

Installation Manual and Operating Guidelines

For Single-Wall Fiberglass Underground
Wastewater Tanks



Owner should retain this manual for
reference to operating guidelines.

XERXES[®]
CORPORATION

This Wastewater Installation Manual and Operating Guidelines gives installation instructions for the following single-wall tank applications: septic, recirculation, dosing and holding tanks.

For installation instructions for single-wall tanks used in other applications and for all double-wall tanks, refer to the Xerxes Installation Manual and Operating Guidelines For Single-Wall and Double-Wall Fiberglass Underground Storage Tanks.

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Read all instructions and operating guidelines before tank installation.

- To Installer:** Before tank installation, read Wastewater Installation Manual and Operating Guidelines. After tank installation, give Wastewater Installation Manual and Operating Guidelines with the completed Tank Installation Checklist to owner.
- To Owner:** After tank installation, retain Wastewater Installation Manual and Operating Guidelines for future reference to operating guidelines.

1. INTRODUCTION

1.1. SAFETY

1.1.1. Before beginning the tank installation, read through the entire Wastewater Installation Manual and Operating Guidelines (subsequently referred to as "Wastewater Installation Manual"). It is the responsibility of the owner, installer and operator to follow all requirements contained in this Wastewater Installation Manual and to comply with all federal, state and local safety regulations that may apply to tank installations and operations.

1.1.2. No instructions or procedures presented in this Wastewater Installation Manual should be interpreted so as to put at risk any person's health or safety, or to harm any property or the environment.

1.1.3. The following definitions will serve as a guide when reading the Wastewater Installation Manual:

WARNING

Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury.

CAUTION

A Caution without the safety alert symbol indicates a potentially hazardous situation, which, if not avoided, may result in property damage.

1.1.4. Keep this Wastewater Installation Manual available at the installation site to refer to safety procedures as needed.

WARNING

Follow OSHA regulations for tank excavations. Collapse of excavation walls could result in death or serious injury.

1.1.5. Working in and around excavations is dangerous. The Occupational Safety and Health Administration (OSHA) has specific requirements that must be followed. Prior to beginning work at the site, the installer should obtain a copy of the following OSHA standards: Part 1926, Subpart M (Fall Protection), 500-503; and Part 1926, Subpart P (Excavations), 650-652. Copies of these standards are available free of charge at OSHA's Web site (www.osha.gov).

1.1.6. Careless activity or operation of equipment can cause death, serious personal injury or property damage.

1.2. GENERAL

1.2.1. It is important to follow the procedures and instructions in this manual in order to safely and properly install a Xerxes underground wastewater tank. Failure to follow these instructions will void Xerxes' obligation under the limited warranty and may cause tank failure, serious personal injury or property damage.

1.2.2. The Xerxes limited warranty applies only to a tank installed according to these instructions. Since Xerxes does not control the parameters of any installation, Xerxes' sole responsibility in any installation is that presented in the applicable limited warranty.

1.2.3. It is the responsibility of the owner and operator to always follow the operating guidelines set forth in Xerxes' applicable limited warranty and SECTION 15 of this Wastewater Installation Manual. A copy of the relevant Xerxes limited warranty is found in the printed material that accompanies each tank, in each applicable product brochure and on the Xerxes Web site (www.xerxescorp.com). It is also available upon request from the UST coordinator at the Xerxes plant nearest you. It is the responsibility of the owner to retain this Wastewater Installation Manual for future reference to operating guidelines.

1.2.4. Use the Tank Installation Checklist (included in this manual) for all tanks as the installation proceeds. Retain a copy of the completed Tank Installation Checklist, and any correspondence, certification, etc., related to the tank. Each tank requires a separate Tank Installation Checklist. Consult your Xerxes representative or distributor if additional Tank Installation Checklist forms are needed.

1.2.5. The tank owner should retain a copy of the Tank Installation Checklist to facilitate any warranty claim. Xerxes recommends that the installing contractor also keep a copy.

1.2.6. Comply with all applicable regulations and standards, such as:

- federal, state and local construction, health, safety and environmental codes
- industry standard practices.

1.2.7. For additional information, contact your state, county and city storage-tank authorities, including health, fire or building departments, and environmental agencies. All work must be performed according to standard industry practices and OSHA regulations.

1.2.8. Federal, state and local codes and regulations always take precedence over a Xerxes requirement.

1.2.9. Xerxes must authorize – in writing and prior to tank installation – any variation to, or deviation from, these Wastewater Installation Manual instructions.

1.2.10. All correspondence regarding variations must be retained for any warranty claim to be valid.

1.2.11. If you have questions or encounter situations not covered in this Wastewater Installation Manual, contact technical support at Xerxes Minneapolis, 952-887-1890.

1.3. DEFINITIONS

1.3.1. For terms related to Xerxes wastewater tanks, see *FIGURE 1-1*.

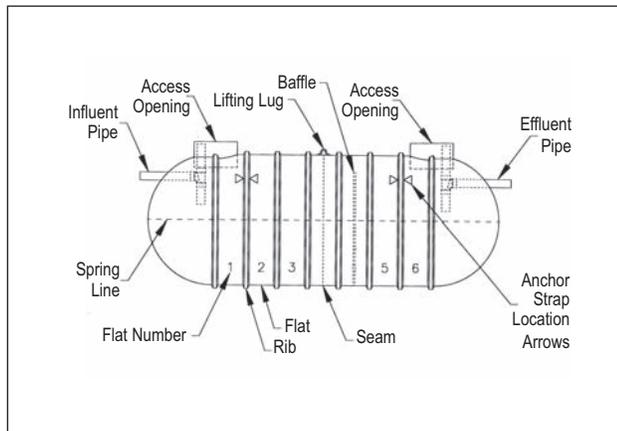


FIGURE 1-1

2. PREPARATION FOR INSTALLATION

2.1. GENERAL

2.1.1. Although Xerxes tanks are rugged, the tank owner and/or tank owner's representative must take care so that the tank is not dropped or damaged during delivery, unloading and handling on the jobsite.

2.1.1.1. Before unloading the tank from the truck, tank owner and/or tank owner's representative must make sure that all tools or other items that may damage the tank during unloading are removed from the trailer bed.

2.1.1.2. When unloading the tank from the truck, tank owner and/or tank owner's representative must make sure that the tank is secured in such a way that it does not roll off the truck.

WARNING

Do not allow driver to release straps securing the tank to the truck until lifting equipment (such as a crane) is secured to the tank's lifting lug(s). Failure to do so could result in death or serious injury.

WARNING

Always chock the tank. The tank is heavy and has a large surface area. The tank will roll on sloped surfaces and could be blown about by the wind. Movement of the tank could result in death or serious injury.

2.1.2. Before the tank is unloaded or relocated on the jobsite (and before preinstallation testing at jobsite), tank owner and/or tank owner's representative must complete the following steps:

2.1.2.1. Visually inspect the entire exterior surface of the tank to make sure that no shipping or handling damage has occurred. Look particularly for holes, cracks or deep scrapes.

2.1.2.2. Sign the shipping papers accepting the tank as delivered.

2.1.2.3. Be sure that all equipment used to lift the tank is rated to handle the load. Refer to the Tank Handling Data section at the end of the Wastewater Installation Manual to determine the weight of the tank and to select the proper lifting equipment.

2.1.2.4. Select a solid, level area to place the tank, and clear that area of all rocks, trash and debris.

2.1.3. When hoisting the tank, follow these instructions: (See *FIGURE 2-1* and *FIGURE 2-2*.)

2.1.3.1. When the tank is not rotated (the tank is upright), use all lifting lug(s) to unload and install the tank. (See *FIGURE 2-2*.)

2.1.3.2. Some tanks are rotated on the truck for shipping purposes. These tanks have extra lifting lug(s) to aid in the loading/unloading process. (See *FIGURE 2-2*.)

2.1.3.2.1. To unload these tanks, use the lifting lugs that are situated on top of the tank in its rotated position. To install the tank, carefully rotate the tank to its upright position and then use all lifting lugs situated on top of the tank in its upright position. (See *FIGURE 2-2*.)

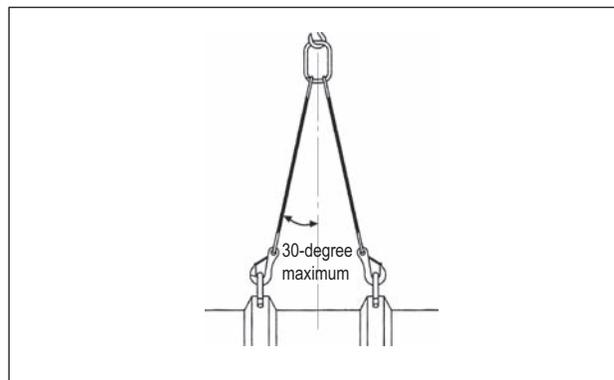


FIGURE 2-1

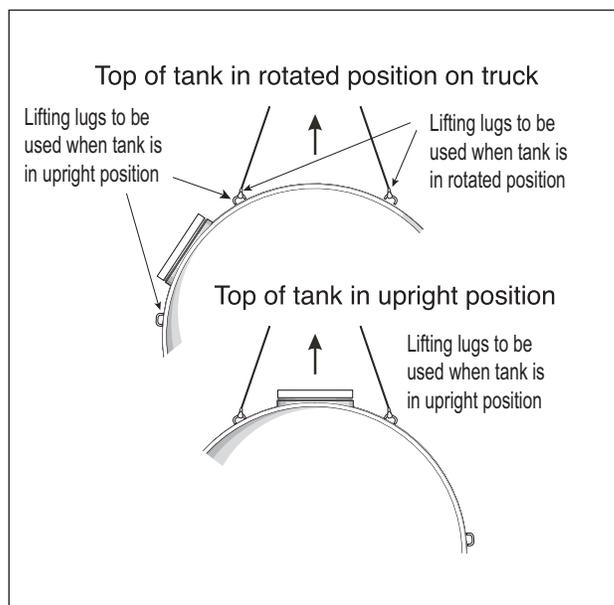


FIGURE 2-2

2.1.3.3. Do not wrap chain or cable around the tank.

2.1.3.4. Use guy ropes to guide the tank when needed.

2.1.3.5. Do not roll the tank to move it.

2.1.3.6. When handling a tank with a bottom sump or fitting, always take extra care so that the bottom sump or fitting is not damaged by contact with any other object, such as the truck bed or the ground.

2.1.4. Whenever a tank is temporarily placed aboveground at the site, chock it in place to prevent rolling. (See FIGURE 2-3.) Tie the tank down if high winds are expected.

2.1.5. Whenever a tank is temporarily placed above the ground in a situation in which there could be freezing temperatures, always take extra care so that water does not accumulate in a way that could result in damage to the tank.

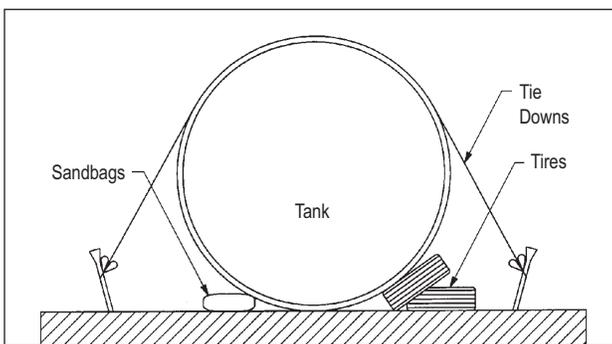


FIGURE 2-3

3. PREINSTALLATION INSPECTION

3.1. INSPECTION

3.1.1. Xerxes tanks are inspected prior to shipment, but the tank must also be inspected at the site prior to installation in order to verify the absence of shipping and handling damage.

3.1.2. Thoroughly inspect the outside of the tank for signs of damage. Rotate or lift the tank to inspect the bottom of the tank.

WARNING

Always secure the tank before moving, rotating or lifting it. This is commonly done by connecting a crane or backhoe to the lifting lugs. Failure to do so could result in death or serious injury.

WARNING

While moving or lifting the tank, do not position any part of your body underneath the tank. This could result in death or serious injury.

CAUTION

If the tank is to be water-tested, it must be supported by backfill on all sides to at least the spring line (middle) of the tank. Failure to do so may result in property damage. (See Section 10.)

3.1.3. If damage is detected, do not attempt repairs. Contact the UST coordinator at the Xerxes plant nearest you. Telephone and fax numbers are found on the back cover of this manual.

3.1.4. If the tank is equipped for optional preinstallation testing, see Xerxes supplement, Preinstallation Testing Instructions (for Septic Tanks Factory-Equipped for Pressure-Testing).

4. BACKFILL MATERIAL

4.1. GENERAL

4.1.1. Xerxes tanks must be installed using either pea gravel or crushed stone as backfill material.

4.1.2. Using other than approved bedding and backfill materials without prior written authorization from Xerxes will void the tank warranty.

CAUTION

Use of unapproved backfill material may cause tank failure, or damage the tank or surrounding property.

4.1.3. Approved backfill material must meet the following specifications:

4.1.3.1. The material is washed, free-flowing, and free of ice, snow and debris.

4.1.3.2. When using pea gravel, the material is to be a mix of rounded particles, sizes between 1/8 inch and 3/4 inch. (See FIGURE 4-1.) The pea gravel must conform to the specifications of ASTM C-33, paragraph 9.1, sizes 6, 67 or 7.

4.1.3.3. When using crushed stone, the material is to be a mix of angular particles, sizes between 1/8 inch and 1/2 inch. (See FIGURE 4-2.) The crushed stone must conform to the specifications of ASTM C-33, paragraph 9.1, sizes 7 or 8.

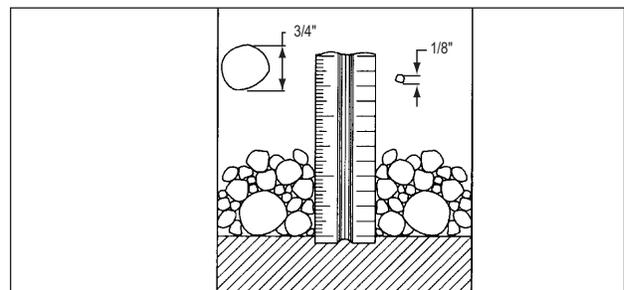


FIGURE 4-1

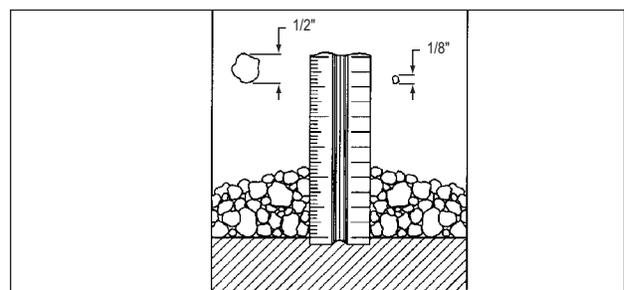


FIGURE 4-2

4.1.3.4. No more than 5% (by weight) of the material may pass through a #8 sieve.

4.1.3.5. It is recommended that the materials supplier certifies that the material conforms to ASTM C-33 and any other applicable specifications.

4.1.3.6. An important characteristic of good backfill material is hardness or stability when exposed to water or loads. Most materials have no problems meeting the hardness requirement. Materials like soft limestone, sandstone, sea shells or shale should not be used as backfill because they may break down over time.

4.1.4. For additional information, refer to the Xerxes document, Backfill Guidelines.

4.1.5. If material which meets these specifications is not available, contact technical support at Xerxes Minneapolis for information on alternate materials and the process for approval.

5. EXCAVATION PARAMETERS

WARNING

Follow OSHA regulations for tank excavations. Collapse of excavation walls could result in death or serious injury.

5.1. GENERAL

5.1.1. The installing contractor must take all precautions necessary to protect employees working in or near a tank excavation. These precautions should include but are not limited to the following:

5.1.1.1. Locate and protect any utility installations near the excavation before opening the excavation.

5.1.1.2. Secure the walls of the excavation.

5.1.1.3. Prevent exposure of employees to hazardous fumes from the excavation.

5.1.1.4. Protect employees from hazards associated with water accumulation in the excavation.

5.1.1.5. Erect barricades, etc., to prevent unauthorized vehicle or pedestrian traffic.

5.1.1.6. Inspect, a minimum of once a day, the excavation and surrounding area.

5.1.2. For additional information on excavation, trenching and shoring safety practices, consult the following OSHA standards: Part 1926, Subpart M (Fall Protection), 500-503; and Part 1926, Subpart P (Excavations), 650-652.

5.2. BURIAL DEPTH

5.2.1. The minimum depth of the excavation is normally determined by the presence or absence of groundwater and the presence or absence of traffic at the site. These dimensions are critical to the successful installation of a tank and are often regulated by code.

5.2.2. For additional requirements and specifications, refer to federal, state and local codes; and *FIGURE 5-1* and *FIGURE 5-2*.

5.2.3. In all cases, the depths of cover given in 5.2.3.1. and in 5.2.3.2. are minimums.

5.2.3.1. Tanks subjected to traffic loads (H-20 loads) must have a cover depth of at least 36 inches of backfill [48 inches for 12-foot-diameter tanks], or 18 inches of backfill [36 inches for 12-foot-diameter tanks] plus 6 inches of reinforced concrete or 9 inches of asphalt. (See *FIGURE 5-1*.) **In a wet condition, sufficient over-**

burden and/or an appropriate anchoring system must be present to offset buoyancy of the tank.

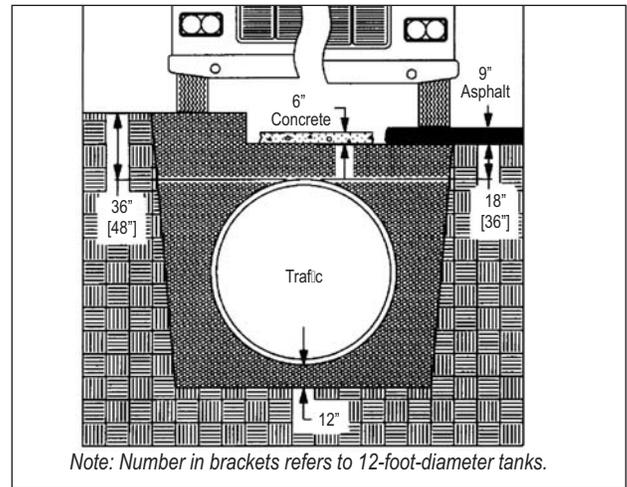


FIGURE 5-1

5.2.3.2. Tanks not subjected to traffic loads must have a cover depth of at least 24 inches of backfill [48 inches for 12-foot-diameter tanks], or 12 inches of backfill [36 inches for 12-foot-diameter tanks] plus 4 inches of reinforced concrete or 6 inches of asphalt. (See *FIGURE 5-2*.) **In a wet condition, sufficient overburden and/or an appropriate anchoring system must be present to offset buoyancy of the tank.**

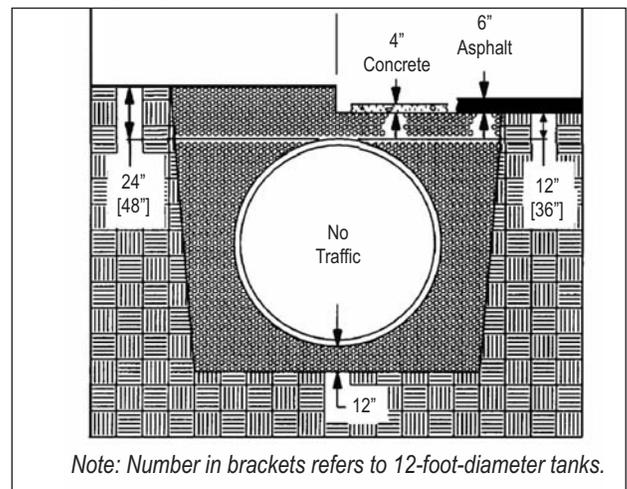


FIGURE 5-2

5.2.3.3. The tank owner or the owner's technical representative is responsible for determining sufficient overburden and/or appropriate anchoring system.

WARNING

In a nontraffic installation, ensure that the areas above the tanks are not subjected to traffic or other types of loads, which could cause tank damage and result in death or serious injury.

5.2.3.4. The maximum burial depth is 7 feet of cover over the top of the tank. Call your Xerxes representative for a special quotation for a made-to-order tank if the burial depth is to be greater than 7 feet.

5.2.3.5. Asphalt and concrete pads must extend a minimum of 12 inches beyond the tank in all directions.

5.2.3.6. If there is an unattached riser over an access opening, it must not transmit load from the asphalt or concrete slab to the tank. A minimum space of 6 inches must exist between the bottom of the riser and the top of the tank.

5.2.3.7. Traffic loads from the top slab must not be transmitted to an attached riser on an access opening. A minimum space of 3 inches must exist between the riser or sump and the slab.

5.3. TANK SPACING

5.3.1. GENERAL

5.3.1.1. The following are minimum spacings and must be increased as needed to accommodate deadmen or anchor slabs. (See Section 6.)

5.3.1.2. Always provide sufficient clearance to allow the deadmen to be set outside the tank "shadow." (See FIGURE 5-3.)

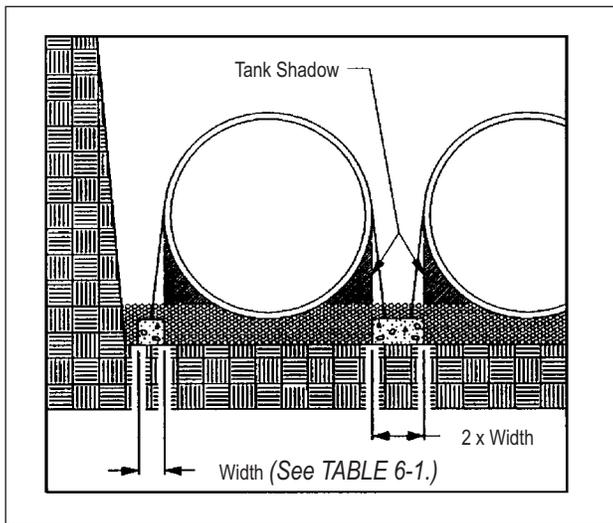


FIGURE 5-3

5.3.2. STABLE IN SITU (NATIVE) SOIL CONDITIONS

5.3.2.1. The minimum spacing between the sidewall or endcap of the tank and the side of the excavation must be 18 inches [24 inches for 12-foot-diameter tanks].

5.3.2.2. If more than one tank is to be installed in the same hole, allow for at least 18 inches between the tanks [24 inches for 12-foot-diameter tanks]. (See FIGURE 5-4.)

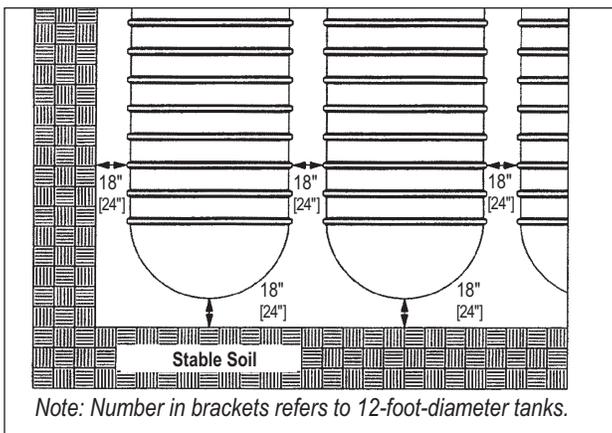


FIGURE 5-4

5.3.3. UNSTABLE IN SITU SOIL CONDITIONS

CAUTION

Xerxes recommends that the tank owner seek the advice of a local foundation professional engineer if the in situ soil is extremely soft or inherently unstable (for example, peat, quicksand, muck, landfill, very soft or highly expansive clay, underground stream, etc.).

5.3.3.1. If the soil has less than 750 lbs./sq. ft. cohesion as calculated from an unconfined compression test; or in soils having an ultimate bearing capacity of less than 3,500 lbs./sq. ft.; or where soil will not maintain a vertical wall, the excavation must allow a minimum space equal to half the diameter of the tank between the excavation wall and both the side and the endcap of the tank to enhance lateral resistance. (See FIGURE 5-5.)

5.3.3.2. The spacing between adjacent tanks is to be at least 18 inches [24 inches for 12-foot-diameter tanks]. (See FIGURE 6-5.)

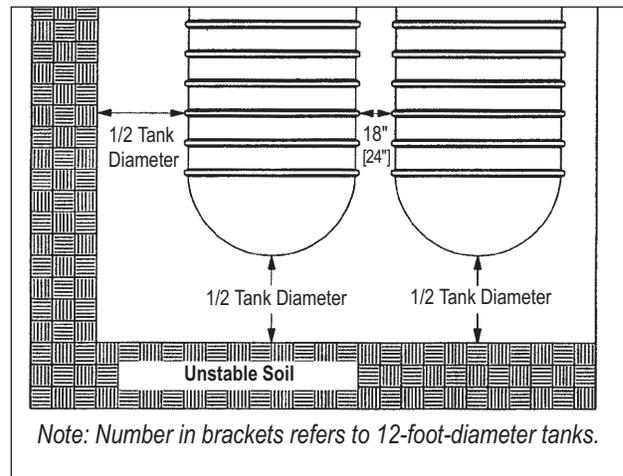


FIGURE 5-5

5.3.3.3. A reinforced concrete slab may be required under the tank as a foundation in the excavation where the bottom is unstable.

5.4. TANK LOCATION — NEARBY STRUCTURES

CAUTION

Xerxes recommends that the tank owner seek the advice of a local foundation professional engineer to determine the proper placement of a tank excavation near any existing structure(s). Improper placement may result in tank and/or other property damage.

5.4.1. The tank owner and/or the owner's technical representative is responsible for determining the proper placement of a tank excavation.

5.4.2. The location of a tank can be affected by the location of nearby structures. When selecting a tank site, care must be taken to avoid undermining the foundations of existing structures or new buildings to be constructed. (See FIGURE 5-6.)

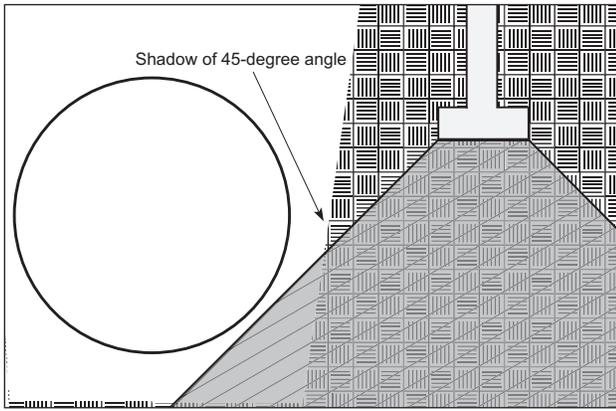


FIGURE 5-6

5.4.2.1. Ensure that downward forces from loads carried by the foundations and supports of nearby structures (constructed before or after tank installation) are not transmitted to the tanks.

5.4.3. Typically, the way to check the placement of the tank in relationship to a nearby structure is to do the following:

5.4.3.1. Determine the depth of burial needed for the tank.

5.4.3.2. Locate the footing of the structure to be considered.

5.4.3.3. Determine the line that would fall into the ground from a 45-degree angle drawn downward from the corner(s) of the footing of the foundation that is closest to the tank.

5.4.3.4. The tank must not fall within the “shadow” of the 45-degree-angle line drawn from the foundation’s footing. (See *FIGURE 5-6*.)

5.4.3.5. If the tank would fall within this “shadow,” do one of the following to ensure that the tank does not fall within the “shadow”:

- move the tank away from the existing building,
- move the foundation of the building to be constructed away from the tank, or
- deepen the footing of the planned building’s foundation.

5.5. GEOTEXTILE

5.5.1. The tank owner or the owner’s technical representative is responsible for determining whether a geotextile or an alternate filtering technique is appropriate for a specific installation. Geotextile allows the passage of water but prevents the migration and mixing of in situ soil and the select backfill material. Geotextile helps preserve the integrity of the select backfill envelope, which surrounds and supports the tank.

5.5.2. Xerxes recommends that geotextile be used when the tank is installed in the following:

- areas with frequently changing groundwater conditions or areas subject to tidal fluctuations
- unstable soils such as cited in *SECTION 5.3.3*.
- water conditions with silty in situ soil.

5.5.3. For further information concerning geotextile specifications and installation procedures, consult the geotextile supplier’s installation guidelines or instructions.

5.5.4. Polyethylene film is not considered an effective geotextile material. It may tear or degrade while in service.

6. ANCHORING TANKS

CAUTION

Xerxes recommends that every site be thoroughly evaluated for the potential of a rise in the local water table or of trapped water. Failure to anchor a tank when required may cause tank failure, or damage the tank or surrounding property.

6.1. GENERAL

6.1.1. The tank owner or the owner’s technical representative is responsible for determining an appropriate anchoring system.

6.2. DEADMEN

6.2.1. Deadmen are typically a reinforced concrete beam.

6.2.2. The length of deadmen is typically equal to the length of the tank.

6.2.3. Deadmen may be fabricated in multiple sections as long as the total length of each deadman is not decreased and as long as each section contains at least two balanced anchor points.

6.2.4. The width and thickness of deadmen depend on the tank diameter, water-table height, number of access openings that extend to the surface and burial depth.

6.2.5. Deadmen should be designed according to the American Concrete Institute (ACI) code.

6.2.6. Refer to *TABLE 6-1* for typical deadmen dimensions given the situation of an empty tank with a burial depth of 3 feet, with groundwater to grade and with two 24-inch access openings that extend to the surface.

| Tank Diameter | Typical Deadman Dimensions (Width x Depth) |
|---------------|--|
| 4' | 6" x 6" |
| 6' | 12" x 12" |
| 8' | 12" x 12" |
| 10' | 18" x 9" |
| 12' | 36" x 8" |

TABLE 6-1

6.2.7. Tanks of 10-foot diameter with a capacity of 30,000 gallons or larger may require larger deadmen than those in *TABLE 6-1*, depending on burial depth, to offset buoyancy. Contact technical support at Xerxes Minneapolis for further information.

6.2.8. Lay the deadmen in the excavation parallel to the tank and outside the tank “shadow.” (See *FIGURE 5-3*.)

6.2.9. In multiple tank installations with deadmen:

- each tank will have its own set of deadmen (one deadman may be used between two tanks if the deadman is double in width)
- a separate anchor point must be provided for each hold-down strap
- the minimum spacing between tanks must be no less than twice the width of a single deadman.

6.3. XERXES PREFABRICATED DEADMEN

6.3.1. Xerxes-supplied prefabricated deadmen are pre-engineered and sized to the tank ordered. As with any deadmen, water-table height, number of access openings that extend to the surface and burial depth must be considered.

6.3.2. Placement of Xerxes prefabricated deadmen is the same as standard deadmen. (See FIGURE 6-1.)

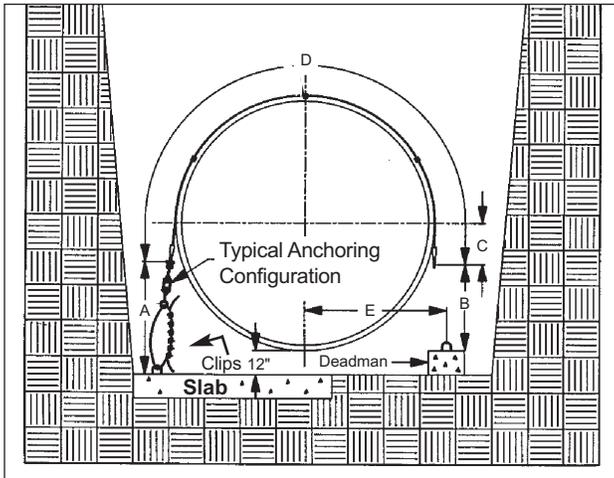


FIGURE 6-1

6.3.3. Xerxes prefabricated deadmen are supplied with 3/4-inch-diameter, galvanized, adjustable anchor points (subsequently referred to as anchor points). These anchor points protrude up through the slots in the deadmen and are held up with temporary supports.

WARNING

Only use the anchor points when lifting and positioning the deadmen. A spreader bar may be required to lift longer sections of deadmen. Use guy ropes to guide the deadmen when lifting. Failure to do so could result in death or serious injury.

6.3.4. The anchor points can be moved and positioned to match hold-down strap locations on the tank (marked by arrowhead symbols ▶◀).

6.3.5. When using these deadmen in man-out-of-hole strapping applications, align the anchor points with the proper ribs before setting them in the hole.

6.3.6. Care should be taken to keep backfill from entering the anchor point slot until final adjustment is made.

6.3.7. The deadmen are to be butted together when multiple sections are used.

6.3.8. Use one anchor point per strap end and only one strap per anchor point.

6.4. ANCHOR SLAB

6.4.1. An anchor slab is typically a reinforced concrete base.

6.4.2. The total length of the slab must be at least the same as the length of the tank.

6.4.3. The minimum slab thickness is 8 inches.

6.4.4. The width of the slab depends on the tank diameter. The slab must extend a minimum of 18 inches [12 inches for 4-foot-diameter tanks] beyond the width of the tank.

6.4.5. Refer to TABLE 6-2 and FIGURE 6-1 for anchor-point dimensions.

| Tank Diameter | Anchoring Dimensions | | | | | |
|---------------|----------------------|-----|-----|--------------|----------|----------|
| | "A" | "B" | "C" | "D" | "E" Min. | "E" Max. |
| 4' | 24" | 18" | 12" | 8' - 4 1/4" | 27" | 30" |
| 6' | 35" | 23" | 13" | 12' - 1" | 42" | 48" |
| 8' | 43" | 31" | 15" | 15' - 1" | 52" | 58" |
| 10' | 57" | 45" | 15" | 18' - 8 3/4" | 69" | 75" |
| 12' | 58" | 50" | 23" | 22' - 6 3/4" | 87" | 93" |

TABLE 6-2

6.4.6. Provide a separate anchor point for each hold-down strap.

6.4.7. All anchor points must be engineered to withstand the tank's buoyancy forces.

6.4.8. When using a concrete base slab, allow sufficient depth in the excavation for 12 inches of bedding material below the tank. (See FIGURE 6-1.)

6.5. HOLD-DOWN STRAPS

6.5.1. Only Xerxes straps may be used when anchoring a Xerxes tank.

6.5.2. The locations for hold-down straps on each tank are marked on the tank by the arrowhead symbols ▶◀.

6.5.3. Straps must be used on all marked hold-down locations.

CAUTION

Do not place straps between ribs (except on 4-foot-diameter tanks). Failure to properly place straps may result in tank damage.

6.5.4. Data for hold-down straps are given in TABLE 6-2 and FIGURE 6-1.

6.5.5. Evenly distribute loads by tightening all hold-down straps uniformly until they are snug over the ribs but cause no deflection of the tank.

6.5.6. Take a measurement of the internal diameter of the tank to determine whether vertical deflection is within the limits specified by Xerxes after the straps have been installed and tightened. (See SECTION 13 of the Wastewater Installation Manual for instructions on taking diameter measurements.)

6.6. HARDWARE AND ANCHORING POINTS

6.6.1. Anchoring hardware must be sized according to TABLE 6-3, and manufactured to industry standards and dimensions.

| Tank Diameter | Minimum Turnbuckle Diameter (by Type) | | | Minimum Wire-Rope Diameter |
|---------------|---------------------------------------|------|------|----------------------------|
| | Hook | Jaw | Eye | |
| 4' | 3/4" | 1/2" | 1/2" | 3/8" |
| 6' | 3/4" | 1/2" | 1/2" | 3/8" |
| 8' | 1 1/4" | 3/4" | 3/4" | 1/2" |
| 10' | 1 1/4" | 3/4" | 3/4" | 1/2" |
| 12' | 1 1/4" | 3/4" | 3/4" | 1/2" |

TABLE 6-3

6.6.2. The installing contractor is responsible for providing hardware and anchor points of sufficient size and strength.

6.6.3. The particular configuration of hardware will be determined by the contractor, the owner or the owner's representative.

6.6.4. Locate the anchor points as shown in TABLE 6-2 and FIGURE 6-1. Refer to dimension "E." Align (within a tolerance of ±1 inch) all anchor points with the marked arrowhead symbols  on the tanks.

6.6.5. For specific information on hardware and its use, consult the hardware manufacturer or supplier.

6.6.6. The installer is responsible for using appropriate and approved engineering practices when fastening wire rope. Refer to recommendations of wire-rope manufacturer and supplier, and follow accepted industry standards when selecting, using, attaching or connecting wire rope. (See FIGURE 6-3, FIGURE 6-4 and FIGURE 6-5.)

 **CAUTION**

Use only appropriately sized hardware with the strap eye. Oversized hardware may damage the strap eye and result in minor or moderate injury. See FIGURE 6-2 for dimensions of strap eye.

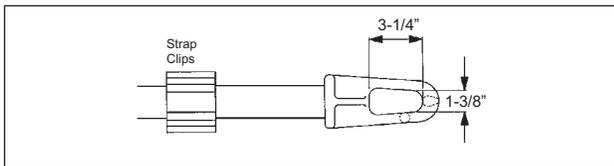


FIGURE 6-2

6.6.7. When connecting the end of a hold-down strap to the anchor, common methods (shown in FIGURE 6-3) are using a drop-forged turnbuckle (see A), using a looped wire rope (see B), or using a combination of both (see C).

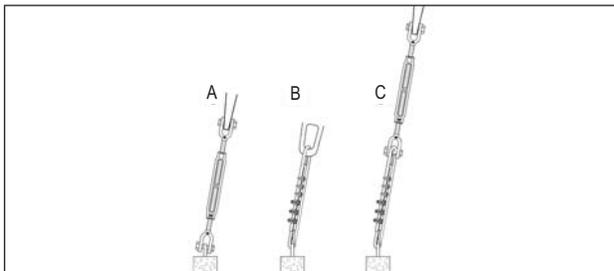


FIGURE 6-3

6.6.8. All exposed metal on the anchoring system must be coated or galvanized to protect against corrosion.

6.6.9. When fastening wire rope, use a minimum of two clips for a 3/8-inch wire rope and three clips for a 1/2-inch wire rope on each termination. See TABLE 6-3 for minimum wire-rope diameter.

6.6.10. Turn back from the thimble the exact amount of wire rope specified by the manufacturer of the clips used.

6.6.11. Apply the first clip at a distance from the dead end of the wire rope that is equal to the largest width of the clip used. (See FIGURE 6-4.)

6.6.12. For each clip, apply a U-bolt over the dead end of the wire rope. (See FIGURE 6-4.) (Note: Live end rests in saddle.)

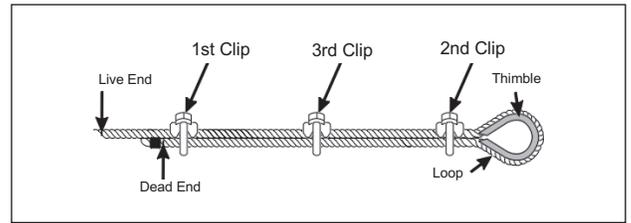


FIGURE 6-4

6.6.13. When two clips are required, apply the second clip as near the loop or thimble as possible. (See FIGURE 6-4.)

6.6.14. When more than two clips are required, apply the second clip as near the loop or thimble as possible; turn nuts on second clip firmly, but do not tighten initially. (See FIGURE 6-4.)

6.6.15. When more than two clips are required, space additional clips equally between the first two; take up rope slack; and tighten nuts on each U-bolt evenly.

6.6.16. Tighten all hardware uniformly and follow the manufacturer's torque specifications. Double-check the tightness once the anchoring system is complete.

6.6.17. If forming a loop in the wire rope, a splice is required for connecting the two ends together. Standard rigging practice for splicing wire rope calls for using twice the number of clips recommended for a single-end termination. Use a minimum of four clips for a 3/8-inch wire rope and a minimum of six clips for a 1/2-inch wire rope. Place the rope ends parallel to each other and install the clips as shown in FIGURE 6-5.

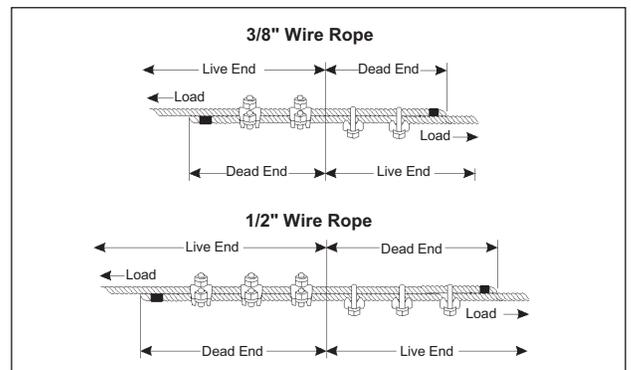


FIGURE 6-5

6.7. MAN-OUT-OF-HOLE ANCHORING

6.7.1. The Xerxes man-out-of-hole (MOH) strapping system is designed for use in installations where water is in the excavation and/or where personnel may not enter the hole because of site restraints. An MOH strapping system can be, but need not be, used in conjunction with Xerxes deadmen.

6.7.2. When using the MOH strapping system, the placement of components is critical. See separate Xerxes document, Man-Out-of-Hole (MOH) Straps Instructions.

6.8. ALTERNATE ANCHORING METHODS IN WET-HOLE INSTALLATIONS

6.8.1. In wet-hole installations, when Xerxes' preferred method of man-out-of-hole anchoring is not available, the following methods may be used.

6.8.1.1. With both methods, place the hold-down strap between the wire rope and the tank so that the wire rope is never in direct contact with the tank.

6.8.1.2. The H-shaped positioning clips around the strap are designed to accommodate the wire rope on top of the strap as shown in FIGURE 6-6 and FIGURE 6-7.

6.8.1.3. The following method is shown in FIGURE 6-6:

- attach a wire rope to each end of each hold-down strap
- secure the termination of the wire rope
- center each hold-down strap on each rib marked with the arrowhead symbols ▶◀
- place the deadmen on top of the wire ropes on each side of the tank
- lower the deadmen to the bottom of the excavation
- take the slack out of each wire rope and splice the termination of the wire ropes on top of the tank.

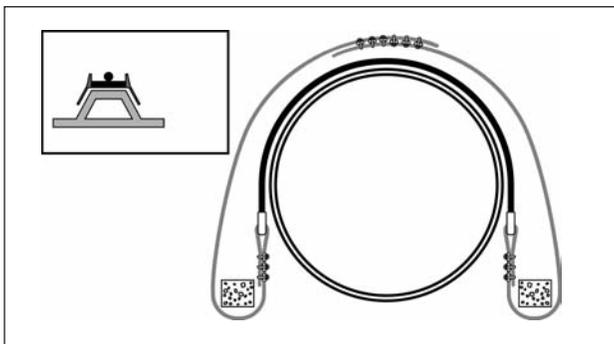


FIGURE 6-6

6.8.1.4. The following method is shown in FIGURE 6-7:

- loop a wire rope around the deadman at each location that corresponds to each rib marked with the arrowhead symbols ▶◀
- secure the termination of the wire rope
- lower each deadman to the bottom of the excavation using the wire rope
- center each hold-down strap on each rib marked with the arrowhead symbols ▶◀
- bring the live end of each wire rope up to the top of the tank at each marked rib
- take the slack out of each wire rope and splice the termination of the wire ropes on top of the tank.

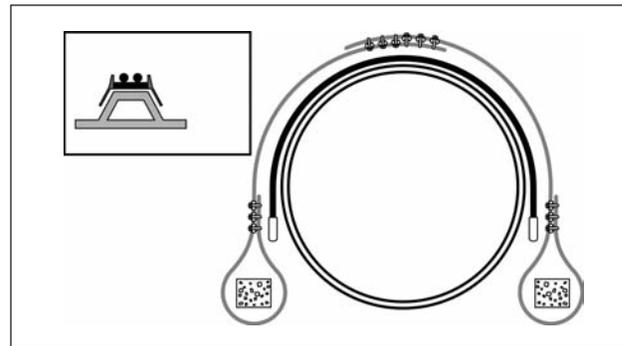


FIGURE 6-7

7. BOTTOM FITTINGS

7.1. GENERAL

7.1.1. When handling a tank with a bottom sump or fitting, always take extra care so that the bottom sump or fitting is not damaged.

CAUTION

All connections to the tank must be flexible. Provisions must be made to accommodate movement and misalignment between the piping and the tank. Failure to do this may damage the tank or surrounding property.

7.1.2. During installation, provide a clear area in the backfill bedding so that the tank rests on the backfill bedding and the bottom fitting is clear.

7.1.3. After setting the tank, fill and tamp the resulting void by using hand tools before continuing the backfilling.

8. INSTALLATION

CAUTION

Adequately ballast the tank (add liquid) in a wet hole or in a dry hole that may become wet (for example, from site runoff) until the installation has been completed. Failure to do this may damage the tank or surrounding property.

8.1. GENERAL

8.1.1. Use only approved backfill material. (See SECTION 4.)

8.1.2. Do not mix approved material with sand or in situ soil.

8.1.3. Do not use in situ soil as backfill material.

8.1.4. All excavated in situ soil must be replaced with approved material.

8.2. DRY-HOLE INSTALLATION

8.2.1. Prepare a smooth level bed, 12 inches thick, of approved backfill material.

8.2.2. Refer to Points 2.1.3. through 2.1.3.6. regarding the use of lifting lugs to hoist the tank when unloading and installing it.

8.2.3. Place the tank or tanks onto the bed. Do not set Xerxes tanks directly onto a concrete slab, on timbers or cradles, or onto the in situ soil.

8.2.4. As the tank is being placed, slope the tank according to site specifications. (Xerxes does not require that a tank be sloped. The slope is determined by the tank owner's specifications.)

8.2.5. Use the tops of the ribs to establish longitudinal level. Establish lateral level by placing the level across the top of a fitting or a manway.

8.2.6. When the tank is placed, take a measurement of the internal diameter of the tank. (See SECTION 13 of the Wastewater Installation Manual for instructions on taking diameter measurements.) Record this measurement as Initial Internal Diameter on the Tank Installation Checklist, SECTION 4.

8.2.7. If the tank is to be anchored, install the anchoring hardware at this time. (See SECTION 6.)

8.2.8. Place one 12-inch lift of approved backfill material evenly around the tank. From the edge of the hole or the top of an adjacent tank, push the backfill in place by using a nonmetal probe long enough to reach beneath the tank. Work the backfill material under the tank body and domes so the tank is fully supported – that is, so there are no voids under the tank. (See FIGURE 8-1 and FIGURE 8-2.)

CAUTION

Do not strike the tank with the probe or tank damage may result.

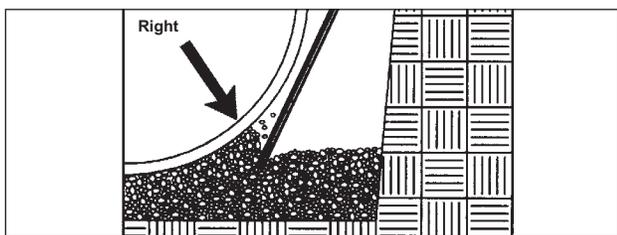


FIGURE 8-1

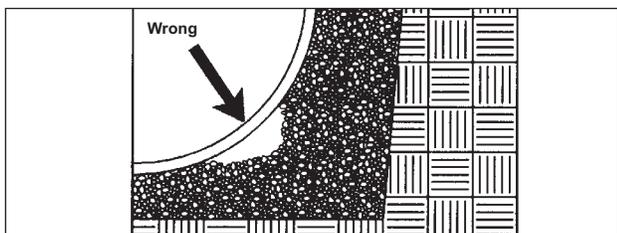


FIGURE 8-2

8.2.9. Repeat Point 8.2.8. with a second 12-inch lift.

8.2.10. After the second lift of material has been placed and worked under the tank, bring the backfill to the top of the tank.

8.3. WET-HOLE INSTALLATION

8.3.1. Follow the dry-hole installation procedure (SECTION 8.2.) with the following modifications:

8.3.1.1. Before performing Point 8.2.1. of the dry-hole installation, take a measurement of the internal diameter of the tank before the tank is placed in the excavation hole. (See SECTION 13 of the Wastewater Installation Manual for instructions on taking diameter measurements.) Record this measurement as Initial Internal Diameter on the Tank Installation Checklist, SECTION 4.

8.3.1.2. Before performing Point 8.2.1. of the dry-hole installation, pump the water from the hole and continue pumping to maintain minimum water level during tank installation.

8.3.1.3. During Point 8.2.3. of the dry-hole installation, when setting and leveling the tank, partially ballast the tank until it settles firmly on the prepared bed. The ballast level in the tank must never exceed the water level in the hole by more than 1 foot until the backfill reaches the top of the tank. (See FIGURE 8-3.)

8.3.1.4. Omit Point 8.2.7.

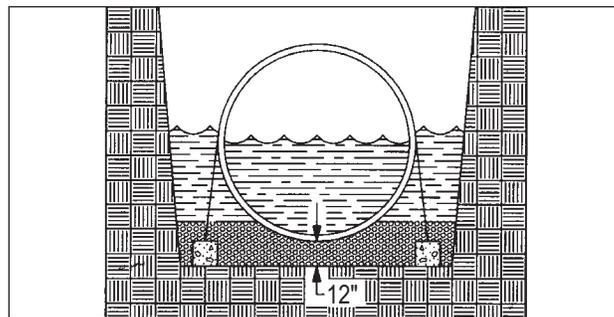


FIGURE 8-3

8.3.2. Cover depth must meet minimum depth as specified in SECTION 5 of this Wastewater Installation Manual.

8.3.3. Completely ballast the tank once backfill is even with the top of the tank.

9. OPTIONAL POSTINSTALLATION TESTING

9.1. GENERAL

9.1.1. Verify that the vertical deflection is within tolerances listed in the table on the Tank Installation Checklist, SECTION 4.

9.2. OPTIONAL HYDROSTATIC TEST

9.2.1. Seal off influent and effluent piping with watertight caps or plugs.

9.2.2. Fill the tank with water up to 3 inches into the access openings after the hole is backfilled at least 3/4 of the way up the tank.

9.2.3. Let the water stand in the tank for a minimum of 1 hour (or longer if required by applicable local codes).

9.2.4. If the water level drops, check to see that plugs or caps sealing off piping are tight and then add more water to fill air voids back to the standard testing level. (See Point 9.2.2.)

9.2.5. If the water level does not stabilize, there may be a leak in the system. **If damage is detected, do not attempt repairs.** Contact the UST coordinator at the Xerxes plant nearest you. Telephone and fax numbers are found on the back cover of this manual.

10. BALLASTING (ADDING LIQUID)

WARNING

The tank shall be adequately vented to prevent the development of vacuum or pressure when filling or emptying the tank. Failure to properly vent the tank/compartments could cause tank failure and result in death or serious injury.

10.1. GENERAL

10.1.1. In most anchoring systems, a tank is not adequately protected against flotation until the tank is fully backfilled to final grade (or until the top slab is in place if applicable). Therefore, during the installation process, the tank should be ballasted completely after the backfill is even with the top of the tank and postinstallation testing has been successfully completed.

10.1.2. Only under wet-hole conditions should ballast be added before the backfill is even with the top of the tank. (See SECTION 8.)

11. PIPING AND VENTING

11.1. INTERNAL PIPING

11.1.1. All piping must conform to all applicable codes and standards. (See SECTION 1.)

CAUTION

All internal piping must be at least 4 inches [6 inches for 12-foot-diameter tanks] from the tank bottom. Failure to do this may damage the tank or surrounding property.

CAUTION

All metal fittings and other metal components must be coated to protect against corrosion. Failure to do this may result in damage to these parts or to surrounding property.

11.1.2. Refer to FIGURE 11-1 along with TABLE 11-1 to determine the correct dimensions for sizing internal piping.

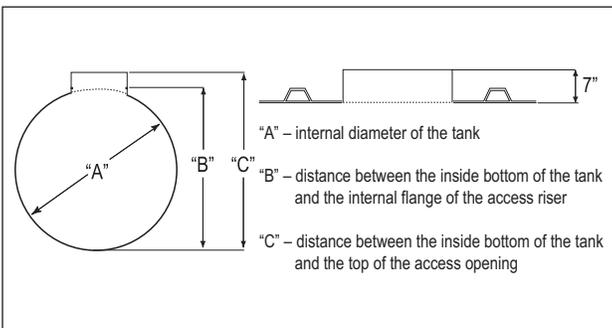


FIGURE 11-1

| Interior Dimensions in FIGURE 12-1 | Tank Diameter | | | | |
|------------------------------------|---------------|---------|---------|----------|----------|
| | 4' | 6' | 8' | 10' | 12' |
| "A" | 48" | 71-3/8" | 91" | 119-1/4" | 138-1/2" |
| "B" | 51-3/8" | 74-3/4" | 94-3/8" | 122-5/8" | 142" |
| "C" | 55-3/8" | 78-3/4" | 98-3/8" | 126-5/8" | 146" |

TABLE 11-1

11.2. EXTERNAL PIPING

WARNING

If pressure testing the external piping, the tank must be isolated from all piping. The test pressures for external piping could cause tank failure and result in death or serious injury.

CAUTION

All connections to the tank must be flexible. Provisions must be made to accommodate movement and misalignment between the piping and the tank. Failure to do this may damage the tank or surrounding property.

11.2.1. All connections to the influent and effluent piping as well as to any other piping must be flexible and properly sized.

11.3. VENTING TANK

WARNING

All underground tanks/compartments shall be adequately vented to prevent the development of vacuum or pressure when filling or emptying the tank. Failure to properly vent a tank or compartment could cause tank failure and result in death or serious injury.

11.3.1. The single-wall tank is designed to operate at atmospheric pressure.

11.3.2. The tank's venting system must be adequately sized to ensure that atmospheric pressure is maintained at all times, including during filling and emptying of tank.

12. BACKFILLING TO GRADE

12.1. GENERAL

12.1.1. Continue to take safety measures (such as placing barricades) around the excavation site until installation is completed.

12.1.2. When the tank has been set, tested and backfilled, and all piping and venting has been completed, add the balance of the backfill material.

12.1.3. The backfill must be free of debris, ice or snow. Any blocks or bricks used as support material during piping must be removed prior to completion of backfilling.

12.1.4. The backfill material specified in SECTION 4 must be used to completely fill excavation.

12.1.5. Be sure that the installation meets all of the requirements of minimum cover as specified in SECTION 5.

12.1.6. When the tank has been backfilled to subgrade (before placement of asphalt or concrete), take a measurement of the internal diameter of the tank. (See SECTION 13 of the Wastewater Installation Manual for instructions on taking diameter measurements.) Record this measurement as Final Internal Diameter on the Tank Installation Checklist, SECTION 4.

12.1.7. Complete the Tank Installation Checklist.

13. DEFLECTION MEASUREMENTS

13.1. GENERAL

13.1.1. Obtain the deflection measurement by taking a minimum of two measurements of the internal diameter of the tank.

13.1.2. Two methods of measuring the internal diameter of the tank are described here. Both methods use a dipstick. (Similar methods can be used, such as with a tape measure, etc.)

13.1.3. The deflection measurement can be obtained by using either method twice or by using each method once. Each will be described here as if that method were being used twice.

13.1.4. Take the initial internal-diameter measurement before backfilling the tank. (See Point 8.2.6.) In a wet-hole installation, take this measurement before the tank is placed in the excavation hole. (See Point 8.3.1.1.)

13.1.5. Take other diameter measurements during the backfilling process to determine whether vertical deflection continues to be within the limits specified by Xerxes. (See Points 6.5.6. and 9.1.1.)

13.1.6. Take the final internal-diameter measurement when the tank has been backfilled to subgrade. (See Point 12.1.6.)

13.1.7. For both methods, drive a small-headed, nonsparking nail (for example, brass) halfway into a wooden dipstick 1 inch above its base.

13.2. INTERNAL-DIAMETER MEASUREMENT WITHOUT A STANDPIPE

13.2.1. Place the dipstick into a service fitting.

13.2.2. Measure and record the distance from the tank bottom to the top of the fitting.

13.2.3. Pull the dipstick up until the exposed nail catches on the inside top of the tank.

13.2.4. Measure the distance from the tank top (inside) to the top of the fitting. Subtract 1 inch from this measurement and record the distance.

13.2.5. Subtract the second distance (inside tank top to top of fitting) from the first distance (tank bottom to top of fitting). Record this measurement as Initial Internal Diameter on the Tank Installation Checklist, SECTION 4.

13.2.6. For subsequent measurements of the internal diameter, repeat Points 13.2.1. through 13.2.5. When the measurement is the final diameter measurement, record this measurement as Final Internal Diameter on the Tank Installation Checklist, SECTION 4.

13.3. INTERNAL-DIAMETER MEASUREMENT WITH A STANDPIPE

13.3.1. Place the dipstick into a service fitting with a standpipe.

13.3.2. Measure and record the distance from the tank bottom to the top of the standpipe.

13.3.3. Pull the dipstick up until the nail catches on the inside top of the tank.

13.3.4. Measure the distance from the tank top (inside) to the top of the standpipe. Subtract 1 inch from this measurement and record the distance.

13.3.5. Subtract the second distance (inside tank top to top of

standpipe) from the first distance (tank bottom to top of standpipe). Record this measurement as Initial Internal Diameter on the Tank Installation Checklist, SECTION 4.

13.3.6. For subsequent measurements of the internal diameter, repeat Points 13.3.1. through 13.3.5. When the measurement is the final diameter measurement, record this measurement as Final Internal Diameter on the Tank Installation Checklist, SECTION 4.

13.4. CALCULATION AND COMPARISON

13.4.1. To get the deflection measurement at any time, subtract the current internal diameter measurement from the initial internal-diameter measurement.

13.4.2. Compare this measurement to the allowable deflections shown in the table on the Tank Installation Checklist, SECTION 4.

13.4.3. Vertical deflection in excess of this measurement indicates improper installation and voids the tank warranty.

14. ADDING TANKS AT EXISTING LOCATIONS

14.1. GENERAL

14.1.1. Additional Xerxes tanks may be installed at existing locations if proper foundation support exists.

14.1.2. It is the responsibility of the tank owner to choose the correct method of installation.

14.1.3. Xerxes requires that one of the following methods be used.

14.2. PREFERRED METHOD

14.2.1. The preferred method (FIGURE 14-1) is the following:

- install a new tank in a separate hole at least 3 feet from the original hole
- follow procedures outlined in this Wastewater Installation Manual
- exercise caution in keeping unusual surface loads off existing tanks
- maintain the natural barrier of undisturbed soil between tanks.

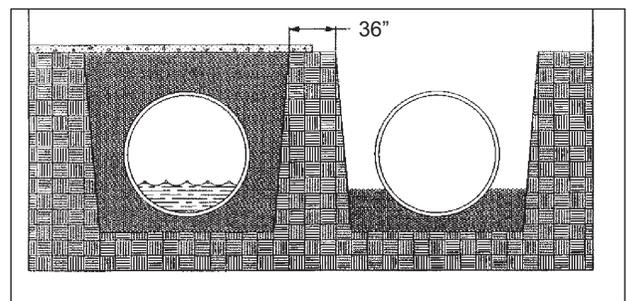


FIGURE 14-1

14.3. ALTERNATE METHOD

14.3.1. If the preferred method outlined above is not practical, an alternate method (FIGURE 14-2) is the following:

- bury additional tanks in the same installation hole
- empty existing tanks to less than 1/4 capacity
- remove the surface slab
- enlarge the excavation for the new tanks, leaving as much backfill as possible around existing tanks
- install shoring, if necessary, to make sure that existing tanks do not move and sufficient backfill remains

- follow procedures and requirements outlined in this Wastewater Installation Manual
- see SECTION 5 for excavation parameters.

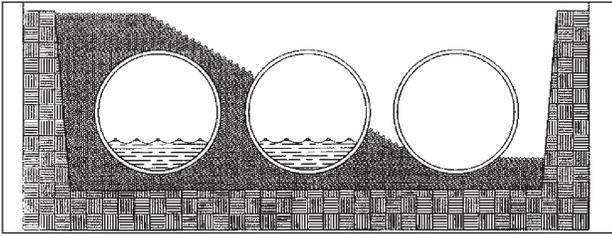


FIGURE 14-2

15. OPERATING GUIDELINES

15.1. GENERAL

15.1.1. Owner must retain the Wastewater Installation Manual and Operating Guidelines for future reference to operating guidelines.

15.1.2. In addition to the Wastewater Installation Manual and Operating Guidelines, follow all federal, state and local laws, regulations, codes and safety precautions that pertain to underground storage tanks and/or their associated systems.

15.1.3. Consult tank brochure and separate accessory instructions, which are available upon request from the UST coordinator at the Xerxes plant nearest you. (See SECTION 17.)

15.1.4. Consult the applicable limited warranty for each tank for further operating guidelines and limitations. A copy of the limited warranty is available upon request from the UST coordinator at the Xerxes plant nearest you. (See SECTION 16.)

15.2. PRODUCT STORAGE

15.2.1. This Wastewater Manual gives installation instructions for the following single-wall tank applications: septic, recirculation, dosing and holding tanks. A Xerxes wastewater tank is designed to store materials identified in the manufacturer's applicable limited warranty.

CAUTION

Storing materials other than those identified in the manufacturer's applicable limited warranty will void Xerxes' obligation under the warranty and may cause tank failure or other property damage.

15.3. TEMPERATURE LIMITS FOR STORED MATERIAL

15.3.1. The maximum temperature for storing wastewater products is 150° F.

CAUTION

Storing a material in a tank in excess of the allowable temperature may damage the tank. Failure to follow this caution may damage the tank and surrounding property.

15.4. ENTERING TANKS

15.4.1. Do not allow anyone to enter the tank unless it has been properly emptied and vented, and unless the person entering the tank has been trained in confined-space entry procedures and applicable OSHA regulations.

WARNING

Improper tank entry could cause fire, explosion or asphyxiation and could result in death or serious injury.

16. LIMITED WARRANTIES

16.1. GENERAL

16.1.1. Each product is covered by a product-specific limited warranty, which contains operating guidelines and parameters that should be reviewed as applicable. A copy of the relevant Xerxes limited warranty is found in the printed material that accompanies each tank, in each applicable product brochure and on the Xerxes Web site (www.xerxescorp.com). It is also available upon request from the UST coordinator at the Xerxes plant nearest you.

17. SELECTED LIST OF SUPPLEMENTAL MATERIALS

17.1. GENERAL

17.1.1. Supplemental materials, which may apply to specific installations and/or conditions, are available upon request from the UST coordinator at the Xerxes plant nearest you or from technical support at Xerxes Minneapolis.

17.1.1.1. Among those materials available from the UST coordinator (and on the Xerxes Web site at www.xerxescorp.com) are the following:

- Backfill Guidelines
- Split Backfill Instructions
- Prefabricated Deadmen Installation Instructions
- Man-Out-of-Hole (MOH) Straps Instructions
- Large Bottom Sump Installation Instructions
- Field Fiberglass Lay-Up Instructions for Containment Sumps
- Installation Manual and Operating Guidelines for Single-Wall and Double-Wall Fiberglass Underground Storage Tanks
- Preinstallation Testing Instructions (for Septic Tanks Factory-Equipped for Pressure-Testing).

17.1.1.2. Among those materials available from technical support at Xerxes Minneapolis are the following:

- Deep Burial Installation Guidelines
- Alternate Backfill (Sand) Installation Instructions
- Cast-in-Place Deadmen Installation.

18. RETAINING INSTALLATION MANUAL

18.1. GENERAL

18.1.1. After installation, tank installer must give Wastewater Installation Manual with completed Tank Installation Checklist to tank owner.

18.1.2. After installation, tank owner must retain Wastewater Installation Manual for future reference to operating guidelines.

Tank Installation Checklist

Fiberglass Underground Wastewater Tanks

Complete this checklist, and keep it with copies of any written authorizations for variations and/or deviations received from Xerxes.

- Date of Installation _____ Tank Size and Capacity _____
- Site Owner _____
- Site Address _____
- Installing Contractor _____
STREET CITY STATE ZIP
- On-Site Supervisor _____
CONTRACTOR NAME STREET CITY STATE ZIP

1. PREINSTALLATION

Verified by: _____

- A. **Visual Inspection:** No evidence of damage (holes, cracks, gouges) in tank. (Document any damage found.)
- B. **Physical Test:** Preinstallation inspection completed in accordance with installation instructions.
- C. **Backfill Material:** (Indicate which type.)
 1. Pea gravel or crushed stone as specified by XERXES.
 2. Other (Requires specific approval by XERXES. Describe.)
- D. **Excavation:** Hole dimensions are correct per installation instructions for appropriate conditions.
- E. **Internal-Diameter Measurement:** The internal diameter of the tank is measured and documented (Initial Internal Diameter in SECTION 4 below).
- F. **Geotextile Utilized:** (Indicate one.)
 1. Yes 2. No
- G. **Hole Condition:** (Indicate one.)
 1. Dry hole (Water is not anticipated to reach tank – area is not subject to flooding.)
 2. Wet hole (Excavation may trap water – area is subject to flooding.)
- H. **Traffic Loads:** (Indicate one.)
 1. Traffic loads anticipated
 2. No traffic loads anticipated
- I. **Anchoring:** Performed in accordance with installation instructions.
 1. Deadmen 2. Full slab
- J. **Fittings and Other Metal Components:** Coated to protect against corrosion.

2. DURING INSTALLATION

Verified by: _____

- A. **Backfill-material bed is level and is a minimum of 12 inches deep, over native soil or slab, before setting tank.**
- B. **Tank Spacing:** Tanks are spaced correctly from each other and from excavation according to instructions.
- C. **Visual Inspection:** No evidence of damage is found after setting in hole.
- D. **Hold-down Straps:** Positioned and secured according to installation instructions. (See SECTION 6-4 of Wastewater Installation Manual.)
- E. **Backfill Compacted:** Material has been tamped and/or compacted to fill all voids around tank.
- F. **Tank is properly ballasted during backfilling:** (wet-hole installation only)
- G. **Tank(s) are buried at proper depth to conform to appropriate conditions:** (wet, dry, traffic or no traffic)
- H. **Influent, effluent and other piping connections are flexible connections.**

3. POSTINSTALLATION

Verified by: _____

- A. **Optional Physical Test:** Hydrostatic test is completed according to installation instructions.
- B. **Internal Diameter Measurement:** The internal diameter of the tank is measured and documented (Final Internal Diameter in SECTION 4 below).
- C. **Wastewater Installation Manual:** Deliver Wastewater Installation Manual and Operating Guidelines to owner.

4. DEFLECTION MEASUREMENTS

All tanks must be measured to determine vertical deflection. Follow deflection-measurement instructions (SECTION 14) in the Wastewater Installation Manual. An initial internal-diameter measurement is taken and recorded as a point of reference. Subsequent internal-diameter measurements show tank deflection and can be compared to the table below. Take each measurement from the same fitting using the same procedure.

| External Tank Diameter (Feet) | 4 | 6 | 8 | 10 | 12 |
|-------------------------------|-----|-----|-------|-------|-------|
| Allowable Deflection (Inches) | 1/2 | 3/4 | 1-1/4 | 1-1/2 | 1-3/4 |

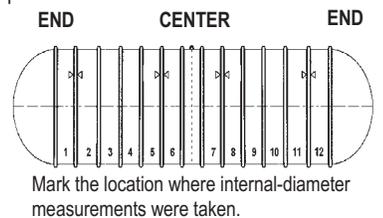
INTERNAL-DIAMETER MEASUREMENTS

Initial Internal Diameter (before backfilling) _____

Final Internal Diameter (after backfilling) _____

Initial Internal Diameter minus
 Final Internal Diameter = Deflection _____

Verified by: _____



Tank Handling Data

Single-Wall Tanks

| NOMINAL TANK DIAMETER (Feet) | NOMINAL TANK CAPACITY (Gallons) | ACTUAL TANK CAPACITY * (Gallons) | ACTUAL TANK DIAMETER ** (Feet-Inches) | ACTUAL TANK LENGTH (Feet-Inches) | NOMINAL TANK WEIGHT *** (Pounds) |
|------------------------------|---------------------------------|----------------------------------|---------------------------------------|----------------------------------|----------------------------------|
| 4 | 600 | 602 | 4'-1/2" | 6'-11 7/8" | 500 |
| | 1,000 | 1,009 | 4'-1/2" | 11'-3 7/8" | 700 |
| | 1,500 | 1,449 | 4'-1/2" | 16'-0" | 1,000 |
| 6 | 1,500 | 1,779 | 6'-3 1/2" | 10'-7 1/4" | 800 |
| | 2,000 | 2,376 | 6'-3 1/2" | 13'-5 3/4" | 1,000 |
| | 3,000 | 2,973 | 6'-3 1/2" | 16'-4 1/4" | 1,200 |
| | 4,000 | 4,131 | 6'-3 1/2" | 21'-11 1/8" | 1,600 |
| | 5,000 | 5,064 | 6'-3 1/2" | 26'-5" | 1,900 |
| | 6,000 | 5,960 | 6'-3 1/2" | 30'-8 3/4" | 2,200 |
| 8 | 2,000 | 2,189 | 8'-0" | 9'-1/2" | 900 |
| | 3,000 | 3,271 | 8'-0" | 12'-3" | 1,200 |
| | 4,000 | 4,218 | 8'-0" | 15'-1/2" | 1,400 |
| | 5,000 | 5,165 | 8'-0" | 17'-8 1/2" | 1,700 |
| | 6,000 | 6,084 | 8'-0" | 20'-6 1/2" | 2,000 |
| | 7,000 | 6,946 | 8'-0" | 23'-1" | 2,200 |
| | 8,000 | 7,950 | 8'-0" | 26'-1/2" | 2,500 |
| | 9,000 | 8,869 | 8'-0" | 28'-9" | 2,700 |
| | 10,000 | 9,816 | 8'-0" | 31'-6 1/2" | 3,000 |
| | 11,000 | 10,763 | 8'-0" | 34'-4" | 3,200 |
| | 12,000 | 11,682 | 8'-0" | 37'-1/2" | 3,500 |
| | 13,000 | 13,081 | 8'-0" | 41'-2" | 4,000 |
| | 14,000 | 14,028 | 8'-0" | 43'-11 1/2" | 4,200 |
| | 15,000 | 14,975 | 8'-0" | 46'-9" | 4,500 |
| 10 | 10,000 | 10,563 | 10'-4" | 21'-5 1/4" | 3,200 |
| | 11,000 | 11,364 | 10'-4" | 22'-9 3/4" | 3,400 |
| | 12,000 | 12,068 | 10'-4" | 24'-1/4" | 3,600 |
| | 13,000 | 12,966 | 10'-4" | 25'-6 3/4" | 3,800 |
| | 14,000 | 13,767 | 10'-4" | 26'-11 1/4" | 4,000 |
| | 15,000 | 15,248 | 10'-4" | 29'-5 3/4" | 4,500 |
| | 20,000 | 20,055 | 10'-4" | 37'-8 3/4" | 5,700 |
| | 22,000 | 22,580 | 10'-4" | 42'-3/4" | 6,600 |
| | 25,000 | 25,783 | 10'-4" | 47'-6 3/4" | 7,900 |
| | 30,000 | 30,590 | 10'-4" | 55'-9 3/4" | 9,400 |
| | 35,000 | 35,397 | 10'-4" | 64'-3/4" | 10,500 |
| | 40,000 | 41,004 | 10'-4" | 73'-8 1/4" | 12,100 |
| 12 **** | 20,000 | 20,781 | 11'-11" | 29'-4" | 9,200 |
| | 25,000 | 25,541 | 11'-11" | 35'-7" | 10,600 |
| | 30,000 | 31,253 | 11'-11" | 43'-1" | 12,500 |
| | 35,000 | 36,013 | 11'-11" | 49'-4" | 13,900 |
| | 40,000 | 39,821 | 11'-11" | 54'-4" | 15,000 |
| | 48,000 | 48,389 | 11'-11" | 65'-7" | 17,700 |
| | 50,000 | 50,293 | 11'-11" | 68'-1" | 18,300 |

* The actual capacity of the tank is the total volume of the tank. The actual working capacity is determined by the elevation of the effluent piping/floats.

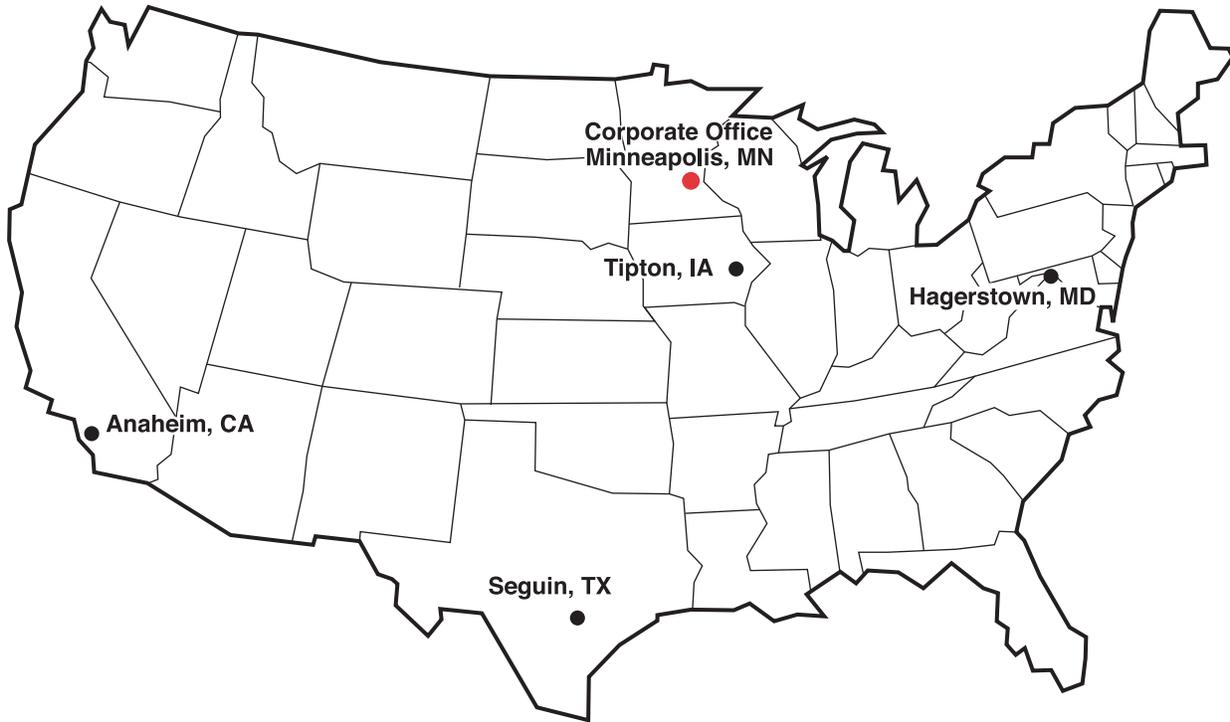
** Actual height of the tank may be greater than actual tank diameter due to fittings and accessories. Load height during shipping may vary due to tank placement on shipping trailer.

*** Adding accessories to the tank may increase the tank weight.

**** The Xerxes septic tank that can be pressure-tested is not available in 12-foot-diameter sizes.

XERXES[®]

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