

SECTION 02618

CENTRIFUGALLY CAST FIBERGLASS PIPE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Centrifugally Cast Fiberglass Reinforced Plastic (FRP) Pipe for sanitary sewers.

1.02 UNIT PRICES

- A. No payment will be made for fiberglass pipe under this Section. Include in unit price for Section 02730 - Gravity Sanitary Sewers or Section 02731 - Sanitary Sewage Force Mains.

1.03 SUBMITTALS

- A. Conform to requirements of all provisions and sections of these specifications.
- B. Provide sufficient data for the Owner's Representative to properly evaluate the pipe.
- C. Product data submittals shall include the following, as a minimum:
 - 1. Details of the proposed pipe.
 - 2. Properties and strengths of the pipe.
 - 3. Details of pipe joint.
 - 4. Pipe design analysis.
 - 5. Instruction on storage, handling, transporting, and installation.
 - 6. Standard catalog sheets.
- D. Test Reports: Provide test reports upon request, certifying that the pipe has been tested in accordance with and exceeds minimum requirements of ASTM D 3262 and ASTM D 3681.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Preapproved manufacturers for centrifugally cast fiberglass pipe is Hobas Pipe USA, Inc., Ameron FCPD or approved equal.

2.02 MATERIALS

- A. Resin Systems: The manufacturer shall use only polyester resin systems with a proven history of performance in this particular application. The historical data shall have been collected from applications of a composite material of similar construction and composition as the proposed product.
- B. Glass Reinforcements: The reinforcing glass fibers used to manufacture the components shall be of highest quality commercial grade glass filaments with binder and sizing compatible with impregnating resins.
- C. Fillers: Silica sand or other suitable materials may be used.
- D. Additives: Resin additives, such as pigments, dyes, and other coloring agents, if used, shall in no way be detrimental to the performance of the product nor shall they impair visual inspection of the finished products.
- E. Rubber Gaskets: Supply from an approved gasket manufacturer in accordance with ASTM F 477, when no contaminant is identified and suitable for the service intended. Gaskets shall either be affixed to the pipe by means of a suitable adhesive or shall be installed in such a manner so as to prevent the gasket from rolling out of the pre-cut groove in the pipe or sleeve coupling. When pipe is to be installed in potentially contaminated areas as shown on the plans or identified in the field by the Owner’s Representative, especially where free product is found near the elevation of the proposed sewer, provide the following gasket materials for the noted contaminants.

CONTAMINANT	GASKET MATERIAL REQUIRED
Petroleum (diesel, gasoline)	Nitrile Rubber
Other Contaminants	As recommended by the pipe manufacturer

- F. The internal liner resin shall be suitable for service as sewer pipe, and shall be highly resistant to exposure to sulfuric acid as produced by biological activity from hydrogen sulfide gases. Pipe shall meet or exceed requirements of ASTM D 3681.

2.03 MANUFACTURE AND CONSTRUCTION

- A. Pipes
 - 1. Furnish pipes in the diameters specified and within the tolerances specified below.
 - 2. Manufacture pipe by the centrifugal casting process to result in a dense, nonporous, corrosion-resistant, consistent composite structure to meet the operating conditions as shown on the Drawings.
 - 3. Do not use stiffening ribs or rings.
- B. Couplings: Unless otherwise specified, the pipe shall be field connected with fiberglass sleeve couplings that utilize elastomeric sealing gaskets as the sole means to maintain joint watertightness. The joints must meet the performance requirements of ASTM D 4161.
- C. Fittings: Flanges, elbows, reducers, tees, and other fittings shall be capable of withstanding operating conditions when installed. They may be contact molded or manufactured from mitered sections of pipe joined by glass fiber reinforced overlays.
- D. Manhole Connections: Provide a water stop flange (wall pipe) for connection to a cast-in-place manhole base or other structure.
- E. Grout Ports: Provide grout ports in the wall of pipe when required by Section 02330 - Tunnel Grout. Provide plugs of 316 stainless steel or other corrosion-resistant material compatible with the pipe. Grout port plugs shall be designed and installed to meet the test pressure of the pipe.

2.04 DIMENSIONS

- A. Diameters: The actual outside diameter of the pipes shall be in accordance with Table 3 of ASTM D 3262 for gravity sewers, or ASTM D 3754 for force mains.
- B. Lengths: The pipe standard length will be approximately 20 feet. A maximum of 10 percent of the lengths, excluding special order pipes, may be supplied in random lengths.
- C. Wall Thickness: The minimum average wall thickness shall be the stated design thickness. The minimum single point thickness shall not be less than 90 percent of the stated design thickness.
- D. End Squareness: Pipe ends shall be square to the pipe axis.

- E. Tolerance of Fittings: The tolerance of the angle of an elbow and the angle between the main and leg of a wye or tee shall be plus or minus 2 degrees. The tolerance on the laying length of a fitting shall be plus or minus 2 inches.

2.05 STIFFNESS CLASSES

- A. Stiffness class of FRP pipe shall satisfy design requirements, but shall not be less than 46 psi, when used in direct bury operation; 36 psi, when installed within a primary tunnel liner.
- B. Stiffness class of FRP in a pipe jacking operation shall be governed either by the ring deflection limitations or by a pipe design providing longitudinal strength required by the jacking method and shall satisfy design requirements stated below. Submit design calculations as required in Paragraph 1.04, Submittals.
 - 1. Ring deflection calculations shall conform with design requirements of 30 TAC Chapter 317.20 pertaining to flexible pipe used in gravity sewers. The pipe deflection calculations shall ensure that predicted deflection will be less than 5 percent under long-term loading conditions (soil prism load) for the highest density of soil overburden and surcharge loads. Deflection on calculations shall be prepared using long-term (drained) values for soil parameters contained in the geotechnical investigation report for the Project, or other site-specific data obtained by the Contractor as approved by the Owner's Representative.
 - 2. Pipe stress calculations based in jacking loads shall be performed to conform with Section 02312- Microtunneling and Pipe-Jacked Tunnels.

2.06 TESTING

- A. Pipes shall be tested in accordance with ASTM D 3262 or ASTM D 3754, as applicable, except that the factory hydrostatic pressure testing is not required.
- B. Joints: Coupling joints shall be qualified per the tests of Section 7 of ASTM D 4161.

2.07 CUSTOMER INSPECTION

- A. The Owner's Representative shall be entitled to inspect pipes or witness the pipe manufacturing. Such inspection shall not relieve the manufacturer of the responsibilities to provide products that comply with the applicable standards and these Specifications.

- B. Manufacturer's Notification to Customer: Should the Owner's Representative wish to see specific pipes during any phase of the manufacturing process, the manufacturer must provide the Owner's Representative with adequate advance notice of when and where the production of those pipes will take place.
- C. Failure to Inspect: Should the Owner's Representative elect not to inspect the manufacturing, testing, or finished pipes, it in no way implies approval of products or tests.

2.08 PACKAGING, HANDLING, AND SHIPPING

- A. Packing, handling, and shipping should be done in accordance with the manufacturer's instructions.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The installation of pipe and fittings shall be in accordance with requirements of Section 02730 - Gravity Sanitary Sewers and 02731 - Sanitary Sewage Force Mains.
- B. The manufacturer must supply a suitable qualified field service representative to be present periodically during the installation of pipe.
- C. Pipe Bedding: Conform to requirements of Section 02227 - Excavation and Backfill for Utilities.
- D. Pipe Handling: Use textile slings.
- E. Jointing
 - 1. Clean ends of pipe and coupling components.
 - 2. Check pipe ends and couplings for damage. Correct any damage found.
 - 3. Coupling grooves must be completely free of dirt.
 - 4. Apply joint lubricant to pipe ends and rubber seals of coupling. Use only lubricants approved by the pipe manufacturer.
 - 5. Use suitable auxiliary equipment, such as a wire rope puller, to pull joints together.

6. Do not exceed forces recommended by the manufacturer for coupling pipe. If excessive force is required, remove coupling, determine source of problem, and correct it.
 7. In the process of jointing the pipe, do not allow the deflection angle to exceed the deflection permitted by the manufacturer.
- F. If pressure grouting of the pipe is conducted as part of a pipe-jacked tunnel installation, seal the grout holes with liner resin to a thickness equal to the pipe liner thickness, or with a threaded plug for that purpose.
- G. Tests: Conform to requirements of Section 02732 - Acceptance Testing for Sanitary Sewers.

END OF SECTION