SECTION 33 16 00
FIBERGLASS TANK SOLUTIONS
FIRE PROTECTION TANKS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Underground Tanks:
   1. For tank installations in the following locations:
      a. United States.
   2. For the following applications:
      a. Fire Protection Tanks.

1.2 RELATED SECTIONS

A. Section 02200 – Earthwork.

B. Section 03300 – Concrete.

1.3 REFERENCES

A. Fire Protection Tanks:
   1. American Concrete Institute (ACI) standard ACI 318, Building Code Requirements for Structural Concrete.
   2. ANSI/AWWA D120: Thermosetting Fiberglass-Reinforced Plastic Tanks.
   3. NFPA 22: Standard for Water Tanks for Private Fire Protection.
   4. NFPA 1142: Standard for Water Supplies for Suburban and Rural Fire Fighting.
   5. ASTM D4097: Standard Specification for Contact-Molded Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks.
   6. ASTM D3299: Standard Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300 – Administrative Requirements.

B. Product Data: Submit manufacturer's data sheets on each product to be used, including, but not limited to, the following:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Installation manual and operating guidelines.

C. Shop Drawings: Tank manufacturer shall submit the following for review and approval prior to fabrication of the tanks:
   1. Detailed shop drawings of each tank complete with all accessories supplied by the manufacturer.
   2. Detailed shipping, handling and installation instructions.

1.5 QUALITY ASSURANCE

A. Tank installations:
   1. Regulatory Requirements: Comply with applicable requirements of the laws, codes,

ordinances, and regulations of federal, state, and local authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. General: Comply with tank manufacturer's Installation and Operating Guidelines recommendations for delivery, storage, and tank handling.

1.7 WARRANTY

A. Warranty: Provide manufacturer's standard limited warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

A. Tank installations:
1. Acceptable Manufacturer: Acceptable Manufacturer: Fiberglass Tank Solutions, which is located at: 436 S. State Hwy 7, Camdenton, MO 65020. Telephone: 573-317-9620. Email: info@fgtsolutions.com. Web: fgtsolutions.com.
2. Acceptable Pre-cast Deadmen Manufacturer: Fiberglass Tank Solutions, which is located at: 436 S. State Hwy 7, Camdenton, MO 65020. Telephone: 573-317-9620. Email: info@fgtsolutions.com. Web: fgtsolutions.com.

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600 – Product Requirements.

2.2 UNDERGROUND TANKS

A. Tank Design - Fiberglass reinforced plastic (FRP) tanks:
1. Tank Design: Single-Wall, Double-Wall or Triple-Wall vessel as specified and shown on the Drawings.
2. The tank size, fittings and accessories shall be as shown on the drawings.
3. Tank shall be manufactured with continuous monolithic structural ribs that are placed at a standard 24" spacing along the cylinder of the tank.
4. Tank shall be manufactured with a laminate consisting of resin and glass fiber reinforcement only. No sand/silica fillers or resin extenders shall be used.
5. Tank shall be vented to atmospheric pressure.
6. Tank shall be compatible with liquids identified in the manufacturer's standard limited warranty.
7. Actual tank capacity shall be equal to or greater than the nominal capacity listed on sales literature and production drawings.
8. Tanks shall have ASME 80:10 tank ends, allowing for maximum capacity with minimum tank footprint.
9. Primary wall construction: filament or helically wound laminate of resin and continuous glass fiber with structural ribs integral to wall; ribs constructed over a foam form.
10. Secondary (outer) wall for DW tanks bonded to inner wall using a 3D structural glass material forming a monitorable interstice.
11. Exterior finish: smooth hot-coat finish for additional corrosion resistance.

B. Loading Conditions – Tank shall meet the following design criteria:
1. Internal Load – Tank shall be designed to withstand a 5-psig air-pressure test with a 5:1 safety factor.

2. Surface Loads – Tank shall be designed to withstand surface H-20 and HS-20 axle loads when properly installed according to manufacturer's current Installation Manual and Operating Guidelines.
3. External Hydrostatic Pressure – Tank shall be designed for 7 feet of overburden over the top of the tank, the hole fully flooded, and a safety factor of 2.5:1 against general buckling.

C. Interstitial Space:
1. The interstitial space between the tank walls shall be constructed with a glass reinforcement material which provides a structural bond between the tank walls while creating a defined interstice that allows for free flow of liquid.

D. Tank Monitoring System:
1. General:
   a. The continuous monitoring system shall include monitoring fluid factory-installed in the interstitial space and within a fiberglass tank-top mounted reservoir.
2. Design:
   a. The continuous monitoring system shall be designed to always detect a leak in either the primary or secondary wall, regardless of the water table conditions at the installation site.
   b. The interstice of the tank shall be designed for a 5:1 safety factor beyond normal hydrostatic operating pressure to ensure structural integrity and to prevent false leak alarms.

E. Fire Protection Tanks:
1. Governing Standards, as applicable:
   a. American Concrete Institute (ACI) standard ACI 318, Building Code Requirements for Structural Concrete.
   b. ANSI/AWWA D120: Thermosetting Fiberglass-Reinforced Plastic Tanks.
   c. NFPA 22: Standard for Water Tanks for Private Fire Protection.
   d. NFPA 1142: Standard for Water Supplies for Suburban and Rural Fire Fighting.
   e. ASTM D4097: Standard Specification for Contact-Molded Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks.
   f. ASTM D3299: Standard Specification for Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Corrosion-Resistant Tanks.
2. Tank Accessories:
   a. Tank Anchoring:
      1) Anchor straps shall be as supplied by tank manufacturer and designed for a maximum load of 25,000 lbs.
      2) Galvanized turnbuckles shall be supplied by the tank manufacturer.
      3) Prefabricated concrete anchors shall be supplied and manufactured by the tank manufacturer, designed to the ACI 318 standard, manufactured with 4,000 psi concrete and shall have adjustable anchor points.
      4) Pre-cast concrete deadmen to be manufactured by Fiberglass Tank Solutions LLC, located at 436 S. State Hwy 7.
      5) Substitutions are not permitted.
   b. Threaded Fittings Connections:
      1) All threaded fittings shall be NPT half or full couplings, in 2-inch, 4-inch and 6-inch diameters.
      2) Threaded fittings are available in FRP, carbon steel and stainless steel.
      3) Fittings shall be installed on the tank-top centerline or in the cover of the manway.

4) Carbon steel and stainless steel NPT fittings shall withstand a minimum of 150 foot-pounds of torque and 1,000 foot-pounds of bending, both with a 2:1 safety factor.

c. PVC Piping and FRP Nozzles Connections:
   1) When acceptable for use, PVC piping shall at a minimum meet the requirements of ANSI Schedule 40.
   2) All flanged nozzles shall be flanged and flat-faced and conform to Class 150 bolting patterns as specified in ANSI/ASME/ B16.5.

d. Flexible Connectors:
   1) Flexible connectors should be utilized for all inlet or outlet connections that penetrate the tank on a horizontal plane.
   2) Flexible connectors should be designed to provide vertical movement to accommodate settlement at the project design burial depth.
   3) Flexible connectors not required on tank top centerline fittings that extend vertically to finished grade.

e. Access Openings:
   1) All access openings shall have a diameter of 24 inches or 30 inches, complete with riser, lid and necessary hardware.

f. Attached Access Risers:
   1) Attached access risers shall be PVC or FRP as supplied by tank Manufacturer.
   2) Attached access risers shall be 24 inches or 30 inches in diameter.
   3) Access risers shall be attached to access openings during installation utilizing adhesive or FRP bonding kits as supplied by the tank manufacturer.
   4) Riser connections to be tested by the installer prior to placing the tank into service.

g. FRP Riser Lids:
   1) 24-inch, 30-inch, 3-inch, 42-inch, or 48-inch diameter lids shall be of an FRP composite material and utilize 316 S.S. bolts and latches.
   2) Connection to lids is gasketed and fits either a flat face flange or the riser pipe plain end connection.
   3) Lids include a textured finish with UV inhibitors.
   4) FRP lids shall be rated for 300-pound pedestrian rating for use in common areas where needed.
   5) FRP lids shall be rated for 2500-pound occasional wheel load for use in common areas where light wheel traffic will be required.
   6) When utilizing FRP riser lids with C.I. manhole ring and lids, construction techniques should be utilized to isolate the wheel load from the FRP riser.

h. Hinged & Lockable Covers
   1) Hinged and lockable covers shall be 100% FRP laminate in construction and are hinged for easy inspection and sealed with a watertight gasket to keep out dirt, groundwater, or insects.

i. Manways:
   1) The standard manway shall be flanged, 22 inches I.D. and complete with gaskets, bolts and cover.

j. Manway Extensions:
   1) FRP Manways shall provide a 24" or 30" I.D. opening and come complete with 304 S.S. bolts, nuts, and neoprene flat face gaskets.
   2) Manways shall provide lengths needed to extend 12" above grade for easy assembly of covers to top manway connection.
   3) Manway extensions shall be gel-coated 12" at finish grade.

k. Baffles and Partitions:
   1) Baffles and Partitions shall be capable of withstanding hydrostatic loads

occurring when one compartment is empty and the remaining compartment(s) full.

l. Ladders:
   1) Ladders shall be the standard FRP ladder as supplied by tank manufacturer.

m. Pump Platforms:
   1) FRP pump platforms shall be supplied by tank manufacturer.

n. Internal Piping
   1) All internal piping shall be supplied by tank manufacturer.
   2) All FRP nozzles for fire pump supply shall have an anti-vortex plate factory installed.

o. Suction/Fill tubes:
   1) Vertical draft/fill tubes shall be a minimum of PVC SCH 40 or FRP.
   2) Vertical draft /fill tubes shall be factory installed.
   3) Vertical draft /fill tubes shall terminate 4 inches above the bottom of tank.
   4) Vertical draft tubes shall have anti-vortex plate factory installed.

PART 3 EXECUTION

3.1 TESTING

A. Tank shall be tested according to the tank manufacturer's Installation Manual and Operating Guidelines in effect at time of installation.

3.2 INSTALLATION

A. Tank shall be installed according to the tank manufacturer's Installation Manual and Operating Guidelines in effect at time of installation.

END OF SECTION