14, Test Method for Impact Resistance of Pipeline Coatings (Falling Weight Test).
			2. American Water Works Association.
				1. AWWA C104, Cement‑Mortar Lining for Ductile Iron Pipe and Fittings for Water.
				2. AWWA C105, Polyethylene Encasement for Ductile-Iron Pipe Systems.
				3. AWWA C110, Ductile Iron and Gray Iron Fittings.
				4. AWWA C111, Rubber‑Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
				5. AWWA C116, Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile Iron and Gray Iron Fittings.
				6. AWWA C150, Standard for Thickness Design of Ductile Iron Pipe.
				7. AWWA C151, Ductile Iron Pipe, Centrifugally Cast.
			3. The Society for Protective Coatings.
				1. SSPC Painting Manual, Volume 1, Para. XIV.
				2. SSPC PA 2, Measurement of Dry Coating Thickness with Magnetic Gages.
			4. National Association of Corrosion Engineers.
				1. NACE RP0188, Discontinuity (Holiday) Testing of Protective Coatings.
	1. QUALITY ASSURANCE

NTS: Edit or delete Paragraph “A” below, if project requirements prohibit using an experience clause. Edit experience requirements to suit the project and delete inapplicable paragraphs.

* + 1. Manufacturer’s Qualifications:
			1. Manufacturer shall have a minimum of 5 years successful experience producing ductile iron pipe and fittings and shall be able to show evidence of at least 5 installations in satisfactory operation in the United States that are similar applications to the specified service.
			2. Lining and coating products shall be manufactured by a firm with a minimum of 5 years successful experience in protecting pipelines exposed to the specified service conditions and shall be able to show evidence of at least 5 installations in satisfactory operation in the United States that are similar applications to the specified service.

NTS: Edit or delete Paragraph “3” below, if not required. Paragraph “3” are intended for non-standard linings and coatings (i.e., other than cement-mortar or paint). If project does require a non-standard lining/coating consider requiring a warranty from the manufacturer on the non-standard lining/coating.

* + - 1. When not applied by the manufacturer, lining and coating Subcontractor shall have a minimum of 5 years successful experience in the application of the specified linings and coatings for similar applications for the specified service, and shall be able to show evidence of at least 5 installations in satisfactory operation in the United States.
		1. Component Supply and Compatibility:
			1. Ductile iron pipe manufacturer shall review and approve or prepare all Shop Drawings and other submittals for pipe, fittings, and appurtenances furnished under this Section.
			2. Pipe, fittings, and appurtenances shall be suitable for the specified service and shall be integrated into overall piping system by ductile iron pipe manufacturer.
			3. Ductile iron pipe manufacturer shall be responsible for all products and all factory-applied linings and coatings, whether installed at pipe manufacturer’s facility or at manufacturer’s Supplier’s facility.
	1. SUBMITTALS
		1. Action Submittals: Submit the following:
			1. Product Data:
				1. Submit product data for pipe, fittings, gaskets, appurtenances, linings, and coatings.

NTS: Edit or delete Paragraphs “b” through “3” below, if not required. Paragraph “b” and 3 are intended for non-standard linings and coatings (i.e., other than cement-mortar or paint)

* + - * 1. Surface preparation and application reports and procedures as required for lining and coating of pipe and fittings. Ductile iron pipe and fitting manufacturer and manufacturer and applicator of lining and coating, as specified, shall mutually determine recommended surface preparation and application methods, and provide written verification of mutually selected method in the submittals.
			1. Samples:
				1. Submit Sample of pipe and fitting with each type of lining, for use at the Site to verify continuity, surface gloss, and color, as applicable, via visual inspection.
			2. Test Procedures:
				1. For linings and coatings in pipe and fittings as requested by Engineer.
		1. Informational Submittals: Submit the following:
			1. Certificates:
				1. Submit manufacturer’s certificate of compliance with standards referenced in this section.
				2. Submit certificate signed by applicator of the linings and coatings, if other than pipe manufacturer, stating that product to be applied conforms to applicable referenced standards and that the applicator shall conform to the Contract Documents.
			2. Source Quality Control Submittals:
				1. When requested by Engineer submit results of specified shop tests for pipe, fittings, linings, and coatings.
				2. When requested by Engineer submit lining and coating test coupons.
	1. DELIVERY, STORAGE, AND HANDLING
		1. Ship and store in accordance with manufacture’s recommendations.
		2. Inspect all materials during unloading process.
		3. Notify Owner of any cracked, flawed or otherwise defective material.
		4. Remove all materials from the Site that are found to be unsatisfactory.
		5. Comply with Section 01 65 00 Product Delivery Requirements and Section 01 66 00 Product Storage and Handling Requirements.
1. PRODUCTS

NTS: For City of Fort Wayne Sanitary projects ductile iron pipe is typically used for a minimum pipe size of 8” and a maximum of 60”. For City of Fort Wayne Storm projects ductile iron pipe is typically used for a minimum pipe size of 12” and a maximum pipe size of 64”.

* 1. MATERIALS
		1. General:
			1. Piping systems shall be suitable for their intended use.

NTS: Coordinate Contract Drawings with Section 2.1.A.2 below. The location and type of joint required shall be clearly stated on the Contract Drawings.

* + - 1. Joints shall be as specified in the Contract Documents. If not specified, push‑on or mechanical joints for buried piping. Provide couplings on pipe with plain or grooved ends where shown or where approved by Engineer.

NTS: Retain paragraph “a.” and delete paragraph “b” unless project requires a specific class. For project specific class delete paragraph “a” and insert at (--1--) the specific pipe class.

* + 1. Ductile Iron Pipe, Joints, and Fittings:
			1. Non-Flanged Pipe: Conform to AWWA C151 for material, pressure, dimensions, tolerances, tests, markings, and other requirements.
				1. Pressure Class:

8 inch diameter through 12 inch diameter shall be a minimum Pressure Class 350 in accordance with AWWA C150.

Larger than 12 inch diameter shall be a minimum Pressure Class 250 in accordance with AWWA C150.

* + - * 1. Special Thickness Class: (--1--).
			1. Pipe Joints:

NTS: Coordinate gaskets with desired pressure rating. Gaskets specified below are for a pressure rating of 250 psi. For higher pressure ratings, specify special gaskets. Information on gasket suitability is online at: [http://www.dipra.org/pdf/gasketsfordip.pdf.](http://www.dipra.org/pdf/gasketsfordip.pdf.%20google.com)

Gaskets: Unless otherwise specified, gaskets shall be at least 1/8 inch thick, ring or full-face as required for the pipe, of synthetic rubber compound containing not less than 50 percent by volume nitrile or neoprene, and shall be free from factice, reclaimed rubber, and other deleterious substances. Gaskets shall be suitable for the service conditions specified, specifically designed for use with ductile iron pipe and fittings.

NTS: Grooved end joints (couplings) are available in four-inch through 24-inch diameter. When used, pipe thickness shall be STCL 53 for four-inch through 16-inch diameter, STCL 54 for 18-inch, STCL 55 for 20-inch, and STCL 56 for 24-inch diameter in accordance with ANSI/AWWA C151. Coordinate required thicknesses with the piping schedules.

* + - * 1. Push‑On Joints: Comply with AWWA C111 and AWWA C151, capable of meeting pressure class or special thickness class, and test pressure specified.

Gaskets: Vulcanized SBR, unless otherwise specified.

Stripes: Each plain end shall be painted with a circular stripe to provide a guide for visual check that joint is properly assembled.

Products and Manufacturers: Provide one of the following:

Tyton or Fastite Joint by Clow Water Systems, Atlantic States Cast Iron Pipe Company, Canada Pipe Company, Ltd., McWane Cast Iron Pipe Company, Pacific States Cast Iron Pipe Company, and Griffin Pipe Products Company.

Fastite Joint by American Cast Iron Pipe Company.

Tyton Joint by U.S. Pipe and Foundry Company.

Or equal.

NTS: When space available for installation prevents using fittings with normal laying lengths (ANSI/AWWA C110), consider using ductile iron compact fittings (ANSI/AWWA C153), standard for which currently covers up to 64-inch diameter. Note, compact fittings are available with MJ ends in three-inch through 48-inch diameter, and flanged or push-on joint ends in 54-inch through 64-inch diameter, however, the pressure rating of 54-inch through 64-inch is 150 psi. Compact fittings are normally used for pressurized water supply piping, and can be used for wastewater piping.

* + - 1. Push-On Joint Fittings: Comply with AWWA C110 and AWWA C111.
				1. Material: Ductile iron.
				2. Pressure rating of fittings shall meet, but not exceed, specified pressure rating or special thickness class of the connected pipe.

NTS: Edit or delete Paragraphs “C” or “D” below as required.

NTS: Unless otherwise specified, cement-mortar lining will be provided by manufacturer with a bituminous seal-coat as standard. Seal coat is generally intended for soft water applications that may react with the cement mortar lining to degrade drinking water quality. Services for which cement-mortar lining are commonly used are listed online at: [http://www.dipra.org/pdf/liningsfordip.pdf](http://www.dipra.org/pdf/liningsForDIP.pdf). Consider alternate lining for services involving abrasives, fluid temperatures above 150 degrees F (212 degrees F without seal coat), pH levels below 4 and above 12 (6 and 12 without seal coat), acids, industrial recycle wastes, chemicals, and scum and grease lines.

* + 1. Cement-mortar Lining:
			1. Where specified in piping schedules included in Contract Drawings, pipe and fittings shall be lined with bituminous seal coated cement‑mortar lining in accordance with AWWA C104.
	1. MARKING FOR IDENTIFICATION
		1. Stamp, mark, and identify push-on joint and mechanical joint pipe with:
			1. Name or trademark of manufacturer.
			2. Weight, class or nominal thickness, and casting period.
			3. Country where cast.
			4. Year the pipe was produced.
			5. Letters “DI” or “Ductile” shall be cast or metal stamped
			6. Pipe Size
		2. Stamp, mark, and identify fittings with:
			1. Manufacturer’s identification.
			2. Pressure rating.
			3. Nominal diameters of openings.
			4. Country where cast.
			5. Letters “DI” or “Ductile” cast on them.
	2. EXTERIOR SURFACE PREPARATION AND COATINGS
		1. Buried Pipe and Fittings:
			1. Asphaltic Coating: Coat pipe and fittings with an asphaltic coating approximately 1 mil thick, in accordance with AWWA C151, AWWA C115, AWWA C110, and AWWA C153, as applicable.

NTS: Edit or delete Paragraph “2” below as required. Fusion bonded epoxy coating is typically used in above ground applications or corrosive soil or sewage applications and where cathodic disbondment protection is required. Consider after performing soils investigation.

* + - 1. Fusion Bonded Epoxy Coating for Fittings:
				1. When specified, fittings shall be factory coated with 100 percent solids, thermosetting, dry powder epoxy, in conformance with AWWA C116.
				2. Apply coating utilizing a method, recommended by manufacturer that meets requirements of this Section, with finished dry film thickness of at least 6 mils, with exception of joint areas, which shall receive at least a 4 mil dry film thickness coating. Heat and cure fittings in accordance with coating manufacturer’s recommendations.
				3. Source Quality Control: Cut a test coupon from coated fitting no less than 6 inches in diameter, and approximately four inches long, and split coupon lengthwise into 2 equal sections. Surface preparation, application procedure, thickness, and curing parameters shall be the same for test coupon as for Project fittings. Perform the following tests on test coupon:

Scribe coating material through to bare surface of fitting with an “X” across full length of test coupon. Immerse coupon for 500 hours in 150 degree F bath of distilled water. Coating shall show no signs of disbondment or blistering.

Test coupon shall be impact tested using ASTM G14 test method with 20 inch pound impact applied near center of convex section of test coupon. Coating shall show no signs of cracking or disbondment without magnification.

* + - * 1. Manufacturer’s Inspection and Certification:

All coated fittings shall be visually inspected by manufacturer and show no sign of blisters, cracks, or lack of coverage.

Check all coated fittings for coating thickness using magnetic film thickness gage utilizing method outlined in SSPC PA 2 Film Thickness Rating.

Holiday-test all coated fittings in accordance with ASTM D5162, NACE RP0188, and SSPC Painting Manual Volume 1, Paragraph XIV, with low-voltage, wet sponge holiday detector. Repair methods and materials for holidays shall be as recommended by coating manufacturer and made prior to shipment to the Site.

* + - * 1. Products and Manufacturers: Provide one of the following:

PipeClad 1500, by Valspar Corporation.

Or equal.

* 1. POLYETHYLENE ENCASEMENT
		+ 1. Supply polyethylene in tubes or sheets.
			2. Provide polyethylene encasement for ductile iron piping to prevent contact between pipe and surrounding bedding material and backfill.
			3. Polyethylene encasement materials shall be in accordance with AWWA C105.
	2. SOURCE QUALITY CONTROL
		1. Shop Tests:
			1. Pipe manufacturer shall maintain continuous quality control program.
			2. Where applicable and when requested by Engineer, submit results of source quality control tests specified in reference standards.
1. EXECUTION
	1. INSPECTION
		1. Inspect pipe materials for defects in material and workmanship. Verify compatibility of pipe and fittings.
	2. INSTALLATION
		1. Buried Piping Installation
			1. Refer to the applicable Division 33 piping installation section.
		2. Bedding and Backfill
			1. Refer to Section 31 00 05 Trenching and Earthwork
	3. POLYETHYLENE ENCASEMENT
		1. Provide polyethylene encasement for ductile iron piping to prevent contact between pipe and surrounding bedding material and backfill.
		2. Polyethylene encasement installation shall be in accordance with AWWA C105.
		3. Lumps of clay, mud, cinders etc. on the pipe surface shall be removed prior to installation of the polyethylene encasement.
		4. Polyethylene film shall be fitted to the contour of the pipe creating a snug, but not tight, encasement with the minimum space between the polyethylene and the pipe. Sufficient slack shall be provided in contouring to prevent stretching the polyethylene where it bridges irregular surfaces, such as, bell-spigot interfaces, bolted joints or fittings and to prevent damage to the polyethylene caused by backfilling operations.
		5. Overlaps and ends shall be secured with adhesive tape of plastic tie straps.
		6. Installations below the water table tube-form polyethylene should be used with both ends thoroughly sealed with adhesive tape or plastic tie straps at the joint overlaps.
		7. Circumferential wraps of tape shall be placed at 2 foot internals along the barrel of the pipe.

NTS: Coordinate article “3.4” below with project specific testing requirements listed within the appropriate installation Section. Insert at (--1--) below either, 33 11 00, Water Piping Installation, 33 31 00, Sanitary Sewer Piping Installation, and/or 33 41 00, Storm Utility Piping Installation.

* 1. FIELD QUALITY CONTROL
		1. Complete pipe-testing requirements in accordance with Section (--1--).

+ + END OF SECTION + +