

**XERXES**<sup>®</sup>  
a **ZCL** company

## Fiberglass Underground Storage Tanks for Petroleum Applications



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## Xerxes® Corporation – A trusted brand for more than 30 years



### Xerxes History

Xerxes Corporation is widely viewed today as the leading manufacturer of underground storage tanks in the United States. Established in 1979, Xerxes has forged strong brand loyalty built on a reputation for innovation and the highest quality products and services.

Like most market leaders, we have a long history of design innovation including development of the first UL-listed double-wall fiberglass tank. We followed that with the introduction of a second-generation double-wall design, which for the first time incorporated a factory-installed hydrostatic monitoring system. This method of leak detection has become the most popular form of monitoring fiberglass underground tanks. More recently, we further improved our tank design by incorporating Parabeam®, a unique and proprietary three-dimensional glass fabric. Parabeam bonds the primary and secondary walls of our double-wall tank together for greater structural integrity, while also allowing for a free-flowing, clearly defined interstice between the two walls. Industry-leading innovations such as these, plus many others, are why petroleum equipment distributors, fuel marketers and commercial accounts rely on Xerxes for safe underground storage tank products.

### One Company – Two Trusted Brands

Today, Xerxes is part of the ZCL® Composites group of companies manufacturing underground and aboveground fiberglass tanks for a wide range of applications, primarily petroleum products. ZCL Composites (ZCL) is a publicly traded company on the Toronto Stock Exchange (TSX: ZCL). Established in 1987, ZCL began manufacturing fiberglass tanks in Canada. Like Xerxes in the United States, ZCL's growth and the popularity of fiberglass tanks in Canada has been steady. Combined, the Xerxes brand in the United States and the ZCL brand in Canada make us North America's largest manufacturer of underground storage tanks. We service our underground storage tank customers from six strategically located North American manufacturing plants, four in the United States and two in Canada. Our extensive geographic coverage gives us unmatched ability to cost-effectively deliver tanks anywhere in North America. With more than 200,000 tanks installed, our position as the industry's leading manufacturer of underground storage tanks strengthens each year.

## Benefits of Xerxes fiberglass underground storage tanks



### Why choose a fiberglass tank?

Since their introduction in the 1960s, fiberglass underground tanks have rapidly grown in popularity. It was becoming clear that rusting steel tanks were leaking and creating serious environmental damage. Therefore, the initial focus of fiberglass manufacturers was to design storage vessels that weren't vulnerable to the effects of external corrosion.

Throughout the 1980s, major oil companies and other large fuel marketers quickly began to realize the benefits of fiberglass over steel underground tanks. Today the preference for fiberglass tanks reaches across all segments of the market and includes those who specify, install and own underground storage tanks. Further, the recognized benefits of fiberglass extend well beyond external corrosion protection. Today, with a greater industry-wide understanding of the increased regulatory burden and risks associated with storage tanks, tank buyers are much more educated and sophisticated in their product selection.

### Consider the following features and benefits:

**Corrosion Resistance** – External corrosion protection will always be a concern, but, with the widespread use of ethanol-blended gasoline (E10, E15, E85), biodiesel fuels and ultra-low sulfur diesel (ULSD), the focus has shifted to internal corrosion protection. These new biofuels are creating increasing incidents of aggressive microbial-induced corrosion (MIC) of metal components in fueling systems. Fiberglass tanks are not vulnerable to internal corrosion caused by MIC. Neither do they rust externally due to corrosive soil environments.

**Fuel Compatibility** – In addition to creating corrosive conditions in tanks, new ethanol-blended fuels today also raise questions regarding compatibility of the stored fuel with tank materials. Xerxes double-wall fiberglass tanks are not only warranted for the full range of ethanol-blended gasoline, they are also UL-tested and UL-listed as compatible with 0-100 percent ethanol storage. This is a very clear and distinct difference from steel storage tanks.

**Track Record** – With hundreds of thousands of tanks installed throughout North America during the last three decades, fiberglass tanks have an outstanding record of both protecting the environment and minimizing tank owners' risk. The great majority of new underground tanks installed today for North America's largest fuel retailers and commercial fleet facilities are fiberglass tanks. After exploring their options and evaluating years of product performance, these tank owners overwhelmingly continue to choose fiberglass.

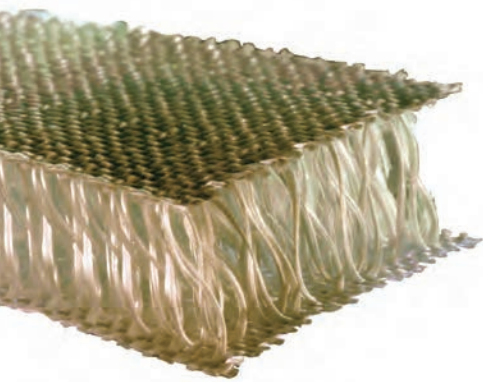
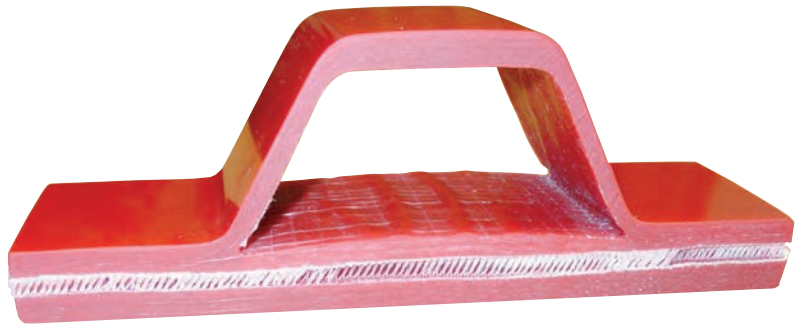
## Why choose a Xerxes tank?

During the last three decades, Xerxes has gained a worldwide reputation as a leader in underground storage tank technology. Since its inception in 1979, Xerxes has steadily grown from a tank manufacturer with a small market share to its role today as the market leader. This recognition can be attributed to the many experienced Xerxes employees who strive to not only meet but to exceed our customers' requirements. Equally significant is the quality of the tanks and related products that we manufacture.

Underground storage tanks are not commodity products. Xerxes storage tanks offer customers a number of unique and significant design and performance differences superior to both competitive fiberglass tanks and steel tanks.

### Consider the following:

**Rib Design** – Circumferential ribs are an important design element of any fiberglass underground vessel. Therefore, the rib geometry and how it's incorporated into the cylinder, or tank itself, is an important consideration for designers and customers as they compare products. In the Xerxes design, with its consistent, high-profile rib structure, ribs are fabricated directly into the tank cylinder – not as a secondary step in the process. This increases the overall strength of the tank and results in a structurally superior product.



**Parabeam® Construction** – As part of our history of continuous improvement, Xerxes introduced Parabeam, a unique and proprietary three-dimensional glass fabric, into its underground tank design. Parabeam enhances overall structural integrity by creating a bond between the primary and secondary cylinder walls, while providing a free-flowing interstitial space for monitoring capabilities. Another important benefit is the elimination of false alarms created by fluctuating reservoir levels that can be a recurring problem in other manufacturers' hydrostatically monitored tanks.

**Maintenance-Free** – Many manufacturers of steel tanks have reduced their warranty duration from 30 years to 10 years, and have incorporated language that requires ongoing maintenance and removal of water bottoms as a condition of warranty coverage. The presence of water in the bottom of fuel tanks is a common condition. Maintenance to frequently remove it can be expensive over both the short-term and long-term life of a tank, and can also leave an owner vulnerable to denied warranty claims should a steel tank corrode internally. Xerxes offers a 30-year limited warranty with no restrictions regarding water-bottom monitoring and removal.

**Company Stability** – Over the last 30 years, tank manufacturers have gone out of business or filed for bankruptcy and no longer provide warranty coverage. Customers who purchase underground tanks do so with the expectation that their tank will provide many years of trouble-free service, and that the manufacturer will be around to support its products and its warranties. Xerxes has a three-decade record of doing just that.

# TRUCHEK® – State-of-the-art continuous monitoring



TRUCHEK® hydrostatic tank monitoring for double-wall tanks is an easy, precise and reliable method for continuous leak detection and for tank-tightness testing. For two decades, TRUCHEK has been successfully monitoring thousands of tanks in many different types of installations.

## Continuous Monitoring

When you order a Xerxes double-wall tank with the TRUCHEK option, the interstice between the two tank walls is filled at the factory with a calcium-chloride fluid that also partially fills a reservoir, creating hydrostatic pressure throughout the interstice. An electronic probe placed in the tank's reservoir alarms when the fluid level either falls below or rises above the acceptable level. This increasingly popular method of leak monitoring gives tank owners greater peace of mind than the alternative method of using a simple liquid sensor, which often never detects an outer-wall breach. TRUCHEK has become the industry standard as a state-of-the-art technique for continuous monitoring.

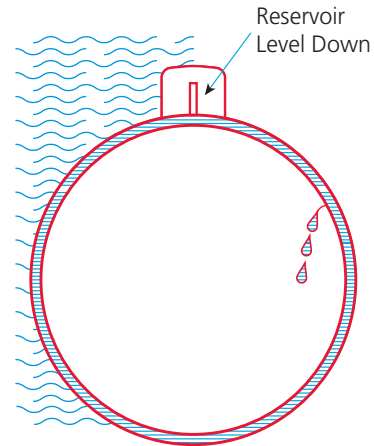
Changing regulations in some markets now require that new double-wall tanks have continuous leak detection using a constant vacuum, air pressure or hydrostatic pressure in the interstice. TRUCHEK is the ideal solution to this growing regulatory requirement.

## Tank Tightness

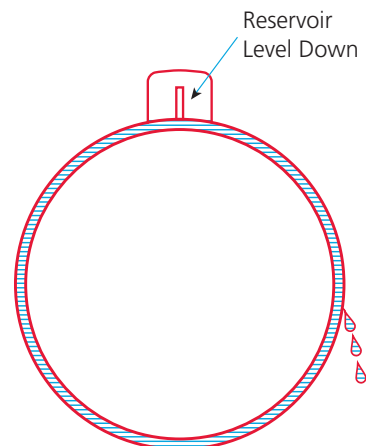
TRUCHEK also provides a simple, precise and reliable method to perform a tank-tightness test. The 10-hour tightness-test procedure meets the strict NFPA329 criteria. A shorter 4-hour test (while product is dispensing) exceeds EPA's criteria for a tank-tightness test.

## How does TRUCHEK work?

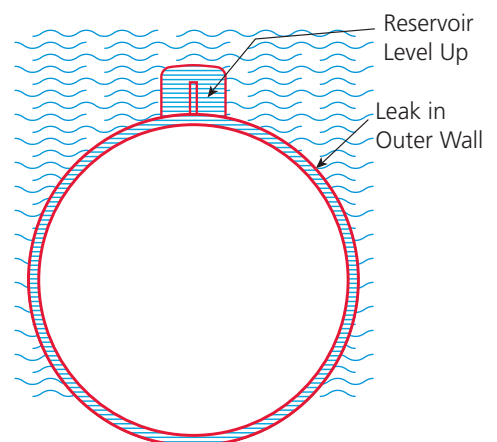
### Primary-Tank Leak in Wet Hole or Dry Hole



### Secondary-Tank Leak in Dry Hole



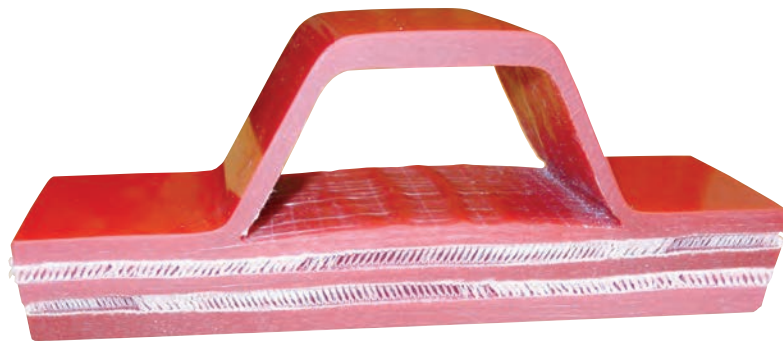
### Secondary-Tank Leak in Wet Hole



## Additional underground storage tank solutions

When a customer's needs go beyond the standard double-wall tank, Xerxes offers products that address a wide range of requirements. With a full line of tank accessories, we offer customers the most comprehensive range of solutions found in the petroleum equipment industry today. Please visit [www.xerxes.com](http://www.xerxes.com) for additional information on each of these products.

**Multicompartment Tanks** – These Xerxes tanks are a popular choice among retail gasoline marketers and fleet fueling owners. The ability to store two or three grades of fuel, or gasoline and diesel, in a single tank is particularly appealing when the amount of onsite space needed for multiple tanks is either not available or difficult to obtain. Customers may also find installation and insurance cost savings when using multicompartment tanks. The Xerxes double-wall multicompartment tank comes standard with a double-wall bulkhead, while other tank manufacturers require an upgrade to a double-wall bulkhead. Xerxes offers a wide range of capacity options in 6-, 8- and 10-foot-diameter models.



**Triple-Wall Tanks** – Some customers and regulatory agencies now require even more enhanced protection than double-wall tanks provide. Conditions that lend themselves to considering a triple-wall tank are sensitive groundwater aquifers, or nearby lakes or streams. The Xerxes UL-listed triple-wall tank, with an additional Parabeam interstice, is the innovative and cost-effective answer when this level of containment is required.

**The ZCL Phoenix System®** – In some situations, single-wall tanks that need to be upgraded to double-wall tanks offer site challenges that make removal of existing tanks either cost-prohibitive or extremely difficult. For instance, tanks are sometimes covered or surrounded by buildings, roads or rail lines. In such cases, converting a single-wall tank (either fiberglass or steel) into a double-wall tank might be done most efficiently with ZCL's Phoenix System. This ULC-listed system consists of two corrosion-resistant laminates with the proprietary Parabeam glass fabric between the laminates creating an interstitial space. The interstice can be either dry or hydrostatically monitored. The Phoenix System, applied onsite by trained installers, is biofuels compatible, including ethanol-blended fuels and biodiesels.



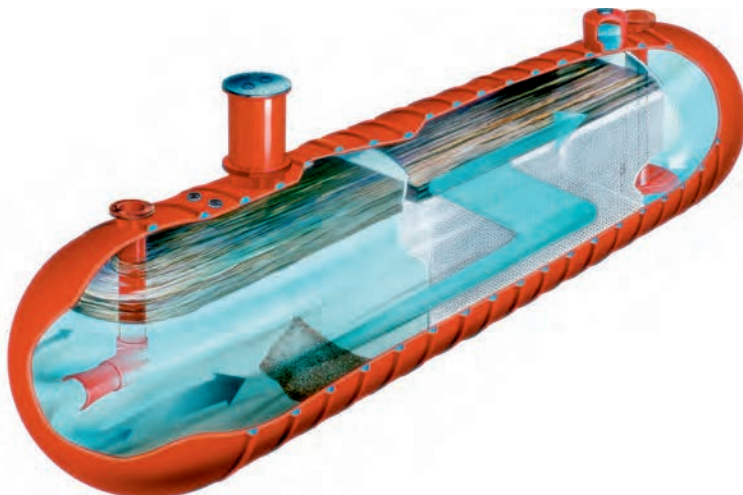
## Additional underground storage tank solutions



**Diesel Exhaust Fluid Tanks** – Demand for diesel exhaust fluid (DEF) is growing significantly as increasing numbers of commercial, passenger, rail and marine diesel engines that require the use of DEF enter the market. A Xerxes underground tank is the ideal solution for the very unique storage requirements that DEF presents. Unlike carbon steel tanks, a Xerxes fiberglass tank does not require special coatings or linings to protect the purity of the DEF product. Extensive testing with third-party laboratories was conducted to verify the suitability of long-term storage while maintaining product quality.

Xerxes uses stainless steel fittings, manway covers and striker plates on all tanks designed for DEF storage. A UL label is attached to all tanks that meet listing criteria. Each tank interior is thoroughly cleaned and then sealed to prevent contamination during shipping and installation.

In the relatively brief period of time that DEF has been used in North America, Xerxes has established a leadership role in introducing fiberglass tanks as the bulk storage vessel of choice. With more than 1,000 DEF tanks in service, customers are clearly putting their trust in Xerxes' design innovation capabilities.



**Oil/Water Separators** – With a fiberglass underground tank at the heart of the design, a Xerxes oil/water separator incorporates unique refinements within the vessel to create a separator that removes free-floating oils and settleable sands from oil/water mixtures. A properly sized polypropylene vertical-tube coalescer is designed to produce effluent quality of 10 ppm free-floating oil. A Xerxes oil/water separator is an excellent choice for managing water runoff from parking lots or equipment washdown stations. This product is also available with a UL 2215 listing.

## Storage tank accessories

Today's retail and commercial fueling facilities are sophisticated systems that are installed in a highly regulated environment. While the storage tank is the critical component in an underground fuel system, other important accessories are necessary in order to provide spill containment, tank anchoring, tank-top corrosion protection, leak detection and other important functions. Xerxes engineers have designed innovative, complimentary products that provide system designers and installers with cost-effective, easy-to-install accessories. Not all tank manufacturers provide the wide range of accessories that Xerxes offers. This is another example of how Xerxes' innovative spirit benefits customers.

As with many products, Xerxes tanks and accessories require proper installation to ensure that the customer receives the long-lasting, trouble-free performance that its products are designed for. To that end, Xerxes provides a comprehensive Installation Manual and Operating Guidelines document that outlines the easy, yet proper, steps necessary for a successful installation.





## Storage tank accessories



**Containment Sumps and Collars** – Sumps and collars are common accessories found on virtually all double-wall tanks installed today. Xerxes supplies optional, factory-installed containment collars that provide secondary containment around tank fittings and manways. Designed to be a custom match to the collar, the Xerxes containment sump comes in a variety of models and sizes, all engineered to accommodate different customer preferences and needs. Xerxes sumps and collars are also available in double-wall models that can be monitored with the reliable TRUCHEK hydrostatic monitoring system.

**Anchoring System** – Site-specific installation conditions generally dictate whether a tank-anchoring system is necessary. Some customers choose to anchor all their tanks. Xerxes offers a complete tank-anchoring system, including reinforced precast concrete deadman (designed to American Concrete Institute standards), fiberglass anchoring straps and galvanized turnbuckles. Each component is engineered to specific tank sizes and for ease of installation. In most cases concrete deadmen can be delivered on the same trailer as the tank. This both minimizes the shipping cost and assures that deadmen are ready for use when the tank is set.

**Hydrostatic Monitoring** – The image on page 8 illustrates the functional design of the highly effective TRUCHEK hydrostatic monitoring system. A “jacket” of calcium-chloride solution is factory-installed in the tank interstice and connected to a tank-top reservoir where the fluid level is monitored with a simple level sensor. The unique Parabeam construction of a Xerxes double-wall tank eliminates false leak alarms that can occur with other tank designs. In addition to its simple, yet highly effective, monitoring capabilities, TRUCHEK provides true continuous monitoring of both tank walls regardless of site conditions. This continuous-monitoring feature is increasingly attractive to state and federal regulators, and may become a requirement for all new double-wall tanks in the future.

# Guide Specifications for Xerxes Underground Petroleum Storage Tanks

## Short form:

The contractor shall provide a double-wall or triple-wall fiberglass reinforced plastic (FRP) UL-listed underground storage tank as shown on the drawings. The tank size, fittings and accessories shall be as shown on the drawings. The fiberglass tank shall be manufactured by Xerxes Corporation.

The tank shall be tested and installed according to the Xerxes Installation Manual and Operating Guidelines for Fiberglass Underground Storage Tanks in effect at time of installation.

## Long form:

### Part I: General

#### 1.01 Quality Assurance

##### A. Acceptable Manufacturer: Xerxes Corporation

##### B. Governing Standards, as applicable:

1. Underwriters Laboratories (UL) Standard for Safety 1316 Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures. A UL label shall be attached to each tank.
2. National Fire Protection Association (NFPA) Standards: NFPA 30: Flammable and Combustible Liquids Code, NFPA 30A: Code for Motor Fuel Dispensing Facilities and Repair Garages, NFPA 31: Standard for the Installation of Oil-Burning Equipment.
3. City of New York Department of Buildings M.E.A., #161-89-M.
4. American Concrete Institute (ACI) standard ACI 318-11, Building Code Requirements for Structural Concrete.

##### C. Submittals

1. Contractor shall submit \_\_\_ copies of shop drawings, manufacturer's product brochures, and Installation Instructions.

### Part II: Products

#### 2.01 Double-Wall and Triple-Wall Fiberglass Reinforced Plastic (FRP) Underground Storage Tanks:

##### A. Loading Conditions – Tank shall meet these design criteria:

1. **Interstitial Pressure** – The interstitial space of the tank shall withstand a minimum 20-psig pressure test.
2. **Internal Load** – Tank shall withstand a 5-psig air-pressure test with a 5:1 safety factor.
3. **Surface Loads** – Tank shall withstand surface H-20 and HS-20 axle loads when properly installed according to Xerxes' current Installation Manual and Operating Guidelines.
4. **External Hydrostatic Pressure** – Tank shall be designed for 7' of overburden over the top of the tank, the hole fully flooded and a safety factor of 5:1 against general buckling.

##### B. Product Storage:

1. The primary compartment of double-wall and triple-wall tanks shall be vented and operated at atmospheric pressure only.
2. Tank shall be capable of storing liquids with a specific gravity up to 1.1.
3. Tank shall be capable of storing products identified in the manufacturer's standard limited warranty in effect at the time of purchase.

##### C. Materials:

1. The primary and secondary walls of the tank shall be manufactured with 100% premium resin and glass-fiber reinforcement. No sand or silica fillers shall be added to the resin.
2. The interstitial space between the primary and secondary walls shall be constructed with a glass reinforcement material such as Parabeam®, which provides a structural bond between the two tank walls, while creating a defined interstice that allows for free flow of liquid.

##### D. Tank Dimensions (Refer to Xerxes literature on gallonage):

1. Tank shall have nominal capacity of \_\_\_\_\_ gallons.
2. Tank shall have nominal outside diameter of \_\_\_\_\_ feet.
3. Tank shall have a nominal overall length of \_\_\_\_\_ feet/inches.

#### 2.02 Tank Monitoring System

##### A. General

1. Tank shall be continuously monitored with the TRUCHEK® hydrostatic leak monitoring system.
2. The continuous monitoring system shall include monitoring fluid factory-installed in the interstitial space and within a fiberglass tank-top mounted reservoir.
3. The monitoring system shall be recognized by the National Work Group on Leak Detection Evaluations (NWGLDE) as continuous leak detection and as a precision tank test.
4. The monitoring system shall be independently tested by a qualified third party and verified to be capable of detecting leaks as small as .05 gallons per hour when TRUCHEK tank-tightness test procedures are followed.

##### B. Design

1. The continuous monitoring system shall be designed to detect a leak in either the primary or secondary wall at all times, regardless of the water-table conditions at the installation site.
2. The interstice of the tank shall be designed for a 5:1 safety factor beyond normal hydrostatic operating pressure to ensure structural integrity and to prevent false leak alarms.

#### 2.03 Accessories

##### A. Tank Anchoring

1. Anchor straps shall be as supplied by tank manufacturer and designed for a maximum load of 25,000 lbs.
2. Galvanized turnbuckles (two per anchor strap) shall be supplied by the tank manufacturer.
3. Prefabricated concrete anchors shall be supplied by the tank manufacturer, designed to the ACI 318-11 standard, manufactured with 4,000 psi concrete, and shall have adjustable anchor points.

##### B. Manways

1. The standard manway shall be flanged, 22" I.D. and complete with UL-listed gaskets, bolts and covers as shown on tank drawings.

##### C. Threaded Fittings

1. All threaded fittings shall be NPT half or full couplings, in 2", 4" or 6" diameters.
2. Fittings shall be installed on the tank-top centerline or in the cover of the manway as shown on the tank drawings.

##### D. Containment Collars & Sumps

1. The tank shall have factory-installed 42"-or 48"-diameter containment collars as shown on the tank drawings.
2. Containment sumps in 42"-or 48"-diameter, provided by the tank manufacturer and designed for mounting on the containment collars, shall be supplied as shown on the tank drawings.
3. Adhesive shall be provided by the tank manufacturer with each containment collar and sump.
4. Containment collars and sumps shall be designed and supplied as a containment system. Only sumps provided by the manufacturer shall be allowed.

### Part III: Testing and Installation

#### 3.01 Testing

**A. Testing** – Tank shall be tested according to the Xerxes Installation Manual and Operating Guidelines in effect at time of installation.

#### 3.02 Installation

**A. Installation** – Tank shall be installed according to the Xerxes Installation Manual and Operating Guidelines in effect at time of installation.

### Part IV: Limited Warranty

#### 4.01 Limited Warranty

**A. Limited Warranty** – Warranty shall be manufacturer's standard limited warranty in effect at time of purchase.

## Xerxes Underground Double-Wall Tank Data

	Nominal Capacity (gallons)	Actual Capacity (gallons)	Tank Length (feet/inches)	Nominal Shipping Weights (lbs) (dry interstitial)	Nominal Shipping Weights (lbs) (wet interstitial)	Number of Anchor Straps Required
<b>4-foot-diameter</b>	600	602	7'-3 1/2"	900	1,100	2
	1,000	1,009	11'-7 1/2"	1,400	1,700	2
	2,000	2,013	22' -3 5/8"	2,800	3,400	2
<b>6-foot-diameter</b>	2,500	2,324	13'-5 3/4"	2,200	2,800	2
	3,000	2,910	16'-4 1/4"	2,600	3,300	2
	4,000	3,789	20'-8"	3,600	4,400	2
	5,000	4,961	26'-5"	4,300	5,200	4
	6,000	5,840	30'-8 3/4"	5,000	6,100	4
	8,000	7,899	37'-1 1/2"	6,000	7,500	4
<b>8-foot-diameter</b>	4,000	4,190	15'- 1/2"	2,700	3,600	2
	5,000	5,089	17'-8 1/2"	3,200	4,200	2
	6,000	6,044	20'-6 1/2"	3,700	4,900	2
	8,000	7,899	26'- 1/2"	4,800	6,200	4
	10,000	9,753	31'-6 1/2"	5,900	7,500	4
	12,000	11,608	37'- 1/2"	7,000	8,800	4
	15,000	14,881	46'- 9"	9,100	11,200	6
<b>10-foot-diameter</b>	10,000	10,420	21'-5 1/4"	4,900	6,400	4
	12,000	11,904	24'- 1/4"	5,600	7,200	4
	15,000	15,041	29'-5 3/4"	7,000	8,900	4
	20,000	19,782	37'-8 3/4"	9,000	11,300	6
	25,000	25,431	47'-6 3/4"	11,800	14,600	8
	30,000	30,172	55'-9 3/4"	14,000	17,200	10
	35,000	34,912	64'- 3/4"	16,500	20,100	12
	40,000	40,443	73'-8 1/4"	19,000	23,100	14
<b>12-foot-diameter</b>	20,000	20,638	29'- -4"	14,000	16,700	6
	25,000	25,381	35'- -7"	16,600	19,700	8
	30,000	31,072	43'- -1"	19,900	23,500	10
	35,000	35,815	49'- -4"	22,500	26,500	12
	40,000	39,609	54'- -4"	24,600	28,900	12
	45,000	44,352	60'- -7"	27,400	32,100	16
	48,000	48,146	65'- -7"	29,500	34,500	18
	50,000	50,044	68'- -1"	30,500	35,700	18

**Notes:**

1. Tank data for single-wall and multicompartiment tank models is available at [www.xerxes.com](http://www.xerxes.com).
2. Actual height of the tank may be greater than the actual diameter due to fittings and accessories. Load height during shipping may vary due to tank placement on the shipping trailer.
3. If an overfill-protection device is installed in the tank, the actual capacity will be reduced.

# North American Manufacturing Facilities



## ZCL Manufacturing Facilities

Edmonton, AB  
Drummondville, QC

## Xerxes Manufacturing Facilities

Anaheim, CA  
Hagerstown, MD  
Seguin, TX  
Tipton, IA

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