



FIBERGLASS UNDERGROUND DOUBLE WALL TANKS

Long Form: Section 13200 Guide Specification Containment Solutions Fiberglass Reinforced Polyester Underground Storage Tanks

Part I General

1.01 Related Work Specified In Other Sections

- A. **Cast-in-Place Concrete:** Section 03300
- B. **Anchor Bolts:** Section 05501
- C. **Plastic Pipe:** Section 15064
- D. **Liquid Level Gauges:** Section 15174
- E. **Other Related Work** - such as Excavation and Boiler Equipment

1.02 Quality Assurance

- A. **Acceptable Manufacturers:** Containment Solutions, Inc., Conroe, Texas.
- B. **Governing Standards:**
 - 1. ASTM Specification D4021. Glass Fiber Reinforced Polyester Underground Petroleum Storage Tanks.
 - 2. UL 1316 Underwriters Laboratories, Inc., Glass Fiber Reinforced Plastic Underground Storage Tanks for Petroleum Products.
 - 3. National Fire Protection Assoc, (NFPA 30) Flammable and Combustible Liquids Code and (NFPA 31) Standards for Installation of Oil Burning Equipment.
 - 4. General Services Administration, Public Building Service Guide Specification, PBS: 1568.

1.03 Submittals:

- A. **Shop Drawings:** Contractor shall submit _____ copies of shop drawings for each tank. Drawings shall include all critical dimensions and show locations of all fittings and accessories, i.e., manways, ladders, hold-down straps, etc. Materials of construction shall be in accordance with Section 1.02 of this specification.
- B. **Catalog Data:** Contractor shall submit _____ copies of manufacturer's literature.
- C. **Certification Plate:** UL labels shall be affixed to each tank.
- D. **Installation Instructions:** Contractors shall submit _____ copies of manufacturer's latest installation instructions.
- E. **Calibration Charts:** Contractors shall submit _____ copies of manufacturer's latest calibration charts.

Part II Products

2.01 Fiberglass Underground Storage Tanks:

- A. **Loading Conditions — Tank shall meet the following design criteria:**
 - 1. External hydrostatic pressure: Buried in ground with 7' of over burden over the top of the tank, the hole fully flooded and safety factor of 5:1 against general buckling.
 - 2. Surface loads: When installed according to manufacturer's installation instructions, tanks will withstand surface H-20 axle loads (32,000 lbs./axle).
 - 3. Internal load: Primary and secondary tanks shall withstand 5 psi air pressure test with 5:1 safety factor.
 - 4. Tanks shall be designed to support accessory equipment such as heating coils, ladders, drop tubes, etc. when installed according to manufacturer's recommendations and limitations.
 - 5. Tank laminate shall include silica treated with silane to improve physical properties and improve resistance to alcohols and alcohol blends.
- B. **Product Storage Requirements:**
 - 1. All primary tanks must be vented. Tanks are designed for operation at atmospheric pressure only, except for use with vapor recovery systems at a pressure or vacuum of approximately 1 psi.
 - 2. Tanks shall be capable of storing liquids with specific gravity up to 1.1.
 - 3. Maximum temperature: Tank shall be capable of storing gasoline, alcohol blended gasoline (with up to 100% methanol or ethanol), oxygenated motor fuels - gasoline with up to 20% (by volume) of methyl tertiary butyl ether (MTBE), ethyl tertiary butyl ether (ETBE), tertiary butyl alcohol (TBA), tertiary amyl methyl ether (TAME), or tertiary amyl ethyl ether (TAEE), or potable water at ambient.
 - 4. Product may be stored at a maximum temperature of 150°F.
 - 5. Tanks shall be chemically inert to petroleum products.

C. Dimensional Requirements

(refer to Containment Solutions literature on gallonage):

1. Nominal capacity of the tank shall be _____ gallons,
2. Nominal outside diameter of the tank shall be _____ feet.
3. Nominal overall length of the tank shall be _____ feet.

D. Monitoring Capabilities:

1. Tanks shall have a space between the primary, secondary, and tertiary shell walls to allow for the free flow and containment of all leaked product from the primary tank.
2. The following continuous monitoring conditions shall be compatible with the cavity between the inner and outer tanks:
 - Vented to atmosphere
 - Vacuum – 5 psi maximum
 - Positive air pressure (5 psi maximum)
 - External hydrostatic pressure – 7' maximum groundwater head pressure over tank top
3. Tanks 6' diameter and larger shall have an integrally mounted reservoir installed on the tank for optional hydrostatic monitoring. The reservoir shall be constructed of fiberglass reinforced plastic materials and warranted for 30 years against failure due to internal/external corrosion and, when properly installed, against structural failure (same as tank warranty).
4. Tank shall be designed with two (2) 4" fittings that will access the tank bottom between the primary, secondary and tertiary walls.
5. The double-wall tank monitor shall be capable of monitoring annular spaces independently detecting a breach in the inner and/or outer tank under the following installed conditions:
 - a. When the inner tank is empty.
 - b. When the inner tank is partially or completely full and the groundwater table is below the tank bottom.
 - c. When the inner tank is partially or completely full and the tank is partially or completely submerged in groundwater.
6. The leak detection performance of the hydrostatic monitoring system shall be tested and verified by a qualified independent consultant to detect leaks as small as 0.10 gallons per hour within a one month period.
7. All monitoring equipment, including FRP reservoirs and electronic controls, shall be U.L. listed or accepted.
8. If hydrostatically monitored, any solution used in the tank annular space shall have U.L. approval for compatibility with the tank and be a contrasting color to the tank surface to facilitate visual inspection of the tank for leaks prior to burial.

2.02 Accessories

- A. Anchor Straps** - Provide glass fiber reinforced plastic anchor straps for each tank shown. Number and location of straps shall be as specified by manufacturer. Each strap shall be capable of withstanding a maximum load for each tank diameter as shown.
- 4'0 - 4,200 lbs.
 - 6'0 - 18,000 lbs.
 - 8'0 - 25,000 lbs.
 - 10'0 - 25,000 lbs.
- Straps shall be standard as supplied by the tank manufacturer.
- B. Certification Plate** – Underwriters Laboratories label shall be permanently affixed to each tank.
- C. Flanged Manways**
1. The standard manway is 22" I.D. The 30" and 36" I.D. manways are optional
 2. All manways will be furnished complete with U. L. listed gaskets, bolts and covers.
 3. Location – see standard tank drawings
 4. The steel manway cover is standard with 4" diameter NPT fittings. 22" manway covers with an even number of fittings will be placed on an 8" radius. Manway covers with an odd number of fittings will have one fitting centered and the remaining fittings placed on a 8" radius. 30" manway cover fittings are standard 12" radius. 36" manway cover fittings are standard 15" radius.
 5. Manway risers 48" in diameter and 42" high will be supplied to provide access to the manway lid. A 24" x 24" galvanized street box with a cover must be provided by contractor for at-grade installation.
 6. Fiberglass manway extension tubes 24" long will be provided for the manways.
- D. Fill Tubes** – Fill tubes of appropriate design will be supplied by contractor.
- E. Hydrostatic Monitor Accessories:**
1. **Brine Antifreeze**
Brine Solution Designation: BAS-30
Chemical Composition: 30%+ calcium chloride, 1% to 3% potassium chloride, 1% to 2% sodium chloride, Balance water
Visual Appearance: Green in color, Odorless fluid Specific Gravity @ 60°F: 1.272-1.317
Factory installed on tanks 30,000 gallon and under. Bulk brine installed at jobsite on 35,000 gallon and 40,000 gallon tanks.
 2. **Reservoir Sensor** - The FHRB 810 reservoir sensor is specifically designed for installation in the reservoirs of CSI double-wall tanks. The components of the sensor are compatible with CSI supplied brine solutions. The sensor is

also compatible with any other control panel that accepts normally open or closed switches. The sensor provides two alarm points: high brine and low brine. The sensor can be wired to a control panel to provide only a single alarm (not distinguishing between high or low alarms) or it can be wired to report both alarm conditions.

- 3. Electronic Controllers for Reservoir Sensor** - The FHRB 810 reservoir sensor interfaces with leak control panels Models CPF or inventory panels Models CPI. The CSI control panels and reservoir sensor shall be UL or Factory Mutual listed as intrinsically safe. The correct number of input circuits must be used, either one or two, to provide the type of desired alarm reporting, i.e. single alarm or dual alarm (high brine or low brine). Additional leak detection sensors and inventory monitoring probes shall be available to interface to the control panels.

All control panels shall include:

- Alarm lights for each circuit
- Audible alarm with reset button
- System test button
- NEMA 4 housing
- Wall mounting capabilities
- Dry contact relay for each input circuit
- RS 232 port (inventory panels)
- ALPHA numeric display (inventory panels)
- Printer option (inventory panels)

Note: All wiring materials are provided by the contractor. Wiring is required from the power source to the control panel and from the control panel to the probe and sensor assemblies.

- 4. Tank Gauge Probe** - The IPFW Series tank gauge probe shall be capable of continuously monitoring liquid levels and detecting water in hydrocarbons at the bottom of tanks. The probe shall be compatible with the liquid it is intended to be submerged in and sized properly to fit into the tank without damaging the tank during installation or operation. The tank gauge probe shall not be rigidly mounted in the tank.

- F. Non-Sealed FRP Turbine Enclosure (Model NTE Series)** - The non-sealed turbine enclosure consists of a fiberglass reinforced plastic (FRP) enclosure body (variable length in 12" increments, 42" or 48" ID's), an FRP reducer (42" x 30" or 48" x 30" ID's), and a loose fit FRP lid with handle. The reducer opening must be large enough (minimum 28") to allow for the removal of a 22" manway lid. The lid OD must be small enough to be removed through a 36" street box. The enclosure body must be capable of joining to the 42" or 48" diameter secondary containment collar with a leaktight adhesive joint.

Model No.	Length	Model No.	Length
NTE42-2	2'	NTE48-2	2'
NTE42-3	3'	NTE48-3	3'
NTE42-4	4'	NTE48-4	4'
NTE42-5	5'	NTE48-5	5'
NTE42-6	6'	NTE48-6	6'

Refer to Section H for the optional adhesive kit (to bond the enclosure body to the containment collar) and Sections I, J, and K for the field installed fitting kits (for electrical and plumbing connections to the turbine enclosure).

- G. Watertight Turbine Enclosure (Model WTE Series)** - The watertight turbine enclosure consists of a fiberglass reinforced plastic (FRP) enclosure body (variable length in 12" increments, 42" or 48" ID's), an FRP reducer (42" 30" or 48" x 30" ID's) with o-ring groove and o-ring gasket, and a push-on FRIP lid with two handles. The reducer opening must be large enough (minimum 28") to allow for the removal of a 22" manway lid. The lid OD must be small enough to be removed through a 36" street box. The enclosure body must be capable of joining to the 42" or 48" diameter secondary containment collar with a leaktight adhesive joint. The reducer must be capable of joining to the enclosure body with an external leaktight adhesive joint to allow for field installation of the adhesive without entering the enclosure.

With the lid installed, the assembly must provide a watertight seal with water up to 12" over the lid. The lid includes a non-skid exterior surface and must be able to support a person standing on the lid without damage to the lid. One of the lid handles is to be offset to aid in the removal of the lid and the other is centered on the lid..

Model No.	Length	Model No.	Length
WTE42-2	2'	WTE48-2	2'
WTE42-3	3'	WTE48-3	3'
WTE42-4	4'	WTE48-4	4'
WTE42-5	5'	WTE48-5	5'
WTE42-6	6'	WTE48-6	6'

Refer to Section H for the optional adhesive kit (to bond the enclosure body to the containment collar) and Sections I, J, and K for the field installed fitting kits (for electrical and plumbing connections to the turbine enclosure).

- H. Sealed FRP Turbine Enclosure (Model STE Series)**
 The sealed turbine enclosure consists of a fiberglass reinforced plastic (FRP) enclosure body (variable length, 42" or 48" ID's), an FRP reducer (42" or 48" ID's) with an oval flanged manway (23" x 29" ID's), a flat gasket, SS bolts with non-galling silicone-bronze nuts (or optional bolt ring), and an oval FRP lid with handle. The reducer opening must be large enough (minimum 28") to allow for the removal of a 22" manway lid. The lid OD must be small enough to be removed through a 36" street box. The enclosure body must be capable of joining to the 42" or 48" diameter secondary containment collar with a leaktight

adhesive joint. The reducer with oval flanged manway must be capable of joining to the enclosure body with a leaktight adhesive joint.

With the lid installed, the assembly must provide a watertight seal with water up to 7' over the lid. The lid may be supplied with an optional 6' NPT fitting with plug which can be used as an observation port. Cut lines for field trimming will be marked on the bottom 12" of the enclosure body in 3" increments.

Model No.	Length	Model No.	Length
STE42-2	2'	STE48-2	2'
STE42-3	3'	STE48-3	3'
STE42-4	4'	STE48-4	4'
STE42-5	5'	STE48-5	5'
STE42-6	6'	STE48-6	6'

Refer to Section H for the optional adhesive kit (to bond the enclosure body to the containment collar) and Sections I, J, and K for the field installed fitting kits (for electrical and plumbing connections to the turbine enclosure).

- I. Turbine Enclosure Adhesive Kit - (Kit AD)** - When properly installed and cured, the adhesive kit provides a watertight seal to prevent the ingress of water. The adhesive kit includes 1/2 gallon of adhesive in a one gallon capacity can. The kit also includes catalyst (hardener), a wooden mixing stick, a three inch wide plastic putty knife, 60 grit sandpaper, and installation instructions. One adhesive kit is required for each turbine enclosure; the watertight and sealed turbine enclosures require two kits.

- J. Field Entry Boot** - (Model FEB-3 or FEB-4) The FEB-3 or FEB-4 is designed to interface with 3" or 4" nominal OD FRP pipe.

- K. FRP Coupling Kit** - (Kit FC-3 or FC-4) - Designed to interface with 3" or 4" nominal OD FRP pipe manufactured by Ameron or Smith Fiberglass. The coupling ID is tapered at both ends.
The two-piece coupling is constructed of fiberglass reinforced plastic and is field installed using the supplied adhesive. Both pieces of the fitting are threaded together to hold the fitting in position while the adhesive cures.
Kit FC-3 or Kit FC-4 includes one 3' or 4' nominal ID FRP coupling, adhesive, catalyst (hardener), plastic mixing stick and applicator, 60 grit sandpaper, and installation instructions.
The contractor must provide the hole saw (4-1/2 or 5-1/2 inch OD) or reciprocating saw to cut the hole in the turbine enclosure prior to installing the FRP coupling.

- L. Electrical Coupling Kit-(Kit EC-1)**- Designed to interface with one inch steel electrical conduit. The two-piece coupling is constructed of steel and is field installed using the supplied adhesive. Both pieces of the fitting are threaded together to hold the fitting in position while the adhesive cures.
Kit EC-11 includes two (2) one inch steel couplings, adhesive, catalyst (hardener), plastic mixing stick, 60 grit sandpaper, and installation instructions.

The contractor must provide a two inch hole saw or reciprocating saw to cut the hole in the turbine enclosure prior to installing the steel coupling.

M. Secondary Containment Collar - The secondary containment collar shall be constructed of fiberglass reinforced plastic. Collar shall be 42" or 48" in diameter and will be factory-installed in accordance with drawings.

N. Containment Collar Sensor is preassembled and ready to wire. All electrical components must be UL listed or accepted. This float switch is capable of detecting a 2" or more accumulation of liquid (water or product) in the turbine enclosure.

O. Ladders - Ladders shall be the standard ladder supplied by the tank manufacturer (carbon steel, stainless steel, aluminum). Refer to drawings for location.

P. Tank Lifting Lugs - Provide lifting lug(s) on all tanks. Lifting lug system shall be capable of withstanding weight of tank with a safety factor of 3:1.

Q. Probe Drawstring - Nylon line shall be 150 lb. break strength located at the monitoring fitting nearest the end of the tank. Drawstring length will allow for a 7' tank burial depth.

R. Fittings Threaded - NPT

1. All threaded fittings on UL labeled tanks shall be located in a manway lid or a tank mounted fitting within 12" of the tank top center line and be constructed consistent with the requirements of the UL label. Fittings to be supplied with temporary thread protectors or permanent metal plugs.

2. All standard threaded fittings to the primary tank and monitoring cavity are 4" in diameter. The standard secondary containment coupling is 6" in diameter. All standard threaded fittings are half couplings. Reducers are to be used for smaller sizes where specified and provided by contractor.

3. **Thread Standards** - All threaded fittings shall have machine tolerances in accordance with the ANSI standard for each fitting size.

4. **Strength** - Primary tank NPT fittings will withstand a minimum of 150 foot-pounds of torque and 1,000 foot-pounds of bending, both with a 2:1 factor of safety.

5. Sizes	Standard	Reducer Sizes
Inlet	4"	_____
Outlet	4"	_____
Vent	4"	_____
Gauge	4"	_____
Fill	4"	_____

6. **Location** - Refer to drawings for location.

7. **Suction Line** - Shall be installed on the site by the contractor. Diameter of pipe and grade and schedule as called out in other sections.
8. **Return Line** - Shall be installed on the site by the contractor. Diameter of pipe and grade and schedule as called out in other sections.
9. All rigid internal piping shall be terminated at least 4" from the bottom of the tank.

Part III Execution

3.01 Installation and Testing

Fiberglass underground tanks must be tested and installed according to the current installation instructions provided with the tank (refer to Containment Solutions Pub. No. INST 6001 and include as part of your application). Tanks shall be installed with pea gravel or crushed stone as specified in current installation instructions provided with the tank. Containment Solutions' tanks are intended for use in storing products listed in the warranty; any other products not listed in the warranty must be approved in advance by Containment Solutions. Proper application and installation methods and materials help to insure long-term corrosion-proof service.

Part IV Warranty

4.01 Warranty shall be Containment Solutions current double-wall tank warranty.

Dimensional Data
Model: TWT-6 Type II Double Wall Tanks

Model& Nominal Capacity	Actual Capacity (Gallons)	Overall Length (Inches)	Nominal Weight	Nominal Weight w/ Brine	No. of 4" NPT Manway Fittings	No. of Lift Lugs	No. of Hold Down Straps Required
6'diameter							
2,500	2,689	13' 9-1/2"	2,700	3,340	5	2	2
3,000	3,323	16' 9-1/2"	3,230	4,000	4	1	2
4,000	3,958	19' 9-1/2"	3,570	4,420	3	1	2
5,000	5,068	25' 1/2"	4,100	5,120	3	2	4
6,000	6,179	30' 3-1/2"	4,660	5,840	3	2	4
8'diameter							
5,000	4,947	16' 9-1/2"	3,770	4,720	6	1	2
6,000	5,897	19' 6-1/2"	4,430	5,580	6	1	2
8,000	7,796	25' 1/2"	5,470	6,940	6	2	4
10,000	9,696	30' 6-1/2"	6,510	8,300	6	2	4
12,000	11,595	36' 1/2"	7,750	9,860	6	2	4
15,000	14,545	44' 7"	9,620	12,250	6	2	6
10'diameter							
10,000	10,257	21'	7,540	9,560	6	4	3
12,000	11,873	23' 9"	8,390	10,870	6	4	4
15,000	15,104	29' 3"	10,180	13,790	6	4	4
20,000	19,951	37' 6"	12,670	17,410	6	4(1)	6
25,000*	24,970	46' 1/2"	15,080	21,060	6	4(1)	8
30,000	29,816	54' 7-1/2"	17,900	25,210	6	8	8
35,000	34,835	63' 1-1/2"	20,610	N/A	*	8	8
40,000	39,854	71' 4-1/2"	23,700	N/A	*	8	10

* Made to order

(1) If brine filled, 8 lift lugs installed

While Containment Solutions has taken every precaution as to the accuracy of content and data presented herein, Containment Solutions cannot be held responsible for the individual interpretation of the data presented, any loss or damage to any property whatsoever, injury or death to any persons whatsoever, or any claims, demands, actions, complaints, proceedings, judgement, losses, damages, compensation, liabilities, costs or charges, however arising from the unauthorized undirected use of this handbook or the data it contains.