

CCFRPM Pipe for Tunnel Carrier Installation - Gravity Service

Part 1 General

1.01 Section Includes

- A. Centrifugally Cast Fiberglass Reinforced Polymer Mortar Pipe. (CCFRPM)

1.02 References

- A. ASTM D3262 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe.
- B. ASTM D4161 - Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals.
- C. ASTM D2412 - Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
- D. ASTM D3681 - Standard Test Method for Chemical Resistance of "Fiberglass" Pipe in a Deflected Condition.
- E. ASTM D638 - Test Method for Tensile Properties of Plastics.

1.03 Specifications

- A. The specifications contained herein govern, unless otherwise agreed upon between the purchaser and supplier.

Part 2 Products

2.01 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 acquired from 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 E-glass filaments with binder and sizing compatible with impregnating resins.
- C. Silica Sand: Sand shall be minimum 98% silica with a maximum moisture content of 0.2%.
- D. Additives: Resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally effect the performance of the product.
- E. Elastomeric Gaskets: Gaskets shall meet ASTM F477 and be supplied by qualified gasket manufacturers and be suitable for the service intended.

2.02 Manufacture and Construction

- A. Pipes: Manufacture pipe by the centrifugal casting process to result in a dense, nonporous, corrosion-resistant, consistent composite structure. The interior surface of the pipes exposed to sewer flow shall be manufactured using a resin with a 50% elongation (minimum) when tested in accordance with D638. The interior surface shall provide crack resistance and abrasion resistance. The exterior surface of the pipes shall be comprised of a sand and resin layer

which provides UV protection to the exterior. Pipes shall be Type 1, Liner 2, Grade 3 per ASTM D3262.

- B. Joints: Unless otherwise specified, the pipe shall be field connected with fiberglass sleeve couplings or bell-spigot joints, "flush" or "non-flush", that utilize elastomeric sealing gaskets as the sole means to maintain joint watertightness. The joints must meet the performance requirements of ASTM D4161. Joints at tie-ins, when needed, may utilize gasket-sealed closure couplings.
- C. Fittings: Flanges, elbows, reducers, tees, wyes, laterals and other fittings shall be capable of withstanding all operating conditions when installed. They may be contact molded or manufactured from mitered sections of pipe joined by glass-fiber-reinforced overlays. Properly protected standard ductile iron, fusion-bonded epoxy-coated steel and stainless steel fittings may also be used.
- D. Acceptable Manufacturer: HOBAS Pipe USA.

2.03 Dimensions

- A. Diameters: The actual outside diameter (18" to 48") of the pipes shall be in accordance with ASTM D3262. For other diameters, OD's shall be per manufacturer's literature.
- B. Lengths: Pipe shall be supplied in nominal lengths of 20 feet. When required by radius curves, pit size, or other limitations restrict the pipe to shorter lengths, nominal sections of 10 feet or other even divisions of 20 feet shall be used. Actual laying length shall be nominal +1, -4 inches. At least 90% of the total footage of each size and class of pipe, excluding special order lengths, shall be furnished in nominal length sections.
- C. Wall Thickness: The minimum wall thickness shall be the stated design thickness.
- D. End Squareness: Pipe ends shall be square to the pipe axis with a maximum tolerance of 1/8".

2.04 Testing

- A. Pipes: Pipes shall be manufactured and tested in accordance with ASTM D3262.
- B. Joints: Joints shall meet the requirements of ASTM D4161.
- C. Stiffness: Minimum pipe stiffness when tested in accordance with ASTM D2412 shall normally be 36 psi.
- D. Strain Corrosion: The extrapolated 50-year strain corrosion value shall not be less than 0.9% as determined in accordance with ASTM D3681 and ASTM D3262

2.05 Customer Inspection

- A. The Owner or other designated representative shall be entitled to inspect pipes or witness the pipe manufacturing.
- B. Manufacturer's Notification to Customer: Should the Owner request to see specific pipes during any phase of the manufacturing process, the manufacturer must provide the Owner with adequate advance notice of when and where the production of those pipes will take place.

2.06 Packaging, Handling, Shipping

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

Part 3 Execution

3.01 Installation

- A. Installation: The installation of pipe and fittings shall be in accordance with the project plans and specifications and the manufacturer's requirements (Section 14 E of the product brochure).
- B. Pipe Grouting: Annular space grouting shall not damage the liner and shall conform to the manufacturer's requirements (Section 14 E of product brochure).
- C. Pipe Handling: Use textile slings, other suitable materials or a forklift. Use of chains or cables is not recommended.
- D. Jointing:
 1. Clean ends of pipe and coupling components.
 2. Apply joint lubricant to pipe ends or bell interior surfaces and the elastomeric seals. Use only lubricants approved by the pipe manufacturer.
 3. Use suitable equipment and end protection to push or pull the pipes together.
 4. Do not exceed forces recommended by the manufacturer for joining or pushing pipe.
 5. Join pipes in straight alignment then deflect to required angle. Do not allow the deflection angle to exceed the deflection permitted by the manufacturer.
- E. Field Tests
 1. Infiltration / Exfiltration Test: Maximum allowable leakage shall be per local specification requirements.
 2. Low Pressure Air Test: Each reach may be tested with air pressure (max 5 psi). The system passes the test if the pressure drop due to leakage through the pipe or pipe joints is less than or equal to the specified amount over the prescribed time period.
 3. Individual Joint Testing: For pipes large enough to enter, individual joints may be pressure tested with a portable tester to 5 psi max. with air or water in lieu of line infiltration, exfiltration or air testing.
 4. Deflection: Maximum allowable long-term deflection is normally 5% of the initial diameter.

