# POLYMER CONCRETE MANHOLES

## PART 1 – GENERAL

### 1.1 SUMMARY

A. This specification shall govern for the furnishing of all work necessary for installation of polymer concrete manholes to be constructed.

### 1.2 REFERENCES

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| A. | ASTM D 6783 | Standard specification for polymer concrete pipe |
| B. | ASTM C 478 | Standard specification for precast reinforced concrete manhole sections |
| C. | ASTM C 443 | Standard specification for joints for concrete pipe and manholes using rubber gaskets |
| D. | ASTM C 923 | Standard specification for resilient connectors between reinforced concrete manholes structures, pipes, and laterals |
| E. | ASTM C 33 | Standard specification for concrete aggregates |
| F. | ASTM C 497 | Standard test methods for concrete pipe, manhole sections, or tile |

### 1.3 SUBMITTALS

A. Submittals shall be made before or at the Pre-Construction Meeting.

B. Submit shop drawings for each manhole. Drawings shall include manhole number, location, rim and invert elevations, dimensions, reinforcing details, joint details, and component parts.

C. Submit calculations signed by a Professional Engineer demonstrating the manhole meets the design criteria.

D. Submit Manufacturer's certification and load test data for manhole steps (if applicable).

E. Submit Manufacturer's certification for each type of cast iron frame, grate, and cover.

### 1.4 TOLERANCES

A. Departure from and return to true vertical from the established manhole alignment shall not exceed ½ inch per 10 feet, up to 2 inches for the total manhole depth.

B. Manufacturing tolerances shall be per ASTM C 478.

PART 2 – PRODUCTS

2.1 MATERIALS (per ASTM D 6783)

A. Resin: The manufacturer shall use only polyester or vinyl ester resin systems designed for use with this particular application. Resin content shall be a minimum of 7% by weight.

B. Filler: All aggregate, sand and quartz powder shall meet the requirements of ASTM C 33, where applicable.

C. Additives: Resin additives, such as curing agents, pigments, dyes, fillers and thixotropic agents, when used, shall not be detrimental to the manhole.

D. Elastomeric Gaskets: Gaskets shall be suitable for the service intended. All gaskets shall meet the requirement of ASTM C 443.

2.2 MANUFACTURING AND PRODUCT CONSTRUCTION

A. Manholes: Manhole components shall be manufactured by the vibratory vertical casting process resulting in a dense, non-porous, corrosion-resistant, homogeneous, composite structure. Manholes shall be steel reinforced per ASTM C 478. Per ASTM C 478, hoop reinforcement shall only be allowed in 48" diameter manhole risers with no openings. Larger diameter manholes shall not use hoop reinforcement. Manholes shall have a monolithic base slab unless otherwise approved. Manholes shall have engineered and rated lifting devices that shall not penetrate through the wall.

B. Section Joints: Round manhole components shall be connected with an elastomeric sealing gasket as the sole means to maintain joint water-tightness and both the gasket material and the manhole joint shall meet the requirements of ASTM C443. Round manholes shall utilize spigot and bell type joints incorporating either a confined o-ring or single step profile joint. Square and rectangular structures shall utilize a ship-lap joint and be sealed with a butyl rope sealant per ASTM C990 as recommended by the structure manufacturer.

C. Pipe to Manhole Connections: Pipes shall be directly connected to all structures using resilient flexible pipe to manhole connector per ASTM C923. Cold joint pipe stub grouting shall not be allowed unless shown on plans as such. In cases where cold joint pipe stubs are shown, they shall be grouted using a corrosion resistant grout and rubber water stop grout ring.

D. Fittings: Cones, reducer slabs, base slabs and adjusting rings shall be of the same material as adjoining riser sections.

E. Invert Channels: Invert channels shall be factory built with polymer concrete. Portland cement concrete shall not be allowed for channel construction.

F. Acceptable manufacturer: Manufacturer of manholes shall employ manufacturing methods and material formulation in use for a minimum of 5 years. Manufacturer of manholes shall have been actively producing manholes under current name for a minimum of 7 years with no more than one year between manhole projects. References demonstrating this requirement shall be submitted for review. Polymer concrete manholes shall be manufactured in accordance with ASTM C 478.

2.3 MANUFACTURER

A. Polymer concrete manholes shall be manufactured by U.S. Composite Pipe, Inc., a division of Thompson Pipe Group, or pre-approved equal.

2.4 DESIGN

A. Manholes shall be designed to withstand all live loads and dead loads as described in project plans and specifications. Dead loads shall include overburden load, soil side pressure and hydrostatic loading conditions. Manhole shop drawings shall be sealed by a licensed Professional Engineer.

B. Manholes wall thickness shall be designed to resist hydrostatic pressures with a minimum safety factor of 2.0 for full depth conditions from grade to invert. In no cases shall the wall thickness be less than 4 inches for 60” diameter and larger and 3” for 48” diameter.

C. Manholes shall be designed with sufficient bottom anchorage and side friction to resist buoyancy. Field cast floatation collars are acceptable.

D. The manhole shall be manufactured in one class of load rating. This class shall be H-20 wheel load (minimum 16,000 pounds dynamic wheel load).

2.5 TESTING

A. Manholes: Manholes shall be manufactured in accordance with ASTM C 478

B. Joints: Joints shall meet the requirements of ASTM C 443.

C. Compressive strength: Polymer concrete shall have a minimum unconfined compressive strength of 9,000 psi when measured in accordance with ASTM C 497.

D. Manhole Leakage: Manhole shall be tested in accordance with ASTM C 1244 Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

2.6 CUSTOMER INSPECTION

A. The Owner or other designated representative shall be entitled to inspect manholes and witness the manufacturing process.

2.7 HANDLING AND SHIPPING

A. Handling and shipping shall be performed in accordance with the Manufacturer's instructions.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Installation: The installation of manholes shall be in accordance with the project plans and specifications and the manufacturer's recommended practices.

B. Handling: Properly rated slings and spreader bar shall be used for lifting. The type of rigging used shall be per the manufacturer's recommendation.

C. Jointing:

1. Sealing surfaces and joint components shall be inspected for damage and cleaned of all debris.
2. Apply joint lubricant to elastomeric seals. Use only lubricants approved by the manufacturer.
3. Use suitable equipment handle and set manholes.
4. Placement and compaction of surrounding backfill material shall be applied so as to provide sufficient and equal side pressure on the manhole.

D. Field Tests:

1. Infiltration / Exfiltration Test: Maximum allowable leakage shall be per local specification requirements.
2. Low-Pressure Air Test: Each section may be tested with air pressure (5 psi max). After allowing the pressure to stabilize, the system passes the test if the pressure drop, due to leakage, is equal to or lesser than that specified.

-END OF SPECIFICATION-