

SECTION 40 27 00.01 CEMENT-MORTAR, CERAMIC-EPOXY, AND GLASS-LINED DUCTILE IRON PIPE AND FITTINGS	
Item	Description
General/Pipe	Physical Characteristics: Pipe manufacturer shall submit certification that source manufacturing facility has been producing ductile iron pipe of specified diameters, dimensions, and standards for a period of not less than 10 years. Functional Characteristics: Service Flow Streams on Piping Schedule as shown on the Drawings. Performance Characteristics: Buried Liquid Service Using Push-on or Proprietary Restrained Joints: AWWA C111/A21.11, and AWWA C151/A21.51, pressure class conforming to Table 3 and Table 5 for Type 4 trench, 250 psi minimum working pressure. Follower glands shall be ductile iron. Exposed Pipe Using Grooved End and Flange Joints: AWWA C115/A21.15, thickness Class 53 minimum, 250 psi minimum working pressure. Testing of pipe required by AWWA C151/A21.51 shall be conducted in testing and laboratory facilities located in the USA and operating under USA laws and regulations. Pipe shall be handled during manufacture and shipped without nesting (without insertion of one pipe inside another).

SECTION 40 27 00.01 CEMENT-MORTAR, CERAMIC-EPOXY, AND GLASS-LINED DUCTILE IRON PIPE AND FITTINGS	
Item	Description
Lining	Physical Characteristics: Cement-mortar: Comply with AWWA C104/A21.4. Ceramic Epoxy: Pipe and fittings to be ceramic-epoxy lined shall not have been previously lined. Surface preparation shall be made to surfaces free of grease, oil, or other substance with abrasive blasting using clean sand or grit abrasive. Lining shall be done within 8 hours of surface preparation and surfaces shall be reblasted if rusting appears before lining. Line with a total dry film thickness of 40 mils of ceramic epoxy. Ceramic epoxy shall be amine-cured Novolac epoxy with 20 percent minimum volume ceramic quartz pigment, Protecto 401 by Induron Coating, or-equal, for sewer service. Lining shall be applied above 40 degrees F ambient temperature and shall not be applied to flange faces. Lining thickness shall be tested using a magnetic film thickness gauge. Lining integrity shall be tested on surfaces with a nondestructive, 2,500-volt dielectric resistance test. Glass: ASTM B1000. Functional Characteristics: None. Performance Characteristics: None.
Coating	Exposed, Encased and Submerged: See the Piping Schedule on the Drawings for coating system requirements. Buried: Physical Characteristics: Provide buried pipe and fittings with factory applied zinc metalizing (200 grams/cubic meter) base coat and standard asphaltic topcoat. Functional Characteristics: None. Performance Characteristics: Zinc coating shall conform to ISO 8179-1, Ductile Iron Pipes-External Zinc-based Coating-Part 1: Metallic Zinc with Finishing Layer.

SECTION 40 27 00.01 CEMENT-MORTAR, CERAMIC-EPOXY, AND GLASS-LINED DUCTILE IRON PIPE AND FITTINGS	
Item	Description
Fittings	Physical Characteristics: Lined and coated same as pipe. Functional Characteristics: None. Performance Characteristics: Push-on: AWWA C110/A21.10, AWWA C111/A21.11, and AWWA C153/A21.53 ductile iron, 250 psi minimum working pressure. Manufacturers and Products: U.S. Pipe and Foundry, Tyton Joint. Or equal. Mechanical: AWWA C110/A21.10, AWWA C111/A21.11, and AWWA C153/A21.53 ductile iron, 250 psi minimum working pressure. Follower glands shall be ductile iron. Proprietary Restrained: AWWA C110/A21.10, AWWA C111/A21.11, and AWWA C153/A21.53, ductile iron, 250 psi minimum working pressure. Restraint shall be achieved with removable metal elements fitted between a welded bar on the pipe barrel and the inside of the joint bell or fitting sizes smaller than 16 inches may be mechanical joint, restrained by anchor gland followers, ductile iron anchor type, wedge action, with break-off tightening bolts. Assembled joints shall be rated for deflection in operation at rated pressure. Rated deflection shall be not less than 1-1/2 degrees for 36-inch and smaller pipe. Rated deflection shall be not less than 1/2 degree for 42-inch and larger pipe. Restrained joints relying on metal teeth molded into the gasket to prevent joint separation under pressure will not be accepted. Manufacturers and Products: U.S. Pipe and Foundry. Or equal. Grooved End: AWWA C606 and AWWA C110/A21.10, ductile iron, 250 psi minimum working pressure. Manufacturers and Products: Victaulic. Or equal.

SECTION 40 27 00.01 CEMENT-MORTAR, CERAMIC-EPOXY, AND GLASS-LINED DUCTILE IRON PIPE AND FITTINGS	
Item	Description
	Flange: AWWA C110/A21.10 ductile iron, faced and drilled, Class 125 flat face or ASME B16.1, Class 250 raised face. Gray cast iron will not be allowed.
Joints	Physical Characteristics: Lined and coated same as pipe. Functional Characteristics: Buried Liquid: Using Push-on or Proprietary Restrained Joints. Or equal. Performance Characteristics: Push-on: 250 psi minimum working pressure, AWWA C110/A21.10 and AWWA C111/A21.11. Manufacturers and Products: U.S. Pipe and Foundry, Tyton Joint. Or equal. Mechanical: 250 psi minimum working pressure. Proprietary Restrained: 150 psi minimum working pressure. Manufacturers and Products: U.S. Pipe, TR Flex. Or equal. Grooved End: Rigid type radius cut conforming to AWWA C606, 250 psi minimum working pressure. Manufacturers and Products: Victaulic. Or equal. Flange: Dimensions per AWWA C110/A21.10 flat face, or ASME B16.1 Class 250 raised face, ductile iron, threaded conforming to AWWA C115/A21.15. Gray cast iron will not be allowed. Branch connections 3 inches and smaller, except from glass-lined pipe, shall be made with service saddles as specified in Section 40 27 01, Process Piping Specialties. Branch connections, 3 inches and smaller from

SECTION 40 27 00.01 CEMENT-MORTAR, CERAMIC-EPOXY, AND GLASS-LINED DUCTILE IRON PIPE AND FITTINGS	
Item	Description
	glass-lined pipe shall be made with glass-lined tee with a flanged branch for adapting to branch piping.
Couplings	Physical Characteristics: Lined and coated same as pipe. Functional Characteristics: None. Performance Characteristics: Grooved End: 250 psi minimum working pressure, malleable iron per ASTM A47/A47M or ductile iron per ASTM A536. Manufacturers and Products: Victaulic. Or equal. Grooved End Adapter Flanges: 250 psi minimum working pressure, malleable iron per ASTM A47/A47M or ductile iron per ASTM A536. Manufacturers and Products: Victaulic. Or equal.
Bolting	Physical Characteristics: Mechanical, Proprietary Restrained, and Grooved End Joints: Manufacturer's standard. Functional Characteristics: None. Performance Characteristics: Flanged: ASTM A307, Grade B carbon steel heavy hex head or stud bolts, ASTM A563, Grade A carbon steel heavy hex head nuts and ASTM F436 hardened steel washers at nuts and bolt heads. Stud bolts are not allowed when bolting to tapped flanges. Torque bolts per gasket manufacturer recommendations. Flanged Joints in Sumps, Wet Wells, and Submerged and Wetted Installations: Type 316 stainless steel, ASTM A320/A320M, Grade B8M heavy hex head or stud bolts; ASTM A194/A194M, Grade 8M heavy hex nuts and ASTM F436 Type 3 alloy washers at nuts and bolt heads. Stud bolts are not allowed when bolting to tapped flanges. Torque bolts per gasket manufacturer recommendations.
Gaskets	Physical Characteristics:

SECTION 40 27 00.01 CEMENT-MORTAR, CERAMIC-EPOXY, AND GLASS-LINED DUCTILE IRON PIPE AND FITTINGS	
Item	Description
	Manufacturer's standard. Full face for flat-faced flanges, flat-ring type for raised-face flanges. Blind flanges shall be epoxy-lined in accordance with the system specified above. Functional Characteristics: None. Performance Characteristics: General: Gaskets in contact with potable water shall be NSF ANSI 61 certified. Push-on, Mechanical, and Proprietary Restrained Joints; Water and Sewage Service: Halogenated butyl or EPDM, Shore A hardness durometer 60, conforming to AWWA C111/A21.11. Push-on, Mechanical, and Proprietary Restrained Joints; Hot Air Service: EPDM or FKM (Fluoro-Elastomer), Shore A hardness durometer 60, conforming to AWWA C111/A21.11. Grooved End Joints: Halogenated butyl conforming to ASTM D2000 and AWWA C606. Flanged Water and Sewage Services: 1/8-inch-thick, homogeneous black rubber (EPDM), hardness 60-80 (Shore A), rated to 275 degrees F, conforming to ASME B16.21 and ASTM D2000. Gasket pressure rating to equal or exceed the system hydrostatic test pressure, see Piping Schedule as shown on the Drawings.
Joint Lubricant	Physical Characteristics: Manufacturer's standard. Functional Characteristics: None. Performance Characteristics: None.

END OF SECTION