

# DOUBLE-WALL FIBERGLASS TANKS

For Underground Petroleum Storage

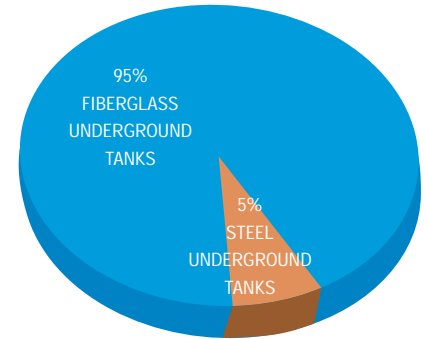


# Advantages

## Double-Wall Tanks from Containment Solutions

### *Why our tanks are your best investment.*

The fiberglass underground storage tank owes its very existence to the shortcomings of steel tanks — and their resulting environmental problems.



*Twenty-four largest retail gasoline marketers*

In the early 1960s, the American Petroleum Institute challenged us (we were then known as the Special Products Division of Owens-Corning) to develop a rustproof underground storage tank that would be safe and strong enough to satisfy the petroleum industry's most stringent long-term storage demands.

Our engineers accepted the challenge and pioneered the underground fiberglass tank technology. The major oil companies responded to our achievement by specifying fiberglass tanks for approximately 95% of their underground fuel storage installations. Their keen awareness of the limitations of a steel tank in a corrosive environment and their confidence in fiberglass tank technology helped us earn a reputation for safe, rust-free, long-term underground storage in over 300,000 installations over the last four decades.

Along the way, we've earned a leadership position in the petroleum industry. Our pioneering design work resulted in the UL 1316 specification which governs fiberglass tank manufacturing.

As the inventors of fiberglass underground storage tank technology, many of the recognized standards began with Owens-Corning and continue with Containment Solutions today.

### **Containment Solutions Manufactures:**

- Compartment Tanks***
- Aboveground and Underground Storage Tanks***
- Automotive Oil and Lubricant Storage Tanks***
- Oil/Water Separators and Interceptors***
- Water/Wastewater Tanks***
- Chemical Storage Tanks***
- ReTank® Retrofit Systems***
- Fiberglass Manholes and Wetwells***
- Leak Detection Systems***

***Our fiberglass tanks have been exhumed after 6, 12, 15 and 21 years of gasoline service and have shown no loss in their original structural properties.***

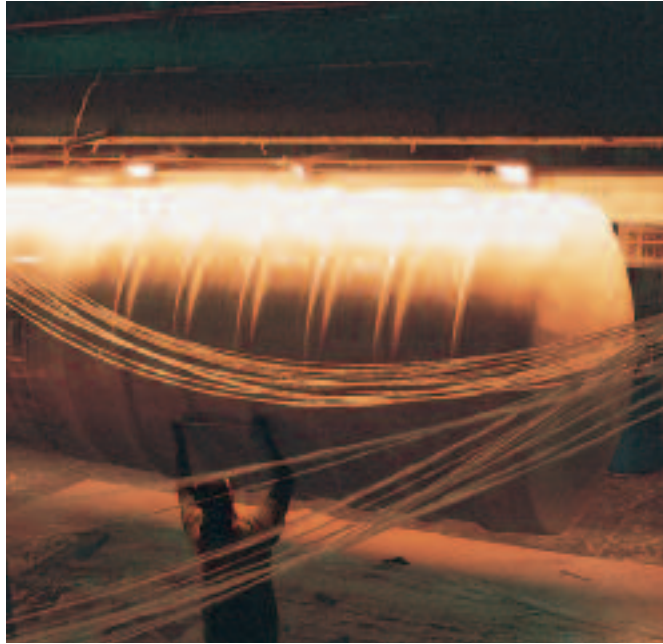
### Table of Contents

Advantages . . . . .	2
Manufacturing Processes . . . . .	4
Research & Development . . . . .	5
Gasoline & Fuel Oil Systems Overviews . . . . .	6
Monitoring . . . . .	10
Tank Specifications/Drawings . . . . .	13
Accessories . . . . .	24
Specifications . . . . .	32

***We will continue to lead, far into the future, thanks to the vision of everyone on our team.***

Each CSI employee brings a tremendous amount of pride to what they do:

- ***Our dedication to research and development.*** We focus our talents on pushing the limits of what is possible in order to provide you with quality products that meet your needs at a competitive price.
- ***Our technologically superior manufacturing process.*** We utilize the finest materials and methods to produce high-quality products that have led the industry for over four decades.
- ***Our industry-leading support.*** We have the most knowledgeable direct field sales force and the only national field service organization staffed by full-time company employees. They, along with our superb inside sales group, are committed to supplying “value-added” service that complements our exceptional products. Our customer service and technical support group promptly and clearly answer any technical questions about our products or services.



All of which adds up to Containment Solutions’ people going above and beyond to deliver the highest quality and best long-term value in underground storage technologies that you can invest in.



Containment Solutions invites you to review our state-of-the-art products at three conveniently located manufacturing facilities in Bakersfield, California, Conroe, Texas and Mt. Union, Pennsylvania. Only then will you understand the depth and breadth of our advantages — and our pride which is evident in every product we make.



***Our tanks carry the Underwriters Laboratories listing.***



## Processes

### ***The product of precision engineering and forward thinking.***

The process by which our fiberglass tanks are manufactured speaks volumes about their quality, integrity, safety and longevity.

Since the first non-corrosive tank was designed back in the 1960s, we have maintained the highest quality standards and have utilized promising technologies to engineer and build the world's premier fiberglass storage tank.

### ***Our tanks are made on steel molds from the inside out.***

We use steel mandrels (cylindrical steel molds) and build our tanks from the inside out. Steel molds provide us with a firm and consistent surface upon which we apply materials to make our tank. The rotation of the mandrel and the application of the materials are controlled by a computer, custom designed to manufacture underground tanks. As the mandrel rotates, resin, glass and specially treated silica are precisely metered onto the mandrel from above. The result is a closely controlled process and a very consistent tank wall composition and thickness.



After the tank wall is made, its thickness is precisely determined. An instrument that magnetically senses the metal mold surface through the fiberglass reinforced plastic laminate is used to accurately measure the thickness of the laminate at many points all over the surface of the tank wall. This method of thickness measurement with a metal mold is quick, easy and more exact than the ultrasonic methods used by other manufacturers.

### ***Stronger tanks, inside and out.***

*The inside-out approach to building the tank wall has some other advantages as well. The first layer of material forms the inside surface of the tank. Because of the smooth steel mold, the inside surface of the tank is very smooth and free of surface variations.*

*The inside surface is not exposed to air as it cures, which eliminates the air inhibited surface cure problems associated with other manufacturing methods. The result is a well cured and smooth tank interior that will be exposed to the fuel in the tank.*

By applying materials to the outside of the tank, we can easily add additional thickness, reinforcing ribs, filament winding glass in tension, glass woven roving, glass mat, or any other materials in specific locations on the tank wall. With this capability, we use the most efficient materials in the most efficient locations to meet the design requirements of the finished tank. Additional wall thickness is added exactly where it is needed. Ribs are applied in optimal locations, made in the most efficient shapes, and constructed of the most efficient reinforcing materials.

***Engineered and tested corrosion resistance.***

The Containment Solutions' tank wall is composed of resin, glass and a specially treated silica that together result in a composite matrix that is compatible with petroleum products, including gasoline, jet fuel, av-gas, motor oil, kerosene, diesel fuel and fuel oil, and up to 100% ethanol and/or methanol blends and oxygenated motor fuels.



*Containment Solutions pioneered and perfected the use of a specially treated silica that is a part of our laminate matrix. The addition of this material has been proven to enhance the performance of our laminate in all fuels, including alcohols.*

Our laminate has been thoroughly tested to meet the requirements of UL 1316. Additional long-term corrosion testing continues at our Research and Development Center (R&D). This testing is done in conditions that match actual installation conditions. This results in data that can be used to accurately predict the long-term properties needed for accurate tank designs. Data has been accumulated for current fuels and blends as well as its effects on the laminate after a number of years. This data includes tests on current fuels and blends and other oxygenates. We are constantly testing new products that can be stored in our tanks in the future.

***Our R&D Center never stops asking questions.***

We could never maintain our position on the leading edge of fiberglass tank design without an uncompromising commitment to research and development. Our R&D Center gives us the ability to look at new and promising ways to improve our products, expand our capabilities and better serve our customer's ever-changing needs.

***Our underground tank test pit helps us perfect our product.***

Containment Solutions is the only fiberglass tank manufacturer that studies tanks in all buried conditions and configurations. To do this, we constructed a full-scale test pit at our Conroe, Texas R&D Center, which allows us to test various tank designs with different backfill materials, anchoring methods, groundwater conditions and many other variables.

## Products

### ***Our Line of Type II Double-Wall Tanks is Rustproof***

Fiberglass tanks simply will not rust on all four surfaces of the double-wall tank.

That's the reason Containment Solutions' fiberglass tanks have proven to be safe, cost-effective containment solutions for petroleum and related products. The fact is, after nearly 300,000 installations since the early 1960s, not a single leak has been attributed to internal or external corrosion.

### ***True Double-Wall Construction Means High Strength***

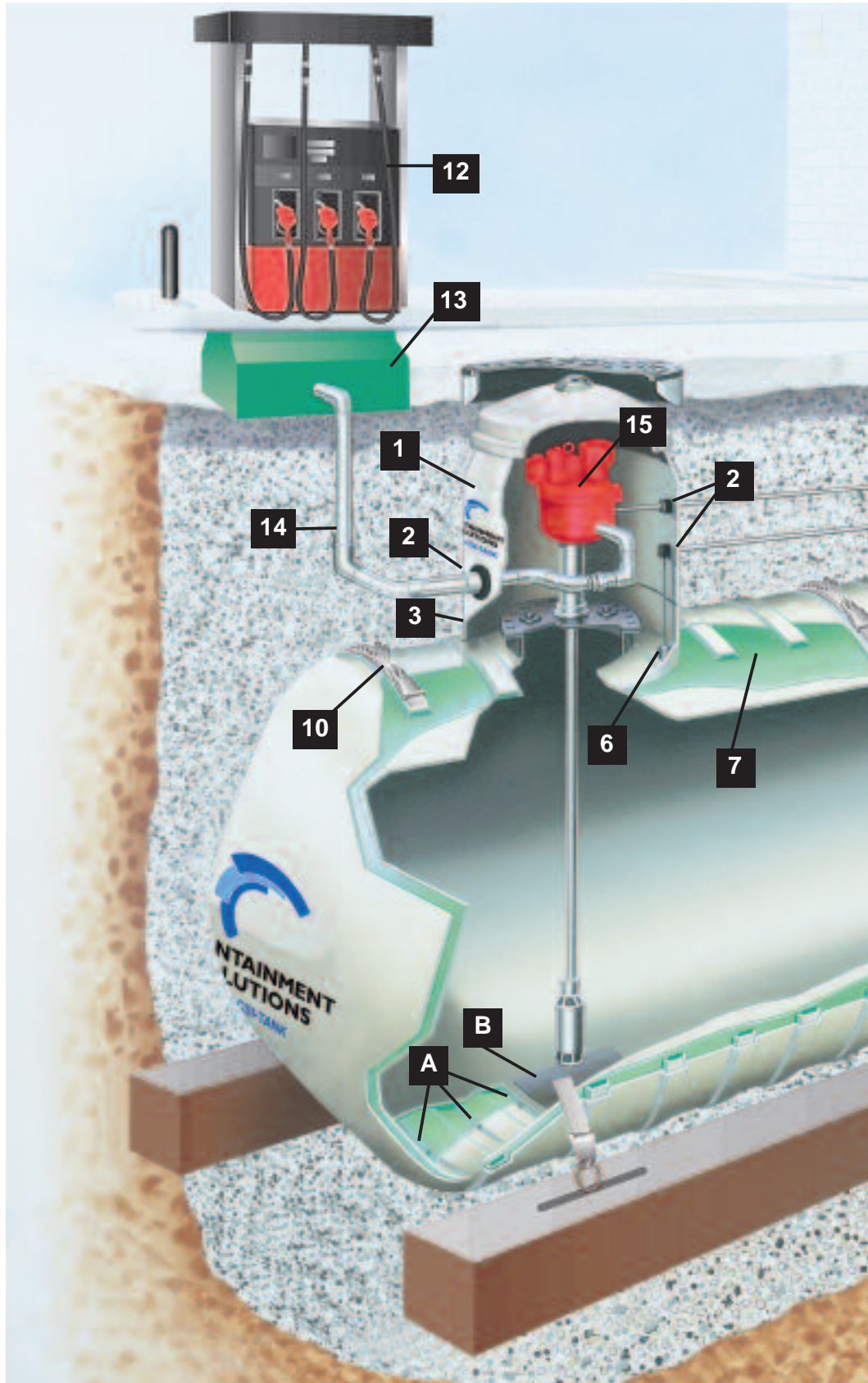
We build strength and quality into every double-wall tank from the beginning.

Tank inner and outer walls and specifically designed ribs act together to form a structural system that has earned the UL 1316 listing that distinguishes this as a true double-wall tank.

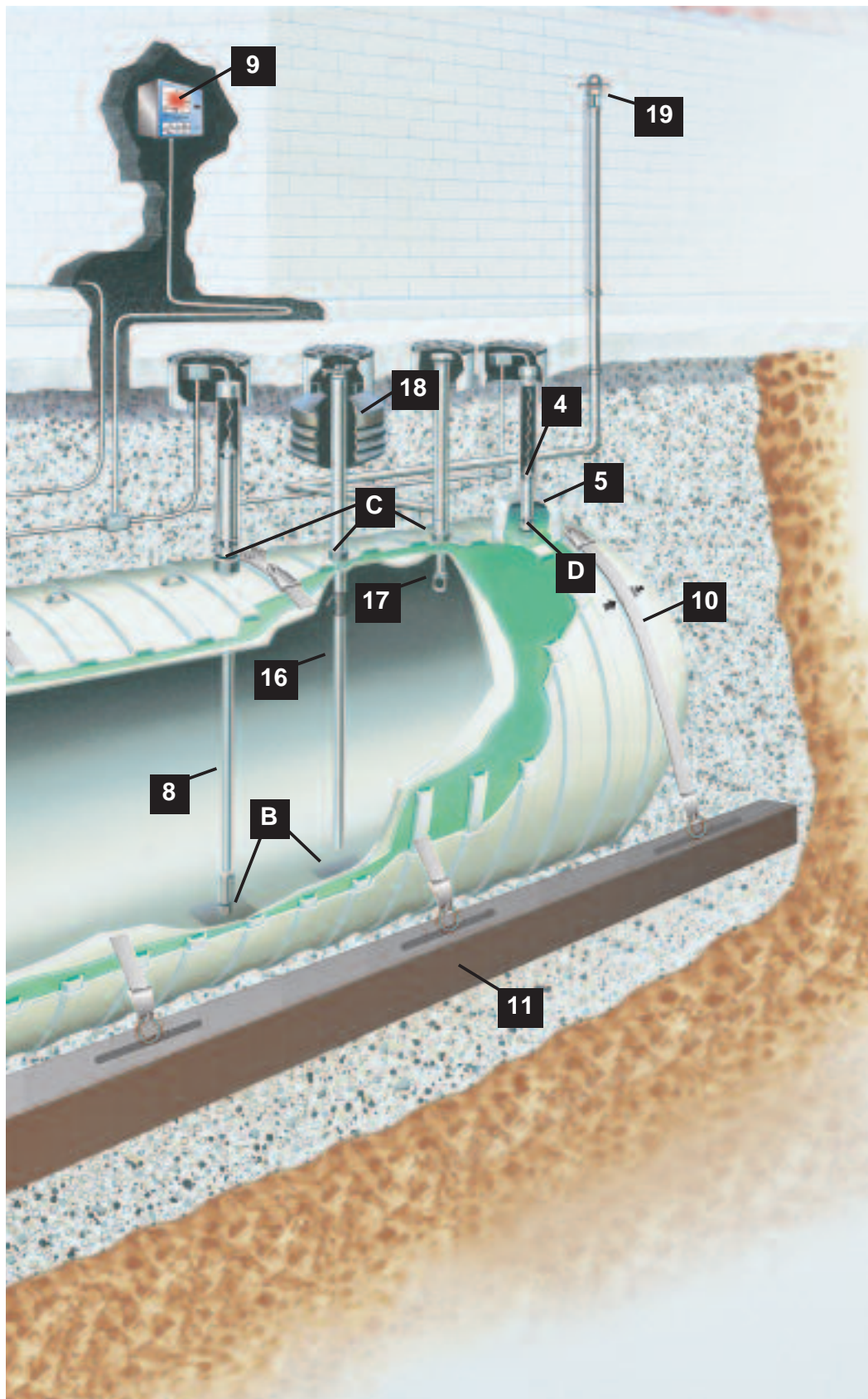
### ***Secondary Containment Provides 360° of Protection***

You can count on total protection from our double-wall tank.

Our tanks are available with dry or wet monitoring of the annular space and will detect leaks in inner and outer walls under all conditions.



## Typical Gasoline System Overview (Model DWT-6)



### **Standard Features:**

- A. Flow Channels
- B. Tank Bottom Deflector Plates
- C. Primary Tank Fittings
- D. Monitoring Fitting

### **Recommended Accessories from Containment Solutions:**

1. FRP Tank Sump
2. Fitting Kits for Tank Sump
3. FRP Secondary Containment Collar
4. Reservoir Sensor
5. Fiberglass Reservoir (replaces monitoring fitting)
6. Containment Collar Sensor
7. Monitoring Fluid with Color Tracer
8. Electronic Inventory Gauge
9. Electronic Control Panel
10. Split Strap Anchor System
11. Deadman Anchor Systems

### **Optional Accessories from Your Local Petroleum Distributor:**

12. Dispenser
13. Dispenser Sump
14. Double-Wall Pipe
15. Submersible Pump
16. Fill Tube with Overfill Shut-Off Device
17. Ball Float Valve
18. Overfill Spill Container
19. Primary Tank Vent

## ***Our Double-Wall Tanks deliver state-of-the-art protection.***

CSI's advanced double-wall technology gives owners, municipalities, counties and states proven protection against petroleum contamination of underground water supplies. In addition to our UL listing, our tanks comply with the American Petroleum Institute's recommendation for secondary containment systems wherever underground tanks are located within 300 feet of underground water supplies.

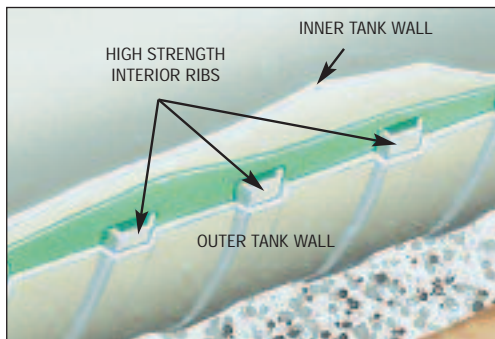
As liabilities associated with leaking fuels soar, UL-listed fiberglass Type II Double-Wall Tanks for underground storage applications provide you with your best long-term protection.

## ***Don't settle for less than the ultimate in risk management.***

Type II Double-Wall Tanks give you two levels of protection, so you have twice the assurance and twice the risk management that any single-wall tank can offer. The primary tank is designed to contain your fuel. In the unlikely event that there is a breach in this wall, the secondary wall is designed to contain your product and prevent a spill into the environment.

## ***System testing assures you of product tightness.***

Continued assurance of the integrity of our double-wall tanks can be determined by testing at the jobsite – prior to and after installation – to prove the durability and product tightness of both the primary and secondary tanks. With some competitive tanks, the secondary walls or jackets cannot be tested after the tanks have been installed.



## ***Continuous monitoring and precision tank-testing capabilities are built in.***

Because it is comforting to be able to test the ongoing integrity of any storage tank, CSI built into each of our double-wall tanks both continuous monitoring and precision tank-testing capabilities.

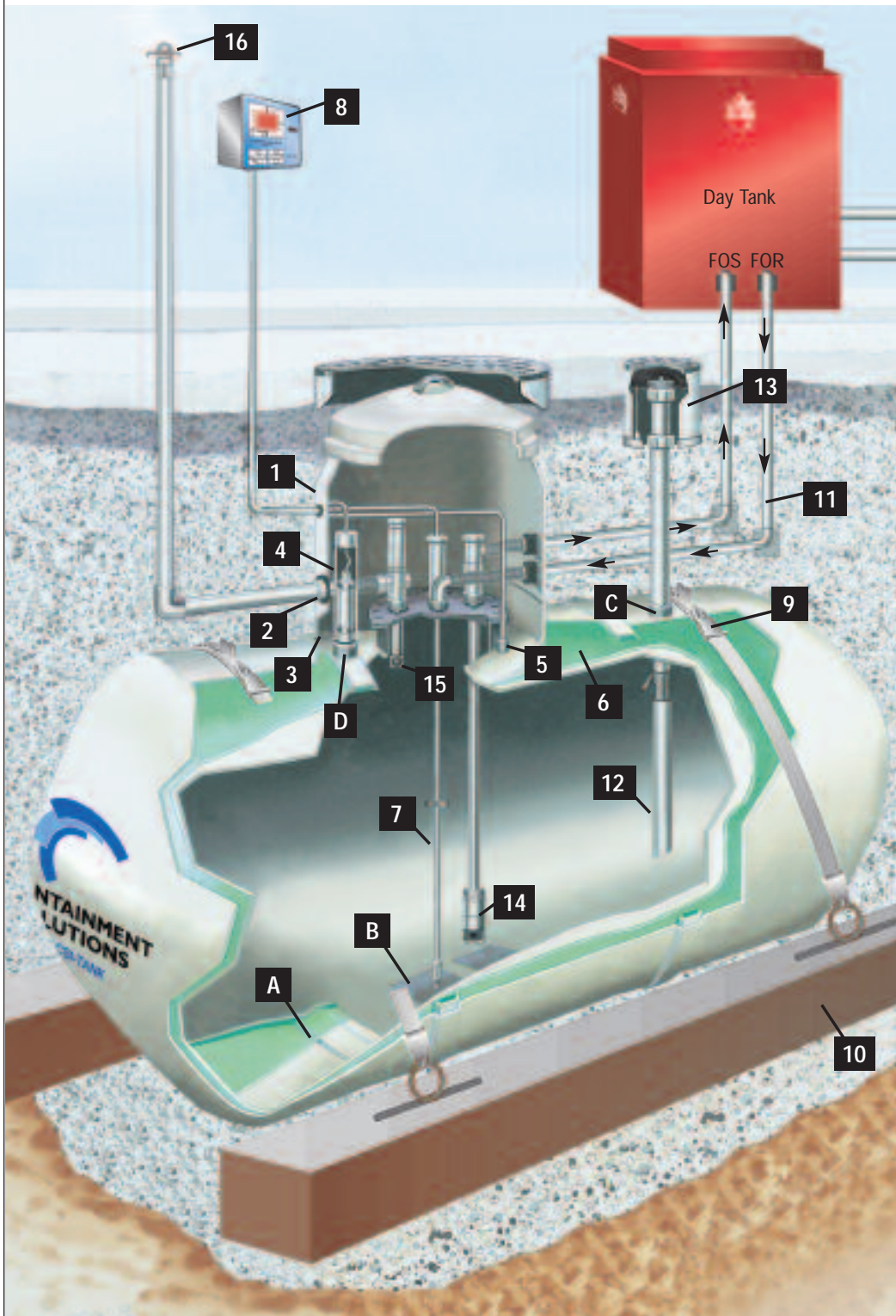
Our Type II Double-Wall Tanks provide a defined annular space to accommodate virtually any type of monitoring method you choose — wet or dry. Our tanks can be supplied with a factory installed Hydrostatic Monitoring System with a brine monitoring fluid. The brine is a dark green color preinstalled in the interstitial space at the factory and is used to perform visual leak testing during shipment and at the jobsite.

***Two walls mean twice the protection against costly leaks.***

***We recommend the Hydrostatic Monitoring System because it offers a leak detection capability that is superior to other methods. It constantly monitors 100% of both the inner and outer walls under all installed conditions. Most steel tanks do not offer this feature. The Hydrostatic Monitoring System can also double as a precision tank test, which has been independently tested and validated to meet EPA precision tank-testing requirements, able to detect leaks as small as 0.1 gallons per hour. The precision tank-testing procedure is easy to perform and consists of a few simple steps.***



## Typical Fuel-Oil System Overview (Model DWT-6)



### **Standard Features:**

- A. Flow Channels
- B. Tank Bottom Deflector Plates
- C. Primary Tank Fittings
- D. Monitoring Fitting

### **Recommended Accessories from Containment Solutions:**

- 1. FRP Tank Sump
- 2. Fitting Kits for Tank Sump
- 3. FRP Secondary Containment Collar
- 4. Reservoir Sensor
- 5. Containment Collar Sensor
- 6. Monitoring Fluid with Color Tracer
- 7. Electronic Inventory Gauge
- 8. Electronic Control Panel
- 9. Split Strap Anchor System
- 10. Deadman Anchor Systems

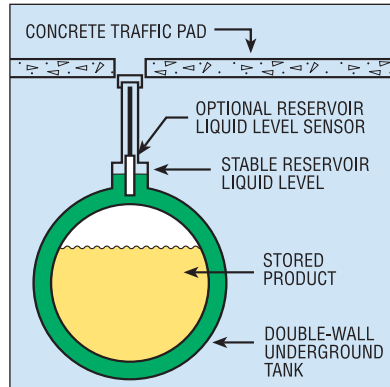
### **Optional Accessories from Your Local Petroleum Distributor:**

- 11. Double-Wall Pipe
- 12. Fill Tube with Overfill Shut-Off Device
- 13. Overfill Spill Container
- 14. Foot Valve
- 15. Ball Float Valve
- 16. Primary Tank Vent

# Monitoring

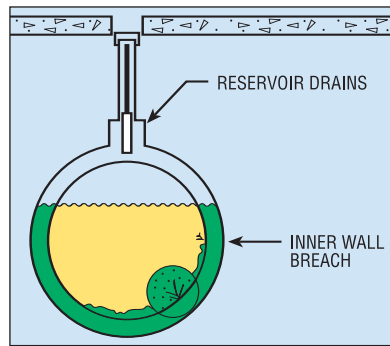
## Normal Conditions

The reservoir liquid level will be stable if both the inner and outer tanks are tight. The reservoir sensor will activate an alarm if the reservoir drains or overfills.



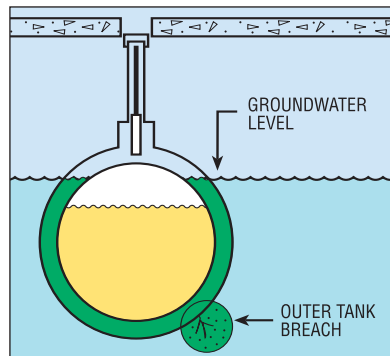
## Inner-Wall Breach

Monitor fluid drains into the primary tank causing the reservoir liquid level to drop and activate an alarm. No petroleum products escape from the primary tank to contaminate the annular space.



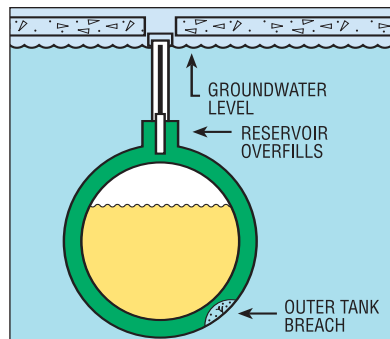
## Outer-Wall Breach Groundwater Below Tank Top

If the groundwater is below the tank top, the monitor fluid drains into the ground, causing the reservoir liquid level to drop and activate the alarm.



## Outer-Wall Breach Groundwater Over Tank Top

If the groundwater is over the tank top, the reservoir will fill up with groundwater and activate the high level alarm on the reservoir sensor.



## Hydrostatic monitoring system helps guard against leaks and liabilities.

Containment Solutions recommends the Hydrostatic Monitoring System for double-wall tanks because of its superior leak detection capability. By filling the cavity between the inner and outer tank walls with a non-hazardous liquid, hydrostatic pressure is continuously applied to both the primary and secondary tank. This system is capable of detecting tank leaks in either the primary or secondary tank walls for all installed conditions.

The Hydrostatic Monitoring System provides continuous leak detection while avoiding false alarms caused by changes in product temperature, product level, tank deflection under loads, or groundwater conditions.

## Precision Tank Test Capability

The Hydrostatic Monitoring System, with a stand pipe, can also serve the dual function of a precision tank test. The system has been independently tested and statistically validated to meet the EPA and National Fire Protection Association's criteria as a precision tank test. Using a stand pipe, the system has been shown to be capable of detecting leaks as small as 0.10 gallons per hour with a 99.9% probability of detection and less than a 1.2% probability of a false alarm.

## Accessories

### Antifreeze Mixtures

In areas where ambient temperatures or delivered products may be subjected to freezing conditions, an antifreeze solution must be used with our Hydrostatic Tank Monitor to avoid potential tank damage.

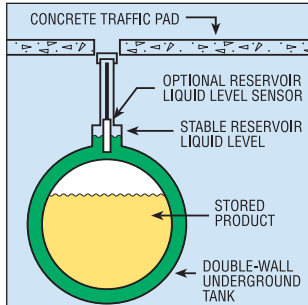
### Brine Antifreeze Solution

Our pre-mixed and blended calcium chloride solution provides freeze protection to -40°F. This non-toxic brine antifreeze can be factory-installed into tanks measuring up to 10' diameter and 30,000-gallon capacity. Its color tracer helps detect hidden damage from shipping or jobsite handling.

## Monitoring System Configurations

Our fiberglass double-wall tanks are designed to accommodate wet (hydrostatic) or dry leak-monitoring systems.

### Wet Annular Space

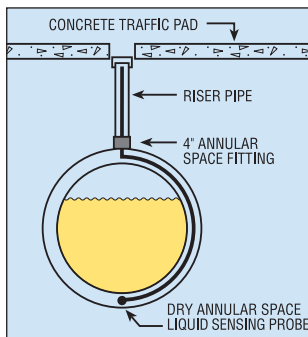


### Hydrostatic Monitoring System

1. Use antifreeze (brine) solution in cold climates.
2. Maximum burial depth from tank top is seven feet below grade.
3. Monitoring cavity must be vented to the atmosphere. The optional reservoir sensor includes vent holes to vent the monitoring cavity.
4. After installation, set the liquid level in the reservoir per CSI installation instructions.

### Dry Annular Space

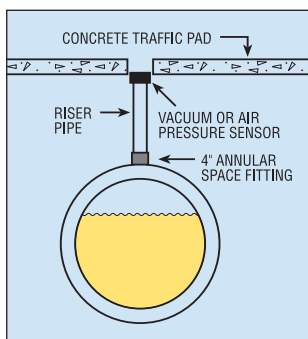
Containment Solutions provides a factory-installed "drawstring" at the annular space monitoring fitting, to assist in positioning liquid sensors at the bottom of the annular space. If your tank is ordered with a dry annular space, but fitted with the optional fiberglass reservoir (instead of a monitoring fitting), the drawstring will be positioned within the reservoir.



### Monitoring System with Liquid Sensor

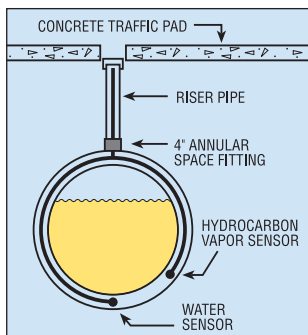
Typical configuration for an electronic sensor or manual dipstick.

1. Use the standard monitoring fitting.
2. Monitoring cavity may be vented or sealed.



### Monitoring System with Vacuum and Air Pressure

1. Use the standard monitoring fitting.
2. Maximum continuous positive air pressure is 3 psi.
3. Maximum continuous vacuum is 3" mercury (1.5 psi maximum).



### Monitoring System with Gasoline Vapor Sensor

Many vapor sensors also include a water sensor.

1. Use the standard monitoring fitting.
2. Monitoring cavity may be vented or sealed.

*The Hydrostatic Monitoring System is the best at leak detection because it is continuously monitoring the complete inner and outer tank.*

## Alternative Monitoring Systems: A Performance Comparison

	Containment Solutions Hydrostatic Tank Monitor	Liquid Sensors In Dry Annular Space	Vacuum Or Air Pressure Monitors	Gasoline Vapor Sensors
<b><i>Leak Detection Performance</i></b>				
Meets EPA criteria as a precision tank test	Yes	No	No	No
Monitors inner wall totally	Yes	No <sup>(1)(6)</sup>	Large Leaks Only <sup>(4)</sup>	Yes
Monitors outer wall totally	Yes	No <sup>(2)(3)(6)</sup>	Large Leaks Only <sup>(4)(3)</sup>	No <sup>(5)(3)(7)</sup>
Prevents product from escaping into the annular space with an inner wall leak	Yes	No <sup>(3)</sup>	No <sup>(3)</sup>	No <sup>(3)</sup>
<b><i>Proven In Use</i></b>				
Leak detection performance independently tested and statistically validated	Yes	Unknown	Unknown	Unknown
Optional electronic equipment tested and labeled by Underwriters Laboratories	Yes	Unknown	Unknown	Unknown
Long-term proven performance of tank monitor	Yes	Unknown	Unknown	Unknown
<b><i>Design Awards</i></b>				
Winner of National Safety Council Award for achievements in product safety	Yes	No	No	No

**Footnotes:**

- (1) Only monitors the portion of the inner wall which is in contact with liquid product.
- (2) Only monitors the portion of the outer wall which is submerged in groundwater.
- (3) With an inner wall leak, product can leak to the outer wall. Then, if the outer tank has an unknown leak, product will spill.
- (4) The vacuum or pressure pump can mask small leaks in the inner and/or outer tank wall. This pump is normally required to compensate for pressure and vacuum losses caused by line losses or changes in product temperatures.
- (5) Does not monitor any portion of the outer wall.
- (6) If the outer wall has a larger leak than the inner wall, product may spill without accumulating in the annular space.
- (7) If the annular space is contaminated with product, residual fumes are difficult to remove.

## Electronics

Containment Solutions' monitoring and inventory control components can be configured to satisfy a wide range of customer requirements.

Optional Containment Solutions' components – control and switch panels, sensors, probes and gauges – are available for all double-wall, single-wall, compartment and oil/water separator tanks as well as for single or multiple tank installations.

## Standard Tank Notes

1. The primary tank's standard pipe fittings are 4" NPT half couplings. All tanks include one manway with three or more primary tank fittings in the cover. All other primary tank fittings are mounted on the tank. Additional manways and tank fittings are available on a made-to-order basis.
2. Tank bottom deflector plates are standard under every manway and primary tank fitting.
3. An optional fiberglass reservoir for leak monitoring can be integrally bonded to the top of all 6' diameter and larger double-wall tanks. It includes a 4" NPT half-coupling fitting mounted on top of the reservoir, which allows access to the cavity between the inner and outer tank walls. On 6' diameter and larger tanks with an optional fiberglass reservoir, the reservoir is positioned over the normal monitor fitting position and the tank will not include a separate monitoring fitting. The rib under the reservoir is hollow if the annular space is not factory filled with monitoring liquid.
4. For all double-wall tanks without a reservoir, a 4" NPT annular space fitting is included on the top of the tank for monitoring. It permits access to a hollow rib which accommodates the installation of liquid sensors.
5. Fiberglass reservoirs are not included on 4' diameter tanks. A contractor-supplied 4" diameter riser pipe must be inserted into the 4" diameter annular space fitting to serve as the tank's reservoir. This riser pipe must be at least 2" longer than the electronic sensor.
6. All primary tanks must be vented. They are intended to be operated with fluid levels no higher than the tank top. Fiberglass tanks are designed to be operated at atmospheric pressure only – except when using vapor-recovery systems – provided the pressure or vacuum does not exceed 1 psi on the primary tank. Over-pressurizing the primary tank will result in tank failure. When venting the monitoring cavity between the inner and outer tank, it must be vented independently from the primary tank (annular space venting is required for all hydrostatically monitored tanks).

See pages 14-22 for standard tank data and configuration.

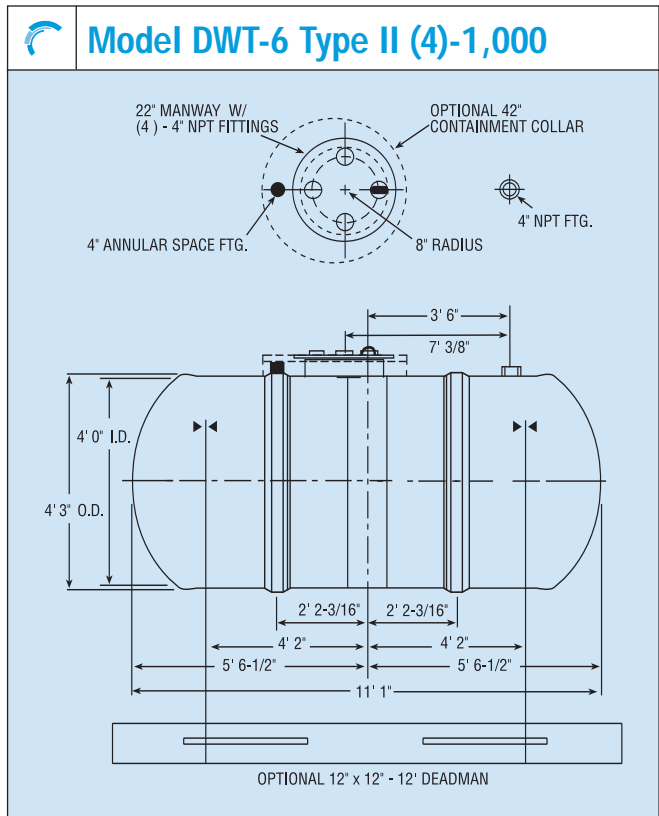
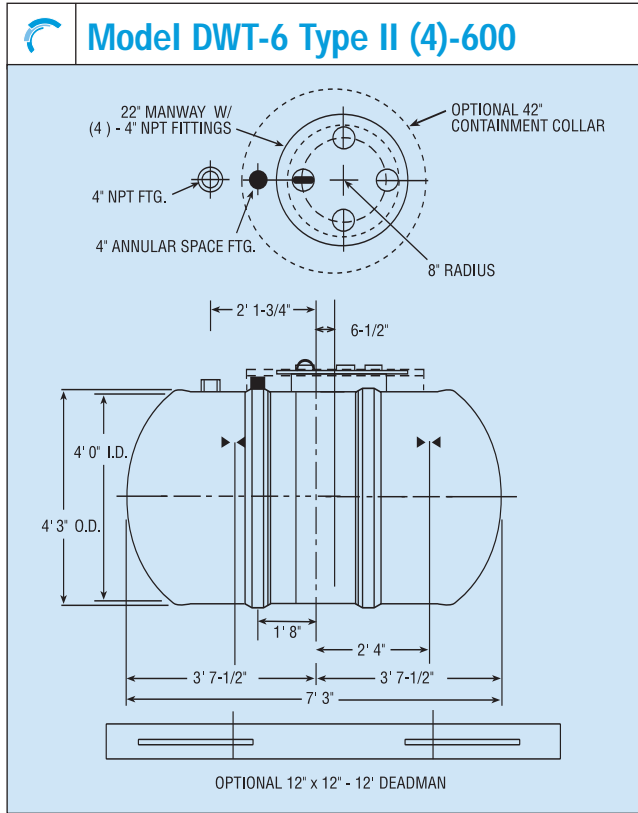
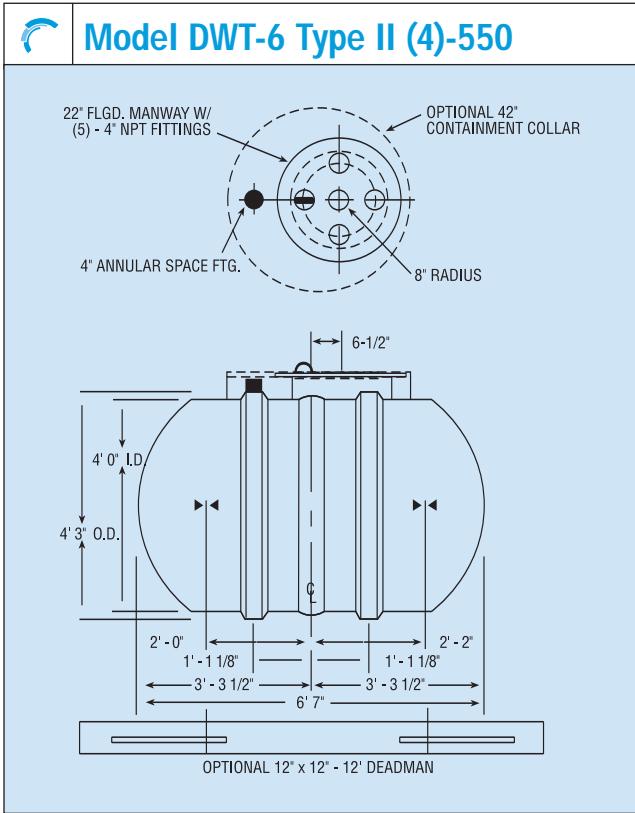


# Tank Model: DWT-6 Type II

## Standard Tanks

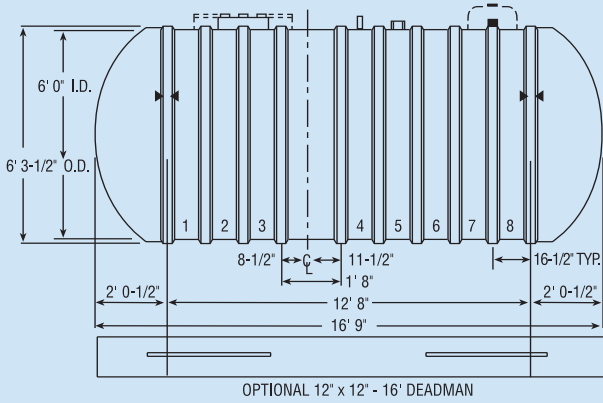
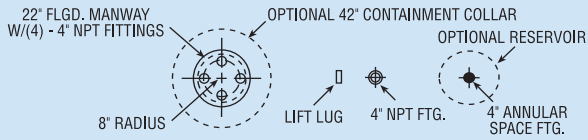
Tank Diameter	Nominal Capacity	Actual Capacity	Overall Length	Nominal Weight	Nominal Wt. w/Brine	No. of 4" NPT Manway Fittings	No. of 4" NPT Tank Fittings	No. of Lift Lugs	No. of Hold Down Straps Required
4'	550	543	6' 7"	690	895	5	N/A	1	2
4'	600	606	7' 3"	750	975	4	1	1	2
4'	1,000	966	11' 1"	950	1,235	4	1	1	2
6'	2,500	2,689	13' 9"	2,150	2,650	5	1	2	2
6'	3,000	3,323	16' 9"	2,450	3,000	4	1	1	2
6'	4,000	3,958	19' 9"	2,900	3,550	3	3	1	2
6'	5,000	5,068	24' 9"	3,450	4,350	3	3	1	4
6'	6,000	6,179	30' 3"	4,050	5,100	3	3	1	4
8'	5,000	4,947	16' 9"	2,950	3,600	5	1	1	2
8'	6,000	5,897	19' 6"	3,300	4,050	4	2	1	2
8'	8,000	7,796	25' 0"	4,050	5,000	3	3	1	4
8'	10,000	9,696	30' 6"	4,800	5,950	3	3	1	4
8'	12,000	11,595	36' 0"	5,550	7,050	3	3	2	4
8'	15,000	14,545	44' 6-1/2"	7,500	9,350	3	3	2	6
10'	10,000	10,257	20' 11-1/2"	5,850	7,500	5	1	2	3
10'	12,000	11,873	23' 8-1/2"	6,550	8,600	4	2	2	4
10'	15,000	15,104	29' 2-1/2"	7,700	10,500	3	3	4	4
10'	20,000	19,951	37' 5-1/2"	9,750	13,550	3	3	4	6
10'	25,000	24,970	46' 0"	12,250	17,100	3	3	4	8
10'	30,000	29,816	54' 3"	14,500	20,400	3	3	6	8
10'	35,000	34,835	62' 9-1/2"	17,000	24,350	3	3	6	8
10'	40,000	39,854	71' 4"	19,300	27,750	3	3	8	10

# 4' Diameter

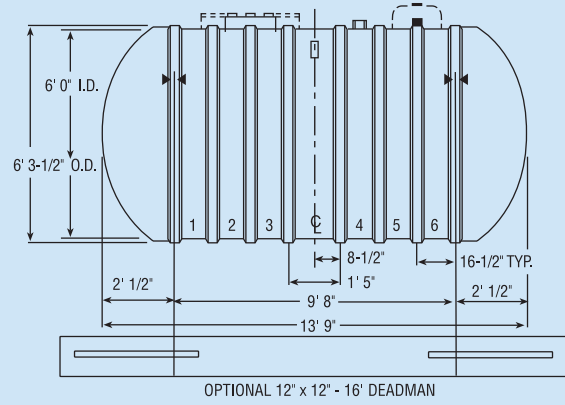
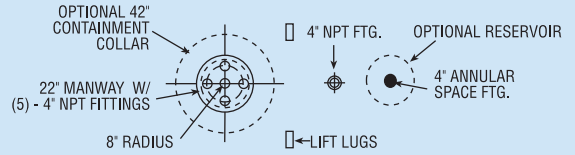


6' Diameter

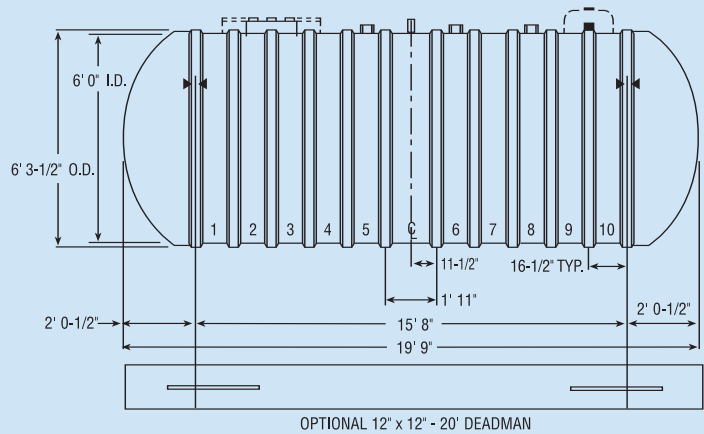
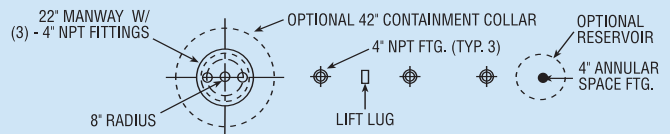
**Model DWT-6 Type II (6)-3,000 Gallon**



**Model DWT-6 Type II (6)-2,500 Gallon**

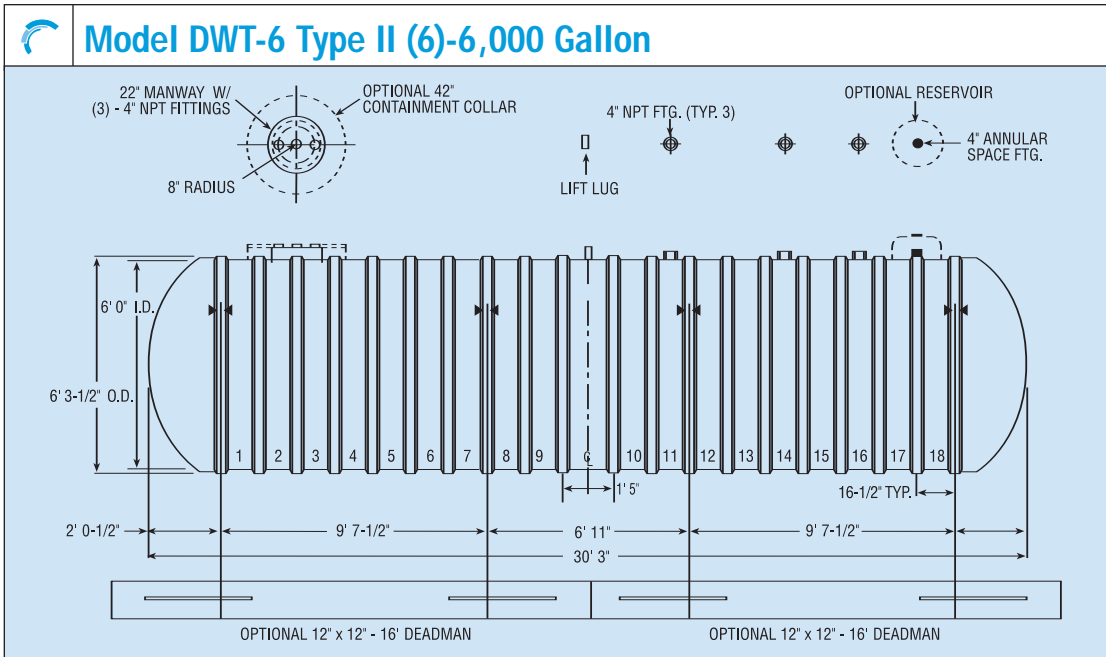
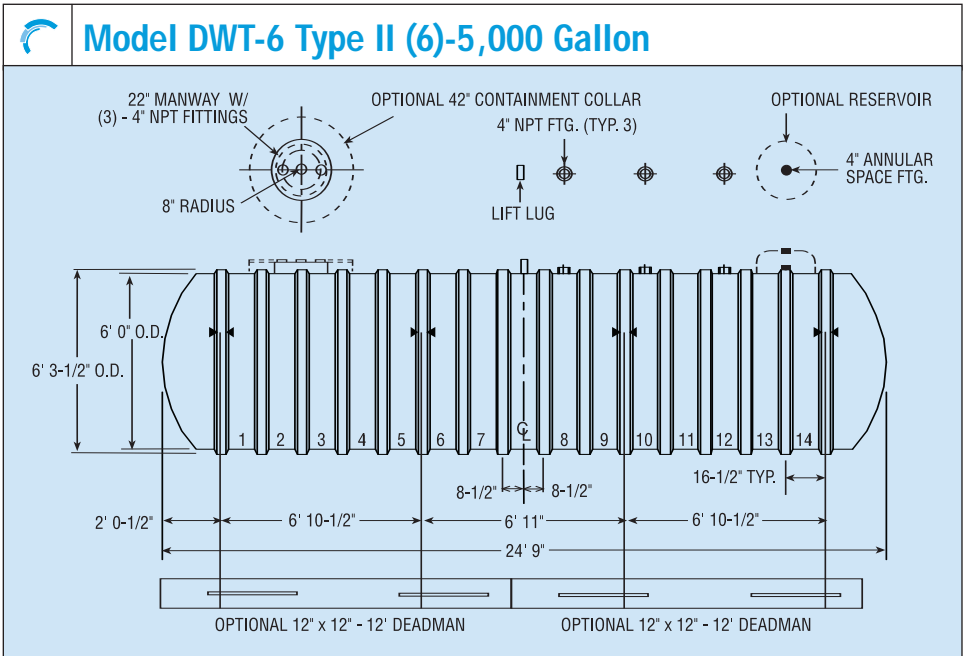


**Model DWT-6 Type II (6)-4,000 Gallon**





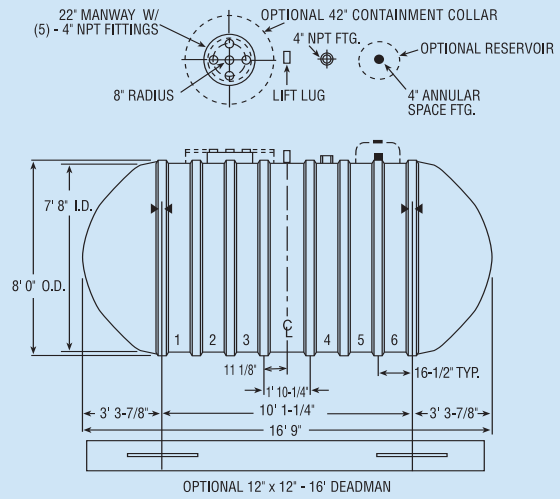
6' Diameter



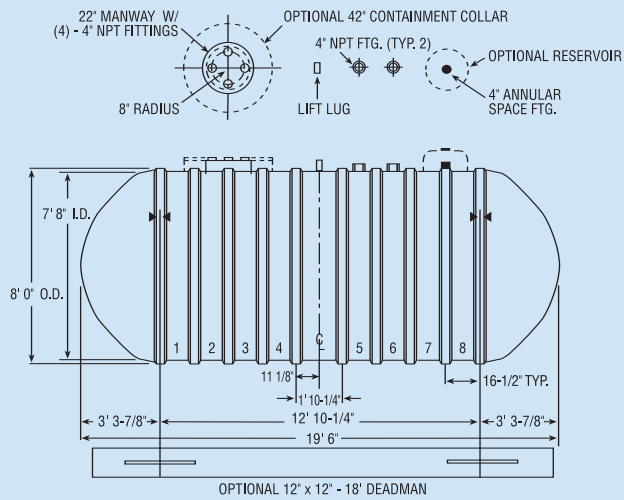
8' Diameter



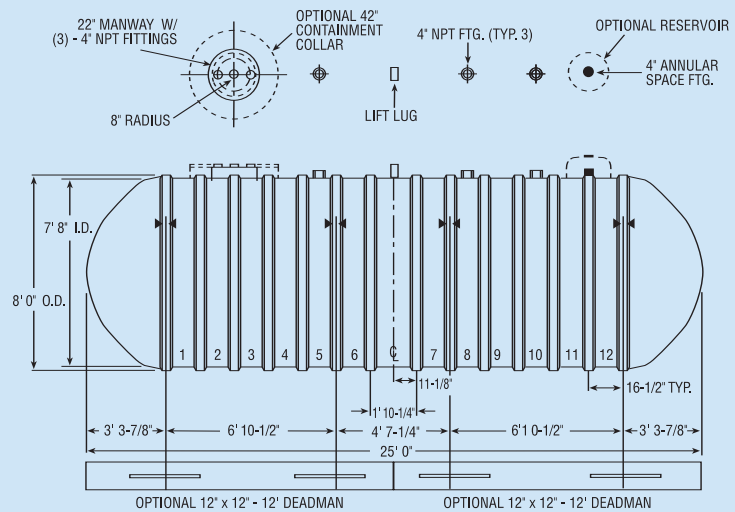
### Model DWT-6 Type II (8)-5,000 Gallon



### Model DWT-6 Type II (8)-6,000 Gallon



### Model DWT-6 Type II (8)-8,000 Gallon



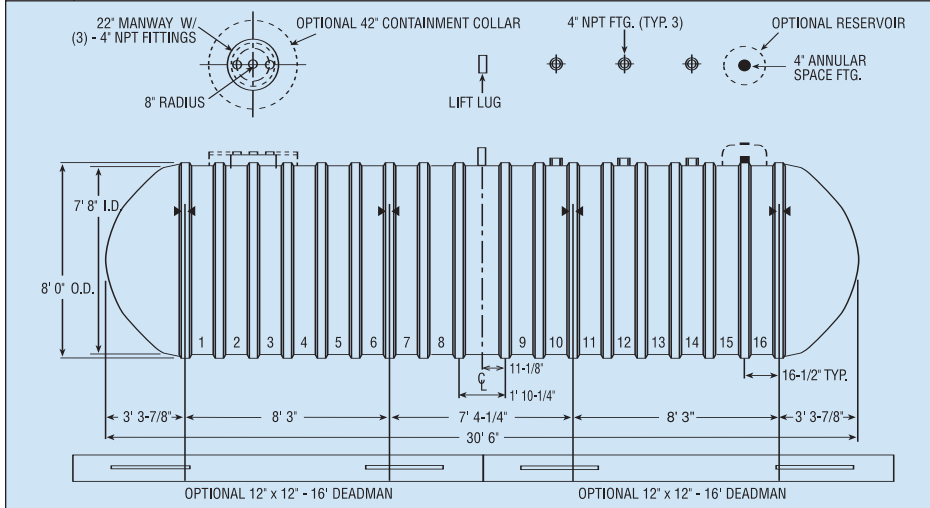
8' Diameter

Double-Wall Fiberglass  
Belowground Storage Tanks

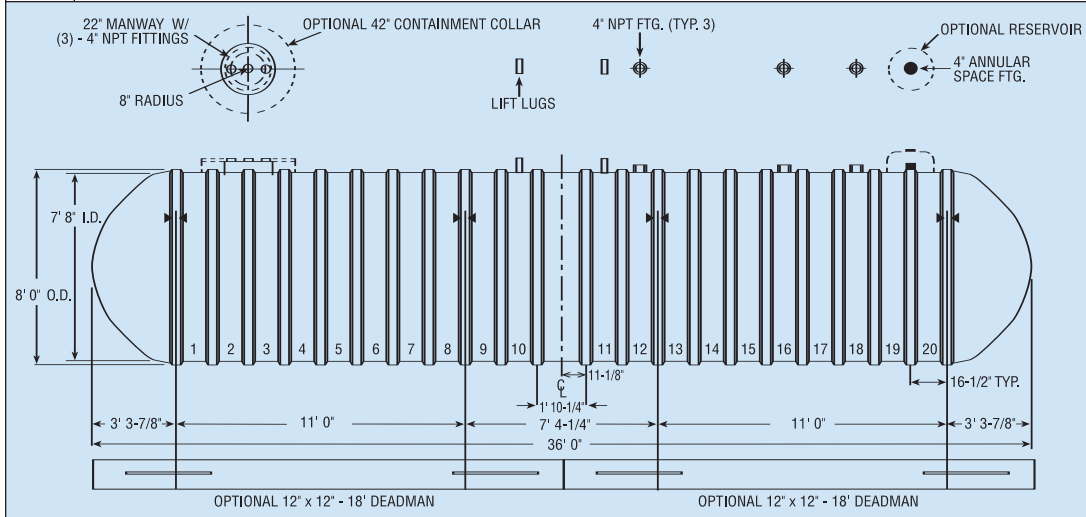
Containment Solutions, Inc.



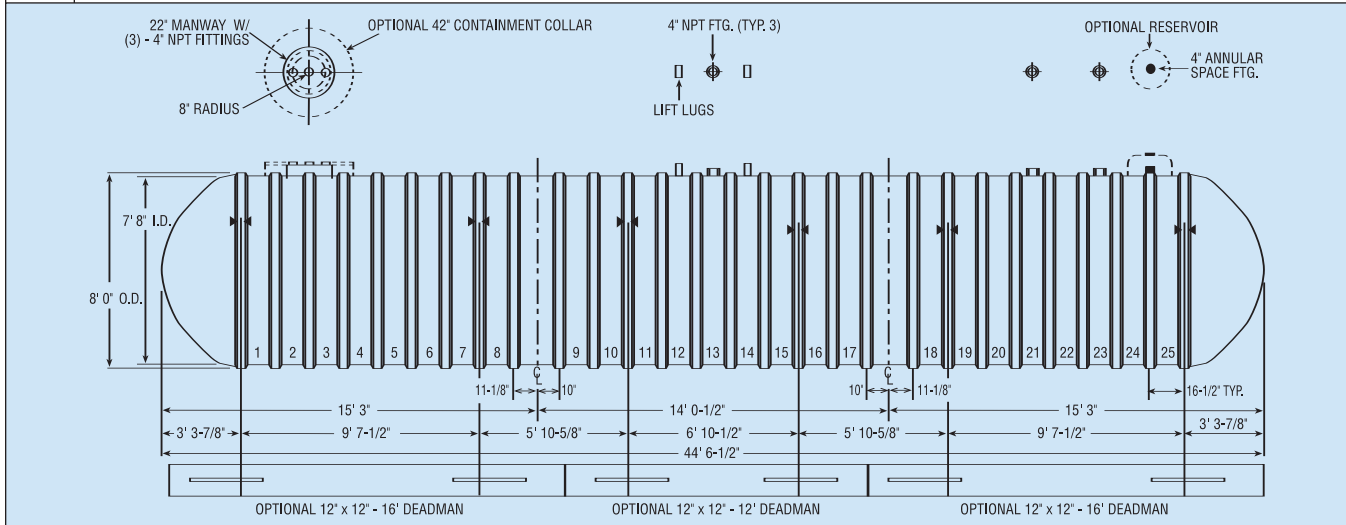
### Model DWT-6 Type II (8)-10,000 Gallon



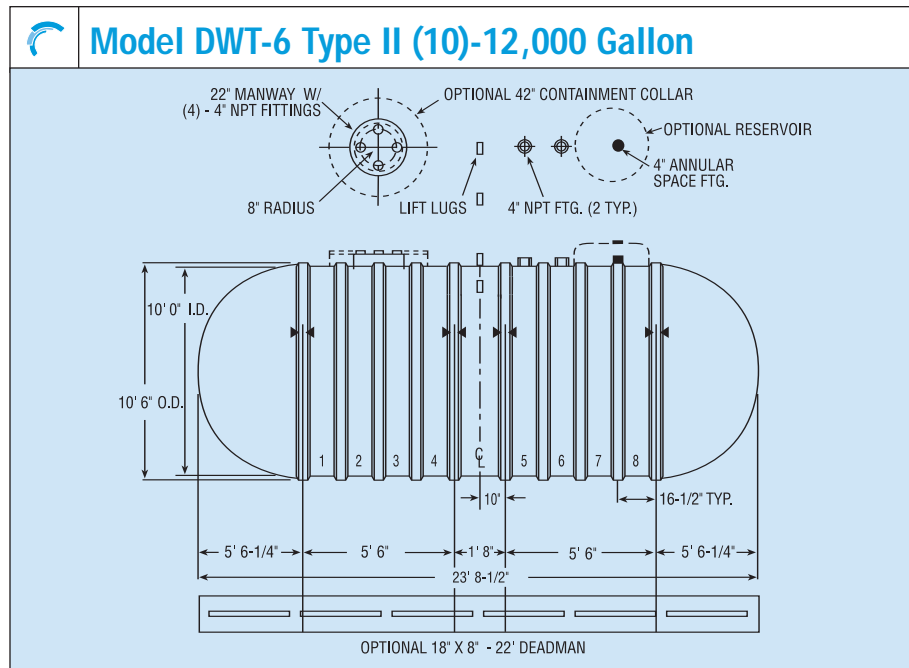
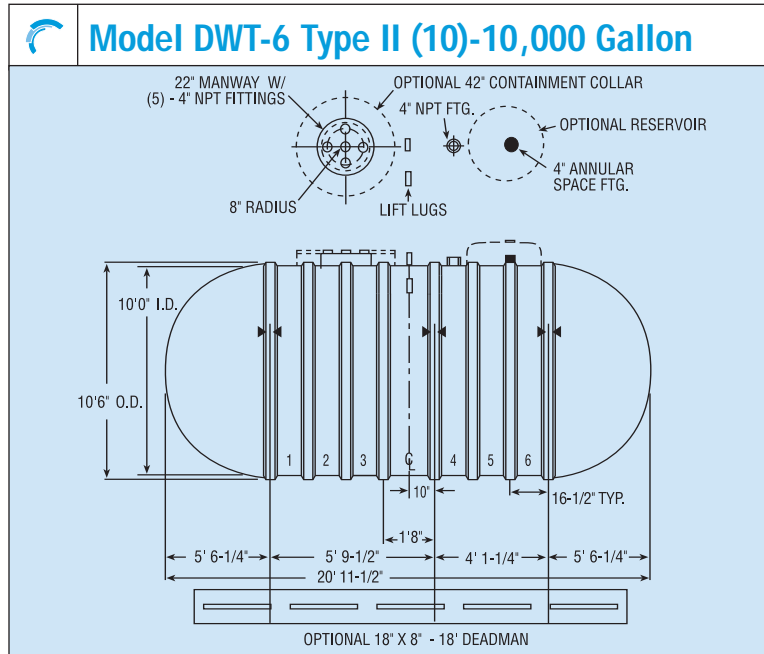
### Model DWT-6 Type II (8)-12,000 Gallon



### Model DWT-6 Type II (8)-15,000 Gallon



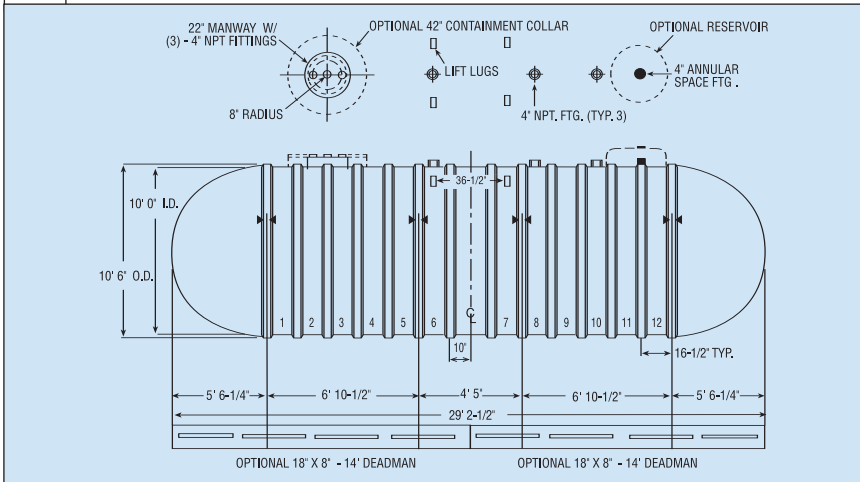
10' Diameter



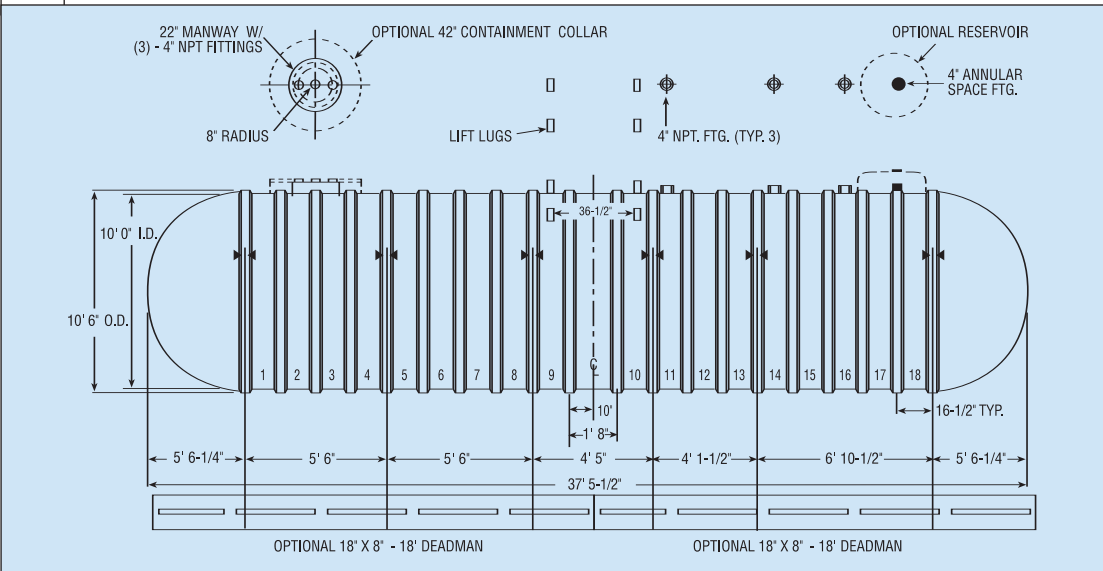
10' Diameter



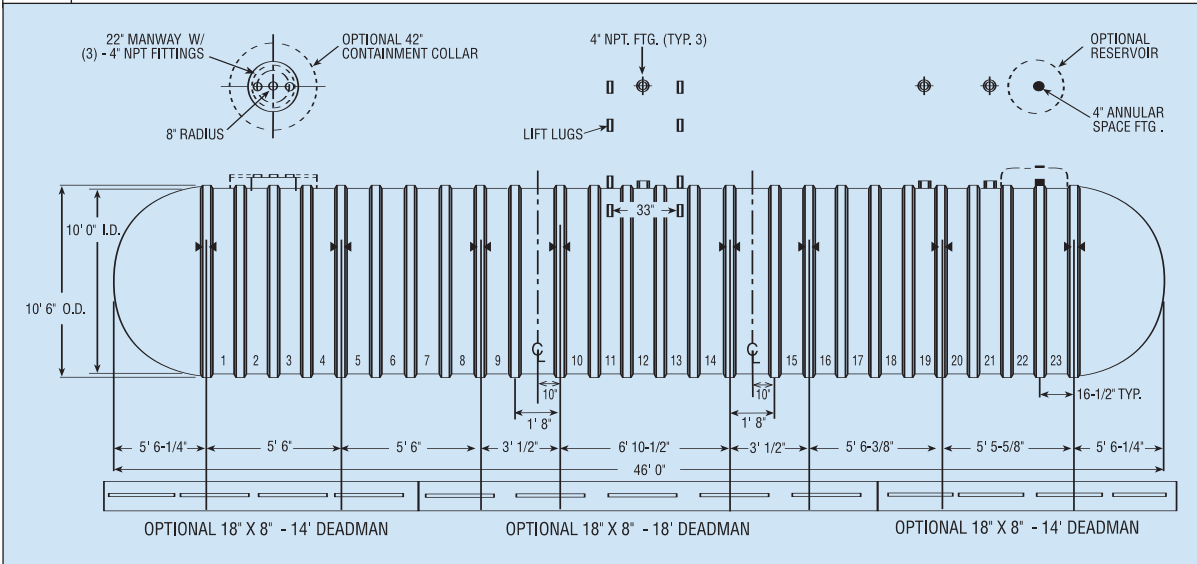
### Model DWT-6 Type II (10)-15,000 Gallon



### Model DWT-6 Type II (10)-20,000 Gallon

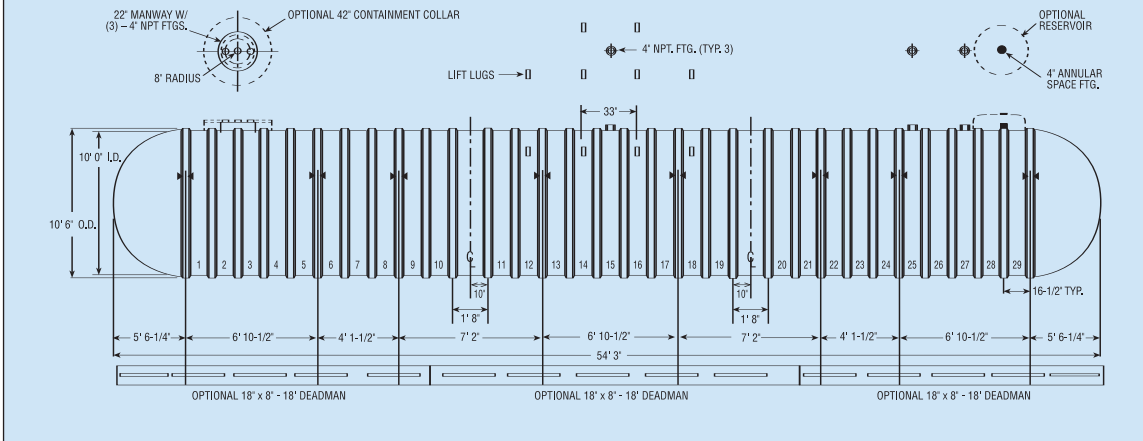


### Model DWT-6 Type II (10)-25,000 Gallon

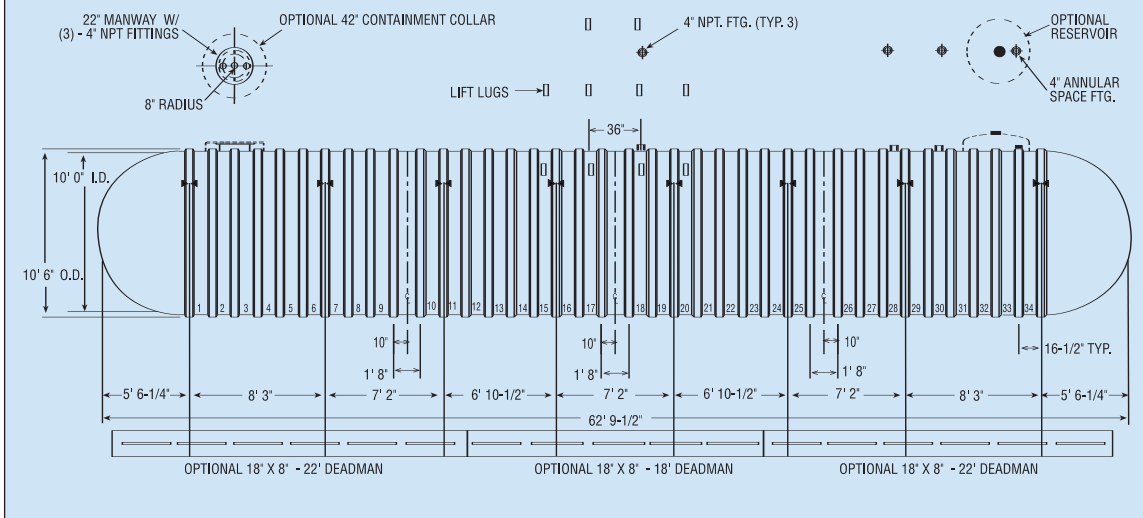


# 10' Diameter

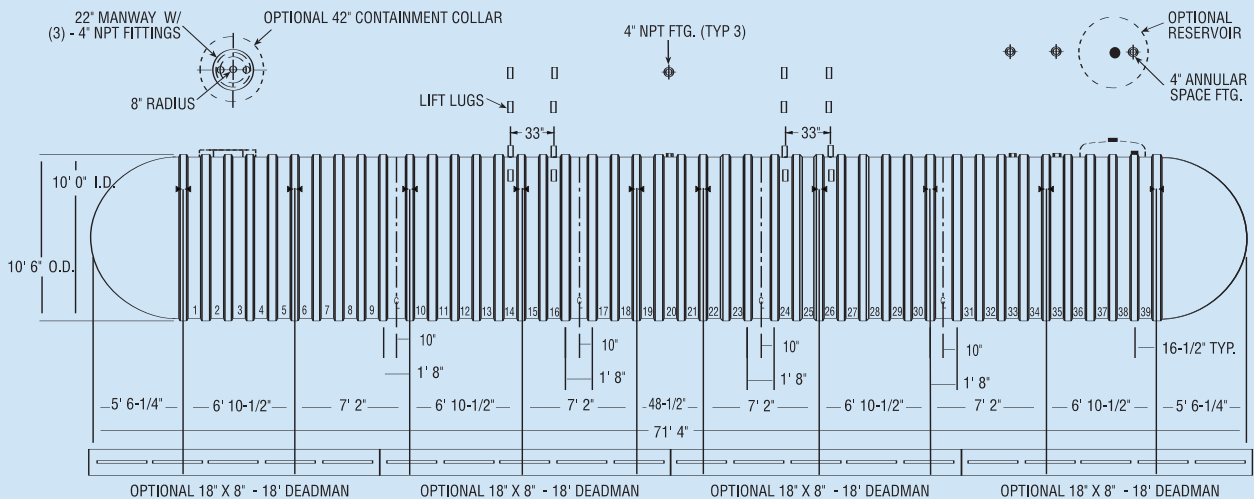
## Model DWT-6 Type II (10)-30,000 Gallon



## Model DWT-6 Type II (10)-35,000 Gallon



## Model DWT-6 Type II (10)-40,000 Gallon



## Compartment Tanks and Made-to-Order Double-Wall Tanks

CSI offers a full line of double-wall Compartment Tanks. These tanks are available in single-wall and double-wall bulkhead configurations.

Although our standard double-wall compartment tanks are designed to accommodate most storage applications, they can be modified to include additional manways, tank-mounted fittings or other double-wall tank accessories.

The standard tanks are shown with tank-mounted fittings in the standard positions. Monitoring fittings, reservoirs, lift lug locations and anchoring strap locations can sometimes be relocated, but require special approval prior to any relocation.

***In addition to the standard tank notes, the following notes apply:***

1. The location of additional and/or modified tank accessories should be referenced by the numbered fitting position between the ribs.
2. The primary tank's standard pipe fittings are 4" NPT half couplings. All tanks require at least one manway. The manway cover should include at least one fitting to facilitate future volumetric tank testing.
3. Specifying additional or larger manways than available on standard tanks may alter the anchoring strap locations. These can often be relocated, but require special approval prior to any relocation. Larger manways also require larger containment collars.
4. Tank bottom deflector plates are standard under every manway and primary tank fitting.
5. Monitoring fittings, reservoirs and lift lug locations can sometimes be relocated, but require special approval prior to any relocation.



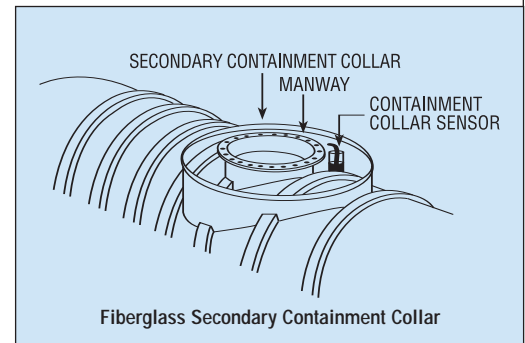
# Containment Collars

## Optional tank accessories for secondary containment systems.

### **Fiberglass Secondary Containment Collar**

An optional secondary containment collar provides a containment area for spilled liquids, as well as a location for the leak-monitoring sensor. Collars can be installed around other tank fittings and accessories, where space permits. Collars are constructed of fiberglass and are available in 42" diameter (with 22" manways) and 48" diameter (with 22" and 30" manways) sizes.

The secondary containment collar is integrally attached to the tank top to provide a watertight seal. The collar is factory installed and tested prior to shipment. Another collar leak test should be performed at the jobsite by the installing contractor. See CSI installation instructions for details. The secondary containment collar must periodically be tested for leaks – at least once each year or after collar maintenance is performed – by adding water to the collar above the tank top. The secondary containment collar must be continuously monitored with an electronic sensor for potential spills or piping leaks.



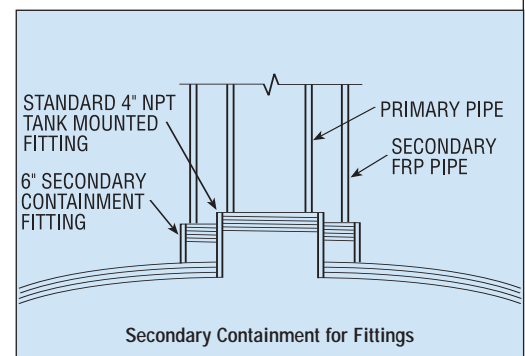
### **Double-Wall Fiberglass Secondary Containment Collars**

For environmentally sensitive areas CSI can provide 42" and 48" double-wall containment collars. Combined with CSI double-wall FRP tank sumps you can continuously monitor the entire containment area for leaks from tank top to grade.

CSI recommends the hydrostatic monitoring system for double-wall tank sumps because of its superior leak detection capability. Alternate monitoring methods utilizing continuous vacuum/pressure are also available.

### **Secondary Containment Fitting**

A 6" FRP threaded secondary coupling is concentrically positioned around the 4" NPT primary tank fitting. The secondary containment coupling is surface-mounted onto the tank and does not penetrate the outer wall. There is no access to the tank annular space at the 6" secondary containment coupling. To directly monitor the cavity between the primary and secondary pipe, a fitting with an access port should be installed.





## Fiberglass Tank Sumps provide access to critical equipment and serve as a termination point for piping.

Our tank sumps are fiberglass – a proven material for long-term performance. Compared to other unreinforced plastics and HDPE products, the rigid fiberglass construction minimizes deformation during backfilling to help assure liquid-tight seals at fitting penetrations.

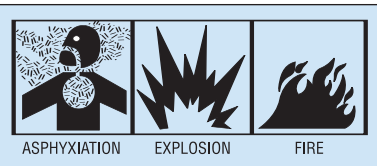
Tank sumps must be mounted on top of a secondary containment collar. Primary piping is installed from the submersible pump to the dispenser. When the double-wall piping is installed over the primary piping, the double-wall pipe connects to the tank sump using optional fittings, available from CSI or your petroleum equipment distributor. In the event of an accidental spill from the primary piping, the spilled product will drain into the tank sump and accumulate in the secondary containment collar. The secondary containment collar serves as a basin to allow early detection of leaks of the submersible pump or the product piping.

When there is concern about the ingress of water at the collar/tank sump seam, the tank sump should be sealed to the secondary containment collar at the jobsite. Containment Solutions provides an alcohol compatible adhesive kit to make this connection. Continuous electronic monitoring of the secondary containment collar should be used to warn the operator of the accumulation of petroleum product before the liquid level rises above the collar/tank sump seam.

Tank Sumps are available in single and double wall models ranging in diameters from 42" to 48". Both round and polygon (flat paneled) shaped tank sumps are available based on customer requirements. To accommodate deeper burial depths, longer tank sumps are available in 1' increments. The tank sump can be trimmed at the jobsite to adjust for the final burial depth.

**Note:** For high groundwater conditions at or above subgrade a watertight tank sump should be used to prevent water infiltration.

**Warning:** When a tank will be equipped with more than one tank sump or manway riser, the tank may require special installation (deeper burial, additional anchor straps, etc.). Contact Tank Technical Support for specific installation details. **Warning:** a tank sump constitutes a confined space. Never enter a tank sump without proper training and OSHA-approved equipment.



# Tank Sumps

## Tank Sumps

Tank sumps are available in two basic models with variations to each - Watertight (WTS), and Non-sealed (NTS). For both models, the tank sump body is mounted on the tank collar. If a leakproof joint is required, cement the sump body to the tank collar using the adhesive (Kit AD). (It is recommended that the joint always be cemented.) All tank sumps are supplied with adhesive kits.

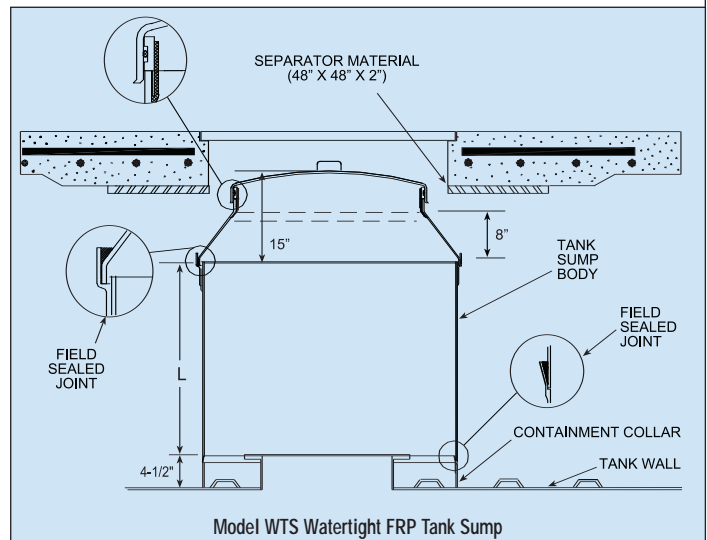
A minimum 36" diameter street box is required with all FRP models to allow the removal of the FRP lid after the tank sump is installed. This also allows the removal of the manway cover.

To leak test the tank sump, use a standing water test or CSI approved vacuum test. **DO NOT use an air pressure test.**

### Watertight FRP Tank Sump (WTS)

#### Suitable for high groundwater

The Watertight FRP Tank Sump includes an FRP sump body (variable length in 12" increments, 42" or 48" ID), an FRP reducer (42" x 30" or 48" x 30" ID's) with o-ring groove and o-ring gasket, and a push-on FRP lid (32.5" OD) with 2 handles. The sump body is field cemented to the tank collar and the reducer is field cemented to the sump body using the supplied adhesive kits (Kit AD, 2 kits required). The reducer/sump body joint is on the exterior of the sump body allowing easy field installation of the adhesive without entering the tank sump.



The lid compresses the lubricated o-ring when it is pushed onto the reducer top, providing a watertight seal with water up to 12" over the lid. The lid can be pushed into position by standing on the lid, which is made with a non-skid exterior surface. The lid includes two handles. One is offset to aid in the removal of the lid and the other is centered on the lid. The 30" opening allows for the removal of a 22" manway lid (28" OD). The sump must be vented at all times (usually accomplished with the double-wall piping).

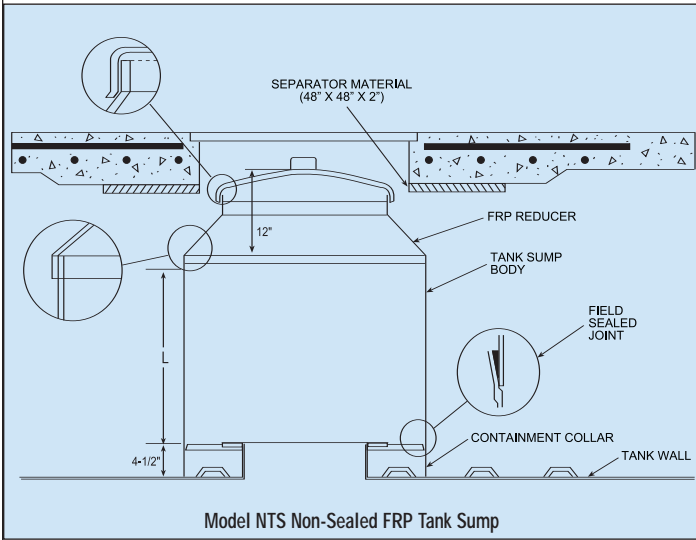
Model	TANK SUMP MODELS				Length (L)
	NTS	WTS	PTS		
			NON-SEALED (NS)	WATERTIGHT (WT)	
42" Diameter Models	NTS42-2	WTS42-2	PTS(NS)42-2	PTS(WT)42-2	2'
	NTS42-3	WTS42-3	PTS(NS)42-3	PTS(WT)42-3	3'
	NTS42-4	WTS42-4	PTS(NS)42-4	PTS(WT)42-4	4'
	NTS42-5	WTS42-5	PTS(NS)42-5	PTS(WT)42-5	5'
	NTS42-6	WTS42-6	PTS(NS)42-6	PTS(WT)42-6	6'
48" Diameter Models	NTS48-2	WTS48-2	PTS(NS)48-2	PTS(WT)48-2	2'
	NTS48-3	WTS48-3	PTS(NS)48-3	PTS(WT)48-3	3'
	NTS48-4	WTS48-4	PTS(NS)48-4	PTS(WT)48-4	4'
	NTS48-5	WTS48-5	PTS(NS)48-5	PTS(WT)48-5	5'
	NTS48-6	WTS48-6	PTS(NS)48-6	PTS(WT)48-6	6'

# Tank Sumps

## Non-Sealed FRP Tank Sump (NTS)

Friction fit lid to repel water from above

The Non-Sealed FRP Tank Sump includes an FRP sump 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 (32.5" OD) with handle. The sump body is field cemented to the tank collar using the supplied adhesive kit (Kit AD). The reducer and the lid fit over the sump body with a loose fit. The 30" opening allows for the removal of a 22" manway lid (28" OD).

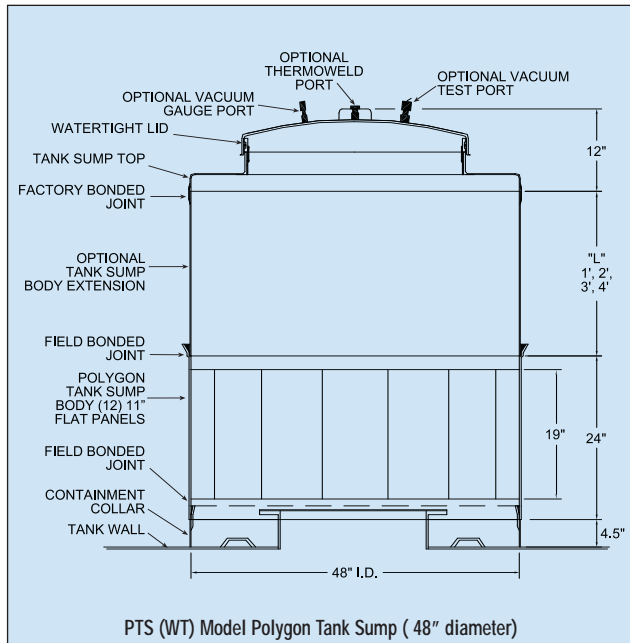
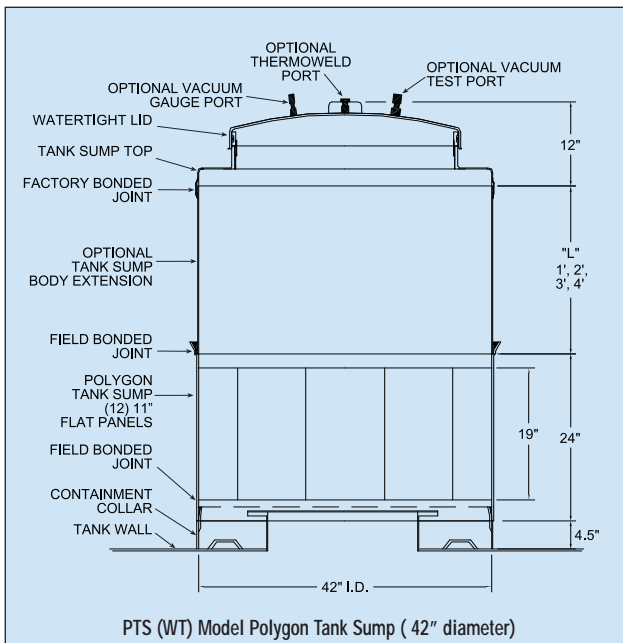


## Polygon FRP (Flat-Paneled) Tank Sumps (PTS)

Available with friction or watertight top and lid

The Polygon FRP Tank Sump (42" or 48") is available in both non-sealed and watertight models. The base unit of the 42" diameter model consists of (12) flat panel sections to facilitate leak-free pipe penetrations; the 48" diameter model consists of (16) flat panel sections.

For shallow burials the standard FRP flat-top reducer may be installed directly on top of the polygon base unit. For deeper burials round pipe extensions can be added in 12" increments, the bottom of the pipe extension can be trimmed in the field for final adjustments. In both cases the top and lid can be provided as non-sealed or watertight (see WTS and NTS sections above).



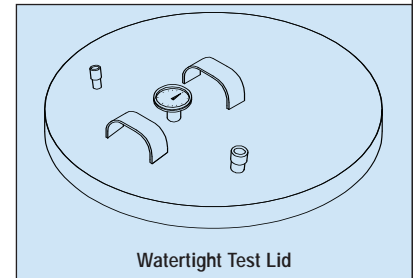
# Tank Sumps and Accessories

## Vacuum Testable Lid Assembly

UST regulations in some areas require tank sumps (TS's) to be periodically tested for tightness. These regulations often require the TS including lid, joints, and piping penetrations be tested after installation and over the lifetime of the system.

In response to these regulations CSI can provide a watertight and testable lid designed to fit on CSI model WTS and PTS tank sumps.

The watertight lid contains quick connect fittings for the vacuum gun and gauge as well as a connection point for a thermometer to track temperature change during the test. The WTL Test Kit, available from CSI, is required to perform your tank sump integrity test.



## Field-Installed Piping and Electrical Fittings

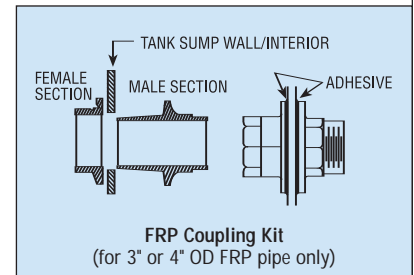
Secondary pipe fittings can be field installed using one of our optional two-piece FRP couplings.

When used for piping connections, the FRP coupling is designed to provide secondary containment connections only to the tank sump. Do not use the FRP coupling for primary piping connections to the tank sump.

### ***FRP Coupling Kit (3" or 4")***

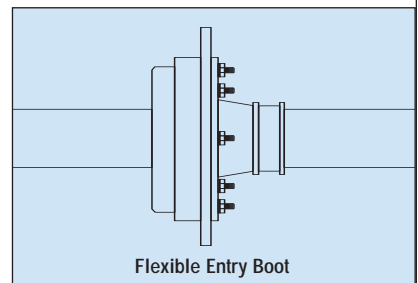
A two-piece field-installed 3" or 4" FRP coupling can be cemented in the tank sump to provide a watertight seal for piping penetrations in high groundwater environments.

The FRP coupling is a two-piece fitting which is cemented to the tank sump. The FRP coupling's male and female sections are threaded together to hold the fitting in place while the adhesive cures. Each kit (Kit FC-3 or FC-4) includes the adhesive and mixing instructions.

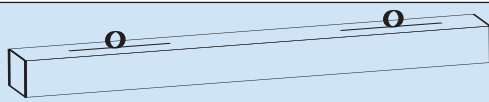


### ***Flexible Entry Boot (FEB)***

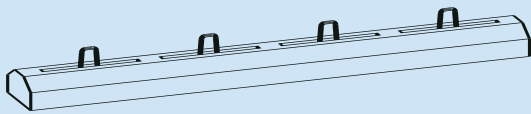
Flexible entry boots are rubber compression type boots installed into the wall of the tank sump to seal all pipe and conduit entries. These boots are designed to permit up to a 300° angle of flexibility for entries. This flexibility is important for aligning pipe connections or as a stress relief for the pipe during backfilling and ground movement. The flexible entry boot is available for standard 3" and 4" secondary piping and 3/4" conduit lines.



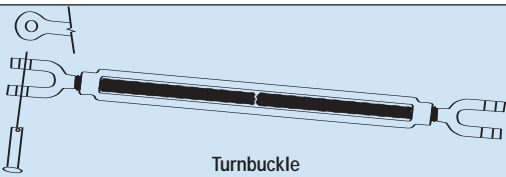
# Anchoring Systems



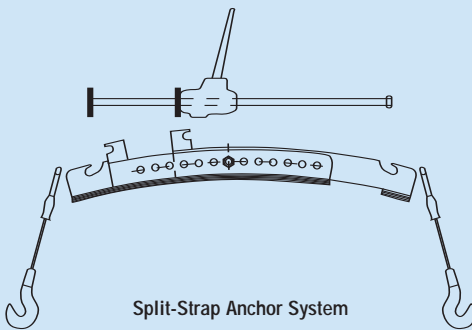
12" x 12" Deadmen for 4', 6' and 8' Diameter Tanks



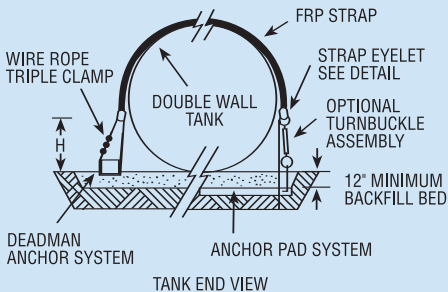
18" x 12" Deadmen for 10' Diameter Tanks



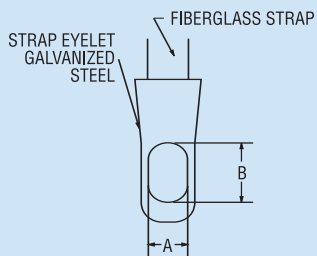
Turnbuckle



Split-Strap Anchor System



One Piece Flat-Strap Anchor System



One Piece Flat-Strap Eyelet Detail

## Pre-Fabricated Deadmen Anchors

Containment Solutions can provide pre-fabricated deadmen anchors and turnbuckles for most double-wall model tanks. Properly designed and cured deadmen anchors provide a means to prevent installed fiberglass tanks from floating out of the ground when the tank is subject to groundwater. When used with CSI fiberglass anchor straps and CSI supplied hardware, and installed according to CSI installation instructions, tank flotation can be prevented.

In most cases CSI deadmen and turnbuckles can be shipped with 4', 6' 8', and 10' tanks (up to 20,000 gallons) at no additional freight charge.

Deadmen are available in various lengths and are designed with adjustable anchoring hardware. Ask for "Deadmen Anchors and Turnbuckles" publication to select the proper deadmen for a particular tank size.

## Split-Strap Anchor System (Man out-of-hole Installation)

Containment Solutions can provide a split-strap anchor system for 6', 8' and 10' diameter double-wall tanks. The split-strap anchor system provides a method to attach and tighten the tank anchor straps to deadmen or to an anchor pad without entry into the excavation. The split-strap anchor system is safer and less costly than traditional methods that require shoring or other hole stabilization techniques to allow entry into the excavation.

## Fiberglass Anchoring Straps

When mechanical anchoring is specified, fiberglass anchoring straps are available for all double-wall tanks. Refer to page 14 for the quantity of straps required for each tank size.

Anchor Strap Dimensions			
Tank Size	H	A	B
4'	21"	9/16"	1 1/8"
6'	30"	1 7/9"	2 7/8"
8'	36"	1 7/9"	2 7/8"
10'	49"	1 7/9"	2 7/8"

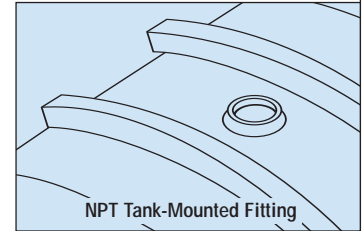
# Accessories

Configure tanks to your needs.

## Fittings/Manways/Ladders

### NPT Tank-Mounted Fittings

The standard tank-mounted fitting is a 4" NPT half coupling. The tank-mounted fittings to the primary tank are placed on the top center line of the tank.



NPT Tank-Mounted Fitting

### Plate Gusseted Nozzles

Fiberglass plate gusseted nozzles are available in 2", 3", 4", 6", 8", 10", 12", 14", 16" and 18" diameters and are installed on the top center line of the tank.

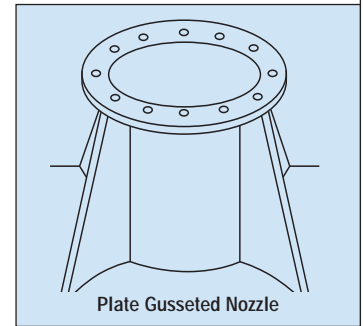
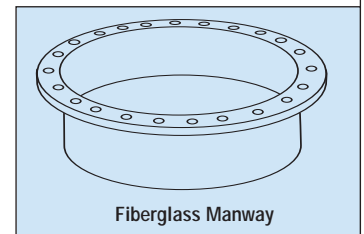


Plate Gusseted Nozzle

### Fiberglass Manways

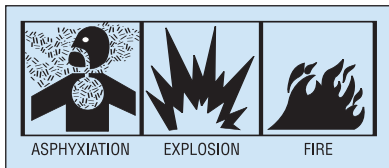
Standard fiberglass manways are 22" diameter. Optional 30" and 36" manways are available.

The standard 22" manway has a maximum load-bearing capacity of 2,400 lbs. Each comes with a painted carbon steel cover, a gasket, 24 zinc-coated 1/2" x 1-1/2" bolts and nuts. Fittings in manway lids are 4" steel NPT half couplings.



Fiberglass Manway

All fiberglass double-wall tanks include one manway. Some of the primary tank fittings are clustered in the manway cover to facilitate secondary containment of the pump and piping.



ASPHYXIATION

EXPLOSION

FIRE

**WARNING:** An underground tank constitutes a confined space. Never enter a tank without proper training and OSHA-approved equipment.

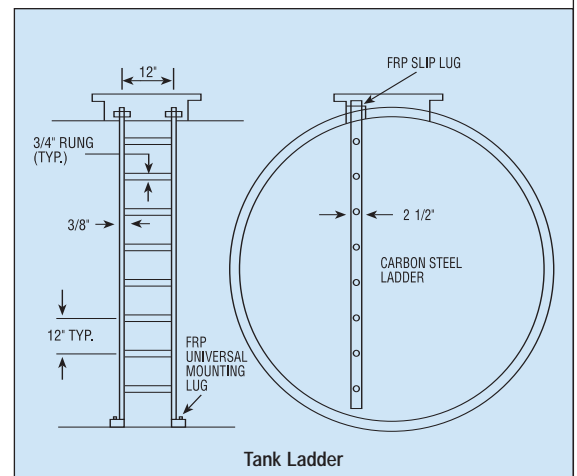
**NOTE:** The use of manways is not intended to encourage tank entry, which can pose a safety hazard for unqualified mechanics, especially after product has been stored in the tank.

### Tank Ladders

Our optional tank ladders are available in either carbon steel, aluminum or stainless steel. These ladders are shipped along with the tank and are field attached to the tank bottom with FRP mounting lugs. Ladders are retained at the top with FRP slip lugs on the trunk of the manway to allow for vertical movement of the ladder. (Manway and ladder are sold separately.)

Tank ladders are not recommended on 4' diameter tank capacities. Because of limited space, the ladders interfere with tank entry.

Tank ladders cannot extend into 22" or 30" manway extensions. In order to have sufficient clearance from tank top to grade a 42" or 48" tank sump is recommended.



Tank Ladder

## Optional Manway Covers/Extensions and Risers

### Note:

- All fittings are standard 4" NPT steel. Typical fitting configurations are available from our Inside Sales Group.
- All manway covers should include at least one fitting to facilitate future volumetric precision tank testing.

### Bolt Hole Configurations

Manway Size	22"	30"	36"
Bolt Size	1/2" x 1-1/2"L	5/8" x 2-1/2"L	5/8" x 3-1/2"L
No. of Bolts	24	30	32
BCD	25-5/16"	35-1/8"	42-3/4"
Cover Diameter	28"	38"	46"

## Made-to-Order Covers

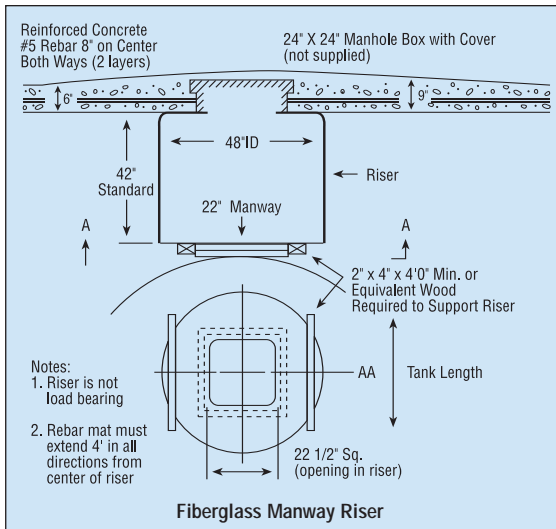
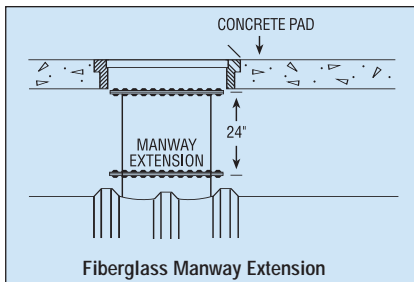
Made-to-order covers with various fitting placements are available. Please provide us with a detailed drawing of the fitting configuration you require.

### Stock Manway Covers — Fitting Configurations

Manway Size	Fitting Pattern	Radius No. of Fittings (4" NPT)	From Center	Spacing	Model	TYPICAL FITTING CONFIGURATIONS
						TYPICAL FITTING CONFIGURATIONS
22"	A	1	Center	—	M221-0	
	B	2	8"	—	M222-A	
	C	3	8"	—	M223-8A	
	D	3	8"	90°	M223-8T	
	E	3	8"	120°	M223-8	
	F	4	8"	90°	M224-8	
	G	5	8"	90°	M225-8	
30"	A	1	Center	—	M301-0	
	B	2	12"	—	M302-12A	
	C	3	12"	—	M303-12A	
	D	3	12"	90°	M303-12T	
	E	3	12"	120°	M303-12	
	F	4	12"	90°	M304-12	
	G	5	12"	90°	M305-12	
36"	A	1	Center	—	M361-0	
	B	2	15"	—	M362-15A	
	C	3	15"	—	M363-15A	
	D	3	15"	90°	M363-15T	
	E	3	15"	120°	M363-15	
	F	4	15"	90°	M364-15	
	G	5	15"	90°	M365-15	

## Fiberglass Manway Extensions

Access to the tank top may be accomplished by using manway extensions. When properly bolted to a tank-mounted manway, the manway extension will provide a watertight access route to the tank top. Fiberglass manway extensions of 22", 30" and 36" diameters are available in 1' lengths. Each manway extension includes a gasket and set of nuts, bolts and washers. Multiple extensions may be bolted together for deeper burials.



## Fiberglass Manway Riser

The optional fiberglass manway riser provides access from a manhole box and cover (traffic areas require reinforced concrete road surface) down to the tank manway.

The manway riser is available in 30" thru 54" lengths in 6" increments. It consists of a 48" diameter tube, open at one end, partially closed on the other end, with a 22-1/2" centered square hole with rounded corners.

If buoyant conditions can exist and the tank has more than one manway riser, contact Tank Technical Service for proper tank anchoring recommendations for the installation.

# Specifications

## Fiberglass Tank Intended Use

Fiberglass petroleum storage tanks are designed for the storage of gasoline, alcohol blended gasoline (with up to 100% methanol or ethanol), jet fuel, av-gas, motor oil, kerosene, diesel fuel, oxygenated fuels (up to 20% MTBE), or potable water at ambient underground temperatures. Fuel oil may be stored at temperatures not to exceed 150°F.

**The storage of other liquids may result in tank failure. Before storing liquids other than those listed above, contact Tank Technical Support.**

## Installation Overview

Fiberglass underground tanks must be installed in accordance with the installation instructions (Containment Solutions Pub. No. INST 6001). This document should be part of your tank specifications. Some key installation steps are highlighted below. See the published installation instructions for complete details.

All tanks must be vented and are intended to be operated with fluid in the tank no higher than the tank top. Fiberglass tanks are designed for operation at atmospheric pressure only, except when using vapor recovery systems, provided the pressure or vacuum does not exceed 1 psi maximum on the primary tank. Overpressurizing of the primary tank will result in tank failure.

Failure to install the tank and its accessories in accordance with the Containment Solutions' installation instructions will void the warranty.

Properly installed, fiberglass underground petroleum storage tanks can provide extended service in storing petroleum products without corrosion-caused leaks and without maintenance.

Containment Solutions maintains a list of independent contractors who have received educational materials from Containment Solutions covering the proper installation of underground fiberglass tanks. On request, we can provide names of educated contractors.

## SHORT FORM SPECIFICATION: FIBERGLASS TANKS FOR FUEL STORAGE

*Auto-cad drawings are available through your local sales representative.*

The contractor shall provide UL labeled model fiberglass underground storage tanks in sizes and with fittings as shown on the drawings. The tanks shall be manufactured by Containment Solutions, Inc.

Tanks shall be tested and installed with pea gravel or approved alternate backfill material according to the current installation instructions (Containment Solutions Pub. No. INST 6001) provided with the tank.

## LONG FORM: SECTION 13200 GUIDE SPECIFICATION

### Containment Solutions Fiberglass Reinforced Polyester Belowground Storage Tanks

*Auto-cad drawings are available through your local sales representative.*

## 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 Belowground Petroleum Storage Tanks.
- 2. UL 1316 Underwriters Laboratories, Inc., Glass Fiber Reinforced Plastic Belowground 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:** Contractors 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, heating coils, 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 Belowground Storage Tanks

- A. **Loading Conditions** – Tank shall be designed to meet the following design criteria:

- 1. External hydrostatic pressure: Buried in ground with 7' of overburden 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.

### 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 fuels (up to 20% MTBE), av-gas, jet fuel, motor oil, (new or used), kerosene, diesel fuel or potable water at ambient underground temperatures not to exceed 150°F at the tank interior surface.
- 4. 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 and secondary 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 – 1.5 psi maximum (3" mercury)
  - Positive air pressure (3 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' diameter DWT-6 Type II tanks do not include a fiberglass reservoir. A 4" diameter riser pipe screwed into the 4" diameter annular space fitting will serve as the reservoir.
4. Tank shall be designed with one 4" fitting that will access the tank bottom between the primary and secondary walls (annular space).
5. The double-wall tank monitor shall be capable of 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 UL listed or accepted.
8. If hydrostatically monitored, any solution used in the tank annular space shall have UL 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" ID. The 30" and 36" ID manways are optional.
2. All manways will be furnished complete with U.L. listed gaskets, bolts and covers.
3. Location – see standard tank drawings (pages 15-22).
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 an 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 jobsite installed 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.
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. Tank Sumps and Collars:**

1. **Non-Sealed FRP Tank Sump (Model NTS Series)** –  
 The non-sealed tank sump consists of a fiberglass reinforced plastic (FRP) sump body (variable length in 12" increments, 42" or 48" ID's), an FRP reducer (42"x30" or 48"x30" 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 sump body must be capable of joining to the 42" or 48" diameter secondary containment collar with a leaktight adhesive joint.

# Specifications

Model No.	Length	Model No.	Length
NTS42-2	2'	NTS48-2	2'
NTS42-3	3'	NTS48-3	3'
NTS42-4	4'	NTS48-4	4'
NTS42-5	5'	NTS48-5	5'
NTS42-6	6'	NTS48-6	6'

Refer to Section G.1. for the adhesive kit (to bond the tank sump body to the double-wall fiberglass storage tanks collar and to bond the reducer to the sump body) and Sections G.2, G.3. and G.4. for the field installed fitting kits (for electrical and plumbing connections to the tank sump).

- 2. Watertight Tank Sump Model WTS Series) –** The watertight tank sump consists of a fiberglass reinforced plastic (FRP) sump body (variable length in 12" increments, 42" or 48" ID's), an FRP reducer (42"x30" or 48"x30" ID's) with o-ring groove and o-ring gasket, and a push-on FRP 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 tank sump 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 sump body with an external leaktight adhesive joint to allow for field installation of the adhesive without entering the tank sump.

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
WTS42-2	2'	WTS48-2	2'
WTS42-3	3'	WTS48-3	3'
WTS42-4	4'	WTS48-4	4'
WTS42-5	5'	WTS48-5	5'
WTS42-6	6'	WTS48-6	6'

Refer to Section G.1. for the adhesive kit (to bond the tank sump body to the double-wall fiberglass storage tanks collar and to bond the reducer to the sump body) and Sections G.2, G.3. and G.4. for the field installed fitting kits (for electrical and plumbing connections to the tank sump).

- 3. Polygon FRP Tank Sump (Model PTS Series)**  
 The polygon tank sump (42" or 48" ID's) consists of a 24" high fiberglass reinforced plastic (FRP) sump body with multiple flat panels. The polygon body must be capable of joining to the 42" or 48" diameter secondary containment collar with a leak tight adhesive joint.

An optional FRP round extension section (lengths of 1,2,3,4,5 or 6 ft.) should be used to adjust for deeper burial depths. The FRP extension section must be capable of joining to the polygon body with an external leak tight adhesive joint to allow for field installation of the adhesive without entering the tank sump. For

shallow burials, the FRP flat top reducer may be joined directly to the polygon body using the same external adhesive joint. With the FRP watertight (WT) lid, the assembly must provide a watertight seal with water up to 12" over the lid. An optional (NS) Non-Sealed friction fit lid may be used in areas where the presence of water does not exist and when periodic tightness testing is not required. The FRP 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.

(WT) Model No.	Length	(NS) Model No.	Length
PTS(WT)42-2	2'	PTS(NS)42-2	2'
PTS(WT)42-3	3'	PTS(NS)42-3	3'
PTS(WT)42-4	4'	PTS(NS)42-4	4'
PTS(WT)42-5	5'	PTS(NS)42-5	5'
PTS(WT)42-6	6'	PTS(NS)42-6	6'

(WT) Model No.	Length	(NS) Model No.	Length
PTS(WT)48-2	2'	PTS(NS)48-2	2'
PTS(WT)48-3	3'	PTS(NS)48-3	3'
PTS(WT)48-4	4'	PTS(NS)48-4	4'
PTS(WT)48-5	5'	PTS(NS)48-5	5'
PTS(WT)48-6	6'	PTS(NS)48-6	6'

Refer to Section G.1. for the adhesive kit (to bond the tank sump body to the double-wall fiberglass storage tanks collar and to bond the reducer to the sump body) and Sections G.2, G.3. and G.4. for the field installed fitting kits (for electrical and plumbing connections to the tank sump).

## G. Tank Sump Accessories

- 1. Tank Sump Adhesive Kit – (Kit AD) -** When properly installed and cured, the alcohol compatible 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 tank sump; the watertight and polygon tank sump requires two kits.
- 2. 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.
- 3. 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 tank sump prior to installing the FRP coupling.

# Specifications

**4. 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-1 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 tank sump prior to installing the steel coupling.

## H. Secondary Containment Collars and Accessories

**1. 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.

**2. 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.

## I. Miscellaneous Accessories

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

**2. 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 2:1.

**3. Probe Drawstring** – Nylon line shall be 150 lb. break strength located at the monitoring fitting nearest the end of the tank. When a reservoir is located at this position, the drawstring shall be installed within the reservoir. Drawstring length will allow for a 7' tank burial depth.

## 4. Fittings Threaded – NPT

a. All threaded fittings on UL labeled tanks shall be located in a manway lid or a tank mount within 12" of the tank top center line and be constructed consistent with the requirements of the UL label. Fittings to be supplied with threaded cast iron plugs.

b. 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.

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

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

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

f. **Location** – Refer to drawings for location.

g. **Suction Line** – Shall be installed on the site by the contractor. Diameter of pipe and grade and schedule as called out in other sections.

h. **Return Line** – Shall be installed on the site by the contractor. Diameter of pipe and grade and schedule as called out in other sections.

i. All rigid internal piping shall be terminated at least 4" from the bottom of the tank.

## 3.01, 3.02 Installation And Testing

Tanks shall 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 specification).

## 4.01 Warranties

### A. Double-Wall Petroleum Storage Tank Warranty

Warranty shall be Containment Solutions' current double-wall tank warranty available on the CSI website at: [www.containmentsolutions.com](http://www.containmentsolutions.com).

### B. Accessory Warranty

All accessories are warranted to be free from material defects in workmanship and materials for a period of one (1) year following date of original delivery by Containment Solutions, Inc.

Containment Solutions (CSI) liability under this warranty shall be limited to, at our option (i) repair of the defective unit, (ii) delivery of a replacement unit to the point of original delivery, or (iii) refund of the original purchase price. We shall not be liable for any labor or installation costs, indirect or consequential damages or other damages in connection with such accessories.

The foregoing constitutes our exclusive obligation and we make no express or implied warranties, or any warranty of merchantability or fitness for any particular purpose whatsoever, except as stated above.

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For most up-to-date information, including specifications and product warranties, please see Containment Solutions website.



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