



Installation Manual and Operating Guidelines

For Single-Wall and Double-Wall
Fiberglass Underground Storage Tanks

Owner should retain this manual for
reference to operating guidelines.

XERXES[®]
CORPORATION

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Read all instructions and operating guidelines before installation.

- To Installer:** Before installation, read Installation Manual and Operating Guidelines. After installation, give Installation Manual and Operating Guidelines with the completed Tank Installation Checklist to owner.
- To Owner:** After installation, retain 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 Installation Manual and Operating Guidelines (subsequently referred to as "Installation Manual"). It is the responsibility of the owner, installer and operator to follow all requirements contained in this 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 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 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 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 must obtain a copy of OSHA's Standard, Part 1926, Subpart P (Excavations), 650-652. A copy of this standard is available free of charge at OSHA's Web site (www.osha.gov).

1.1.6. Careless activity or reckless operation of equipment can cause death, serious 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 storage tank and accessories. Failure to follow these

instructions will void Xerxes' obligation under the 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 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 18 of this 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 Installation Manual for future reference to operating guidelines.

1.2.4. Use the Tank Installation Checklist (included in this manual) for all single-wall tanks (SWT), double-wall tanks (DWT), oil/water separators (OWS) and multicompartment tanks (MCT) 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
- National Fire Protection Association standards (for example, NFPA 30, 30A and 31)
- industry standard practices (for example, PEI RP100, API RP1615)
- EPA reference materials (for example, "Doing It Right").

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 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 Installation Manual, contact technical support at Xerxes Minneapolis, 952-887-1890.

1.3. DEFINITIONS

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

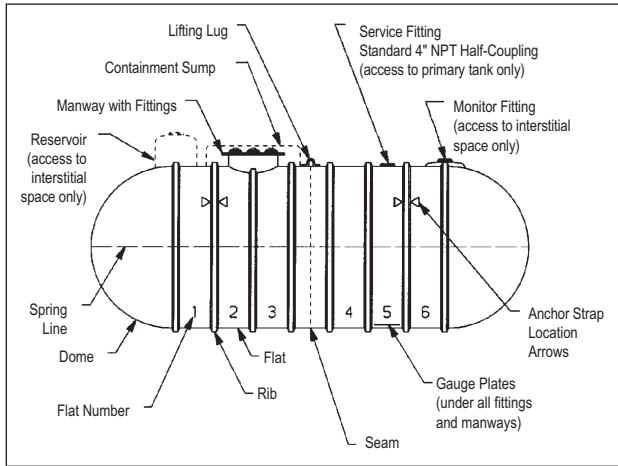


FIGURE 1-1

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 job site (and before preinstallation testing at job site), 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 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 lugs 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.)

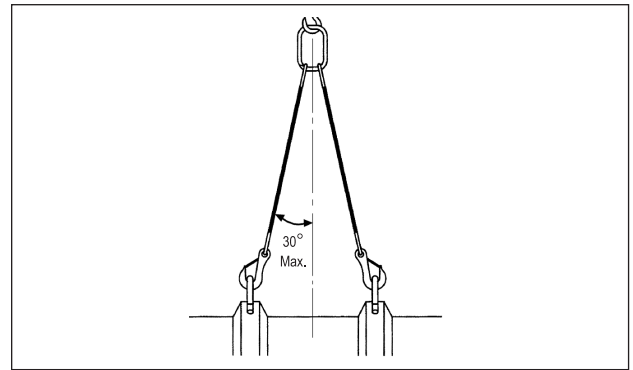


FIGURE 2-1

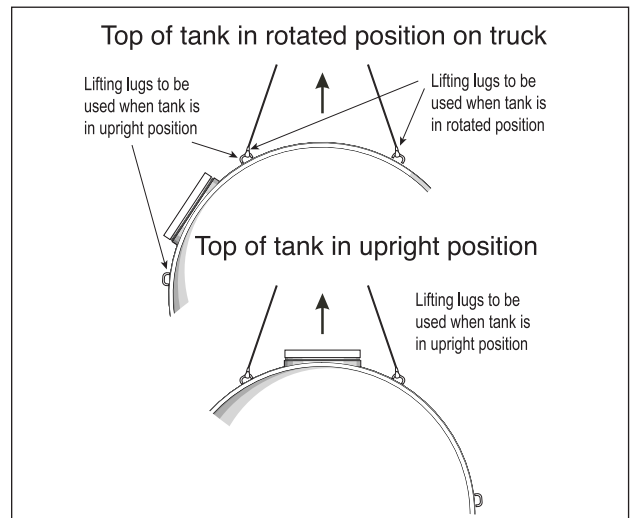


FIGURE 2-2

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 at the site, always take extra care so water does not enter the collar. Xerxes recommends that the tank be rotated and/or the collar covered.

CAUTION

If water enters the collar, it could freeze and may cause damage to the tank or collar.

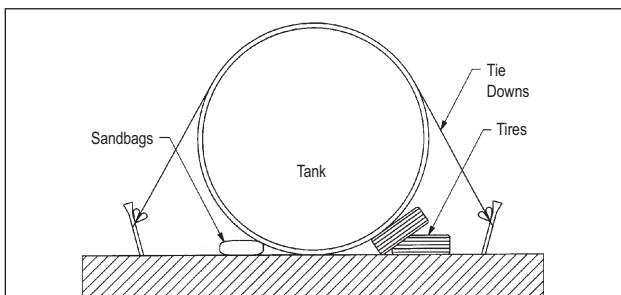


FIGURE 2-3

3. PREINSTALLATION TESTING

⚠ WARNING

Do not conduct preinstallation testing while the tank is on a trailer. Failure to follow this warning could result in death or serious injury.

3.1. GENERAL

3.1.1. Xerxes tanks are tested prior to shipment, but the tank must be retested at the site prior to installation – even if shipped with the optional vacuum in the interstitial space or wet interstitial space – in order to verify the absence of shipping and handling damage.

3.1.2. The tester is responsible for verifying that all of the test equipment is in good working condition, and is properly configured and calibrated.

3.1.3. Construct a test manifold with two air-supply gauges as shown in FIGURE 3-1. Each air-supply gauge must have a maximum full-scale reading of 15 psig with 1/4-lb. or 1/10-lb. increments, and a pressure-relief device set at 6 psig [4 psig for 12-foot-diameter tanks].

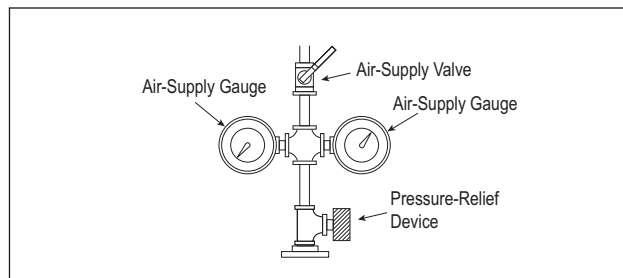


FIGURE 3-1

3.1.4. In air tests, temperature change could be a factor in changes in gauge readings.

Note: Multiple test manifolds are required to test multicompartment tanks.

3.1.5. It is the installer’s responsibility to select a thread sealant that is compatible with the product being stored. Some sealants cannot be used with some products. Remove, clean and redope all factory-furnished temporary plugs with appropriate thread sealant. Install permanent plugs in all openings where piping will not be installed. Make sure all manway bolts are tightened, and the fitting plugs are properly doped and sealed.

3.1.6. Tanks equipped with flanged nozzles may require contractor-supplied blind flanges for preinstallation testing.

3.1.7. When checking the tank for leaks during an air/soap test, rotate the tank to check the bottom, unless it is a tank filled with monitoring fluid.

CAUTION

Never rotate a tank filled with monitoring fluid. See SECTION 3.4. and SECTION 3.8. for instructions regarding these tanks.

3.1.8. Before rotating the tank during an air/soap test, place protective material on the area on which the tank will be rotated. Make sure the area is flat and is free of large or sharp objects, such as rocks, which may damage the tank.

3.1.9. Rotate the tank slowly and carefully to avoid developing too much momentum. Momentum can grow because manways and fittings on top of the tank make it top heavy. Make sure the tank’s fittings and manways never touch the ground. Do not rotate the tank more than 120 degrees from the initial starting point.

⚠ 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.

⚠ WARNING

Do not lift or hoist a tank under pressure. This could result in death or serious injury.

3.1.10. Refer to the appropriate section below for instructions for the following situations:

3.1.10.1. For testing a single-wall tank, see SECTION 3.2.

3.1.10.2. For testing a double-wall tank with a dry interstitial space, see SECTION 3.3.

3.1.10.3. For testing a double-wall tank with a wet interstitial space, see SECTION 3.4.

3.1.10.4. For testing a single-wall multicompartiment tank with a single-wall bulkhead, see SECTION 3.5.

3.1.10.5. For testing a single-wall multicompartiment tank with double-wall bulkhead(s), see SECTION 3.6.

3.1.10.6. For testing a double-wall multicompartiment tank with a dry interstitial space, see SECTION 3.7.

3.1.10.7. For testing a double-wall multicompartiment tank with a wet interstitial space, see SECTION 3.8.

3.1.11. 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.

3.1.12. After installation and before backfilling to grade, testing must be repeated to verify that no damage has occurred during installation.

WARNING

When the tank is under pressure, the manways and/or fittings may dislodge, or the tank could rupture and result in death or serious injury. Before beginning the test, notify all people on the test site to remain in a safe location. ALWAYS ATTEND TO THE TANK DURING THE TEST. Stand clear of manways, fittings and tank ends during the test.

WARNING

The maximum test pressure is 5 psig [3 psig for a 12-foot-diameter tank]. Position the pressure gauge so that the pressure readings can be clearly read at all times. Failure to follow this warning could result in death or serious injury. (See FIGURE 3-2.)

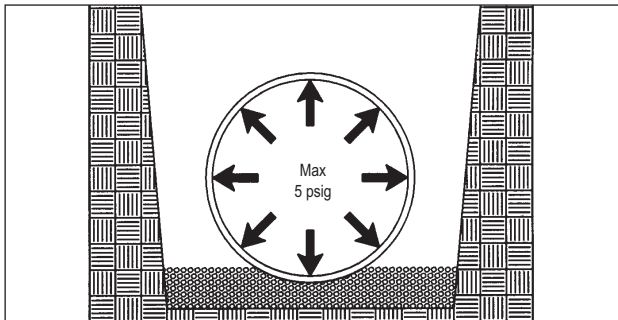


FIGURE 3-2

WARNING

The pressure-relief device or regulated air source must be rated at a maximum of 6 psig [4 psig for a 12-foot-diameter tank] to reduce the risk of overpressurizing the tank. Failure to follow this warning could result in death or serious injury.

3.2. TESTING A SINGLE-WALL TANK

3.2.1. Remove all temporary service-fitting plugs.

3.2.2. Redope fittings and install plugs in all openings, except one service fitting (needed for the test manifold). Follow instructions in Point 3.1.5.

3.2.3. Install the test manifold in the open service fitting. Connect the pressure source to the test manifold. (See FIGURE 3-3.)

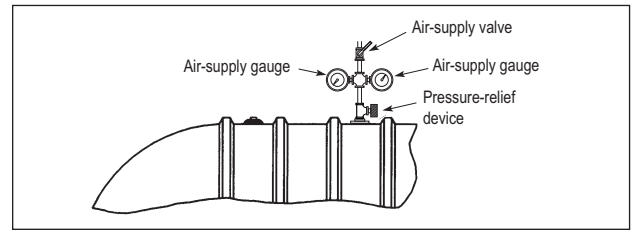


FIGURE 3-3

3.2.4. Pressurize the tank to 5 psig [3 psig for a 12-foot-diameter tank]. Allow the pressure to stabilize by adding or removing air as necessary.

3.2.5. Close the air-supply valve on the test manifold. Disconnect the air-supply line.

3.2.6. Soap the entire exterior of the tank, checking for leaks. (Follow instructions in Points 3.1.6. through 3.1.8., including Warnings following 3.1.8.) Watch for active air bubbles, which indicate a leak. Pay special attention to fittings and manways.

3.2.7. Monitor the pressure for one hour.

3.2.8. When the test is complete, carefully release the air pressure from the tank by opening the air-supply valve.

3.2.9. When airflow stops, remove the test manifold.

3.2.10. Replace the protective covers in the service fittings.

3.3. TESTING A DOUBLE-WALL TANK WITH A DRY INTERSTITIAL SPACE

3.3.1. GENERAL

3.3.1.1. The tank will arrive with a quick-disconnect assembly. (See FIGURE 3-4.)

3.3.1.2. If the tank is not configured as shown in FIGURE 3-4 prior to preinstallation testing, call the UST coordinator at the Xerxes plant nearest you.

3.3.2. PRIMARY TANK (INTERNAL)

3.3.2.1. Remove all temporary service-fitting plugs.

3.3.2.2. Redope fittings and install plugs in all openings, except one service fitting (needed for the test manifold). Follow instructions in Point 3.1.5.

3.3.2.3. Install the test manifold in the open service fitting. Connect the pressure source to the test manifold. (See FIGURE 3-4.)

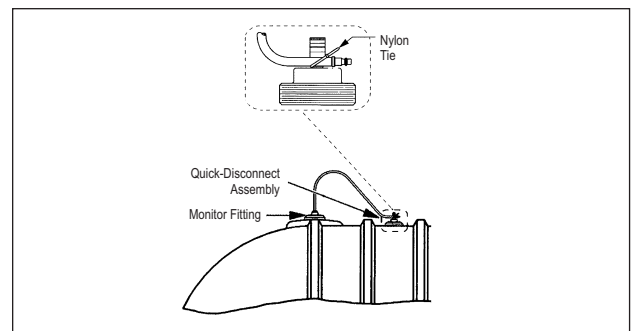


FIGURE 3-4

3.3.2.4. In order to test the primary tank alone, the quick-disconnect assembly must not be connected to the service fitting. Keep the nylon tie in place.

3.3.2.5. Pressurize the primary tank to 5 psig. Allow the pressure to stabilize by adding or removing air as necessary.

3.3.2.6. Close the air-supply valve on the test manifold. Disconnect the air-supply line.

3.3.2.7. Soap all service fittings and manways. Watch for active air bubbles, which indicate a leak.

3.3.2.8. Monitor the pressure for one hour.

3.3.3. SECONDARY TANK (EXTERNAL)

3.3.3.1. Maintain the pressure in the primary tank.

CAUTION

Do not connect air supply directly to the interstitial-space monitor fitting. Pressurizing the secondary tank (interstitial space) by itself may damage the primary tank or cause tank failure.

3.3.3.2. Free the hose from the service fitting by cutting the nylon tie.

3.3.3.3. Insert the hose into the quick-disconnect fitting. This will allow air to transfer from the primary tank to the secondary tank.

3.3.3.4. Reconnect the air-supply line. Allow the pressure to stabilize at 5 psig by adding or removing air as necessary.

3.3.3.5. Close the air-supply valve on the test manifold. Disconnect the air-supply line.

3.3.3.6. Soap the entire exterior of the tank, checking for leaks. (Follow instructions in Points 3.1.6. through 3.1.8., including Warnings following 3.1.8.) Watch for active air bubbles, which indicate a leak. Pay special attention to fittings and manways.

3.3.3.7. Monitor the pressure for one hour.

3.3.3.8. When the test is complete, carefully release the air pressure from the tank by opening the air-supply valve.

3.3.3.9. When the airflow stops, remove the test manifold.

3.3.3.10. Replace the protective covers in the service fittings.

3.4. TESTING A DOUBLE-WALL TANK WITH A WET INTERSTITIAL SPACE

CAUTION

Never pressurize a wet interstitial space. Doing so may damage the primary tank or cause tank failure.

3.4.1. PRIMARY TANK (INTERNAL)

3.4.1.1. Keep the tank vertical (the reservoir on top) at all times or the monitoring fluid may drain from the reservoir.

3.4.1.2. Remove all temporary service-fitting plugs and the reservoir-fitting plug.

3.4.1.3. Check the monitoring-fluid level in the reservoir. Remove pressure-relief valve used for shipping if present.

3.4.1.4. Visually check the interior of the tank for monitoring fluid. **There should not be any.**

3.4.1.5. Redope fittings and install plugs in all openings, except one service fitting (needed for the test manifold) and the reservoir fitting. Follow instructions in Point 3.1.5.

3.4.1.6. Install the test manifold in the open service fitting. Connect the pressure source to the test manifold. (See FIGURE 3-5.)

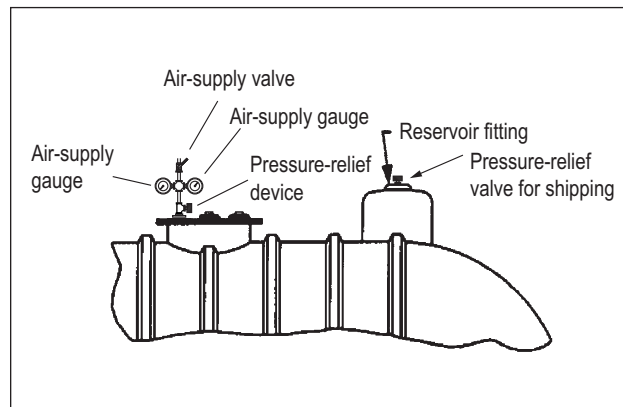


FIGURE 3-5

3.4.1.7. Pressurize the primary tank to 5 psig. Allow the pressure to stabilize by adding or removing air as necessary.

3.4.1.8. Close the air-supply valve on the test manifold. Disconnect the air-supply line.

3.4.1.9. Soap all service fittings and manways. Watch for active air bubbles, which indicate a leak. Look through the laminate for any active air bubbles rising to the top. Their presence would indicate an internal leak. Also, check the reservoir for bubbles in the monitoring fluid. **(The monitoring-fluid level will rise during the air test. It may even overflow from the reservoir.)**

3.4.1.10. Monitor the pressure for one hour.

3.4.1.11. When the test is complete, carefully release the air pressure from the tank by opening the air-supply valve.

3.4.1.12. When the airflow stops, remove the test manifold.

3.4.1.13. Check the level of the monitoring fluid in the reservoir. It should be at approximately the same level as the pretest level.

3.4.2. SECONDARY TANK (EXTERNAL)

CAUTION

Never pressurize a wet interstitial space. Doing so may damage the primary tank or cause tank failure.

3.4.2.1. Check the exterior of the tank for monitoring fluid. (The monitoring fluid is dyed blue to distinguish between moisture and monitoring fluid.) If monitoring fluid is found, wipe the tank dry and verify that the monitoring fluid does not reappear. Lift the tank to check the bottom. **Do not roll the tank.**

WARNING

Do not lift the tank when the tank is under pressure. This could result in death or serious injury.

3.4.2.2. Visually check the interior of the tank for monitoring fluid. **There should not be any.**

3.4.2.3. Replace the protective covers in the service fitting and the reservoir fitting.

3.5. TESTING A SINGLE-WALL MULTICOMPARTMENT TANK WITH A SINGLE-WALL BULKHEAD

3.5.1. GENERAL

3.5.1.1. Remove all temporary service-fitting plugs.

3.5.1.2. Redope fittings and install plugs in all openings, except one service fitting in each compartment (needed for the test manifolds). *Follow instructions in Point 3.1.5. (See FIGURE 3-6 and FIGURE 3-7.)*

3.5.1.3. Before doing the air test of the base tank (described in SECTION 3.5.2.) and the air test of the end tank(s) (described in SECTION 3.5.3.), install the test manifolds on the base and end tank(s).

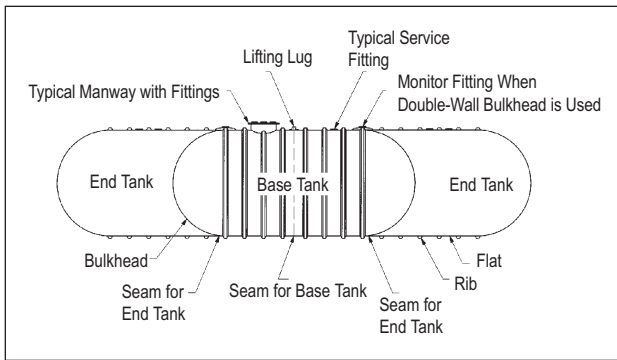


FIGURE 3-6

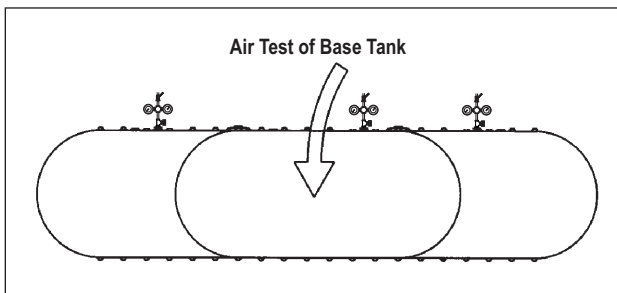


FIGURE 3-7

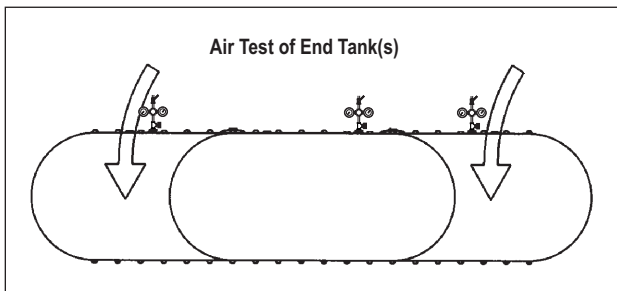


FIGURE 3-8

3.5.2. AIR TEST OF BASE TANK

3.5.2.1. Connect the pressure source to the test manifold on the base tank. (See FIGURE 3-3 and FIGURE 3-7.)

3.5.2.2. Pressurize the base tank to 5 psig. Allow the pressure to stabilize by adding or removing air as necessary.

3.5.2.3. Close the air-supply valve on the test manifold in each compartment. Disconnect the air-supply line.

3.5.2.4. Monitor the pressure for one hour. **Do not release air pressure.**

3.5.3. AIR TEST OF END TANK(S)

3.5.3.1. Connect the pressure source to the test manifold on the end tank(s). (See FIGURE 3-3 and FIGURE 3-8.)

3.5.3.2. Pressurize the end tank(s) to 5 psig. Allow the pressure to stabilize by adding or removing air as necessary.

3.5.3.3. Close the air-supply valve on the test manifold. Disconnect the air-supply line.

3.5.4. EXTERNAL SOAP TEST

3.5.4.1. Soap the entire exterior of the tank, checking for leaks. (Follow instructions in Points 3.1.6. through 3.1.8., including Warnings following 3.1.8.) Watch for active air bubbles, which indicate a leak. Pay special attention to fittings and manways.

3.5.4.2. Monitor the pressure for one hour.

3.5.4.3. After the test is completed, release all tank air pressure and remove gauges.

3.5.4.4. Replace the protective covers in the service fittings.

3.6. TESTING A SINGLE-WALL MULTICOMPARTMENT TANK WITH DOUBLE-WALL BULKHEAD(S)

CAUTION

Do not connect air supply directly to the interstitial-space monitor fitting. Pressurizing the secondary tank (interstitial space) by itself may damage the primary tank or cause tank failure.

3.6.1. GENERAL

3.6.1.1. Remove all temporary service-fitting plugs.

3.6.1.2. Redope fittings and install plugs in all openings, except one service fitting in each compartment (needed for the test manifolds). *Follow instructions in Point 3.1.5. (See FIGURE 3-6 and FIGURE 3-7.)*

3.6.1.3. Before doing the air test of the base tank (described in SECTION 3.6.2.) and the air test of the end tank(s) (described in SECTION 3.6.3.), install the test manifolds on the base and end tank(s).

3.6.2. AIR TEST OF BASE TANK

3.6.2.1. Connect the pressure source to the test manifold on the base tank. (See FIGURE 3-3 and FIGURE 3-7.)

3.6.2.2. Pressurize the base tank to 5 psig. Allow the pressure to stabilize by adding or removing air as necessary.

3.6.2.3. Close the air-supply valve on the test manifold on the base tank. Disconnect the air-supply line.

3.6.2.4. Soap the fittings on top of the base tank to make sure fittings are not leaking. Watch for active air bubbles, which indicate a leak.

3.6.2.5. Monitor the pressure for one hour. **Do not release air pressure.**

3.6.3. AIR TEST OF END TANK(S)

3.6.3.1. Connect the pressure source to the test manifold(s) on the end tank(s). (See FIGURE 3-3 and FIGURE 3-8.)

3.6.3.2. Pressurize the end tank(s) to 5 psig. Allow the pressure to stabilize by adding or removing air as necessary.

3.6.3.3. Close the air-supply valve on the test manifold. Disconnect the air-supply line.

3.6.4. TEST OF DOUBLE-WALL BULKHEAD(S)

3.6.4.1. After the primary and secondary tanks have been pressurized, install a 4-inch NPT plug with a 0-15 psig gauge (1/4-lb. or 1/10-lb. increments) into all monitor fittings leading into the double-wall bulkhead(s). (See FIGURE 3-9.)

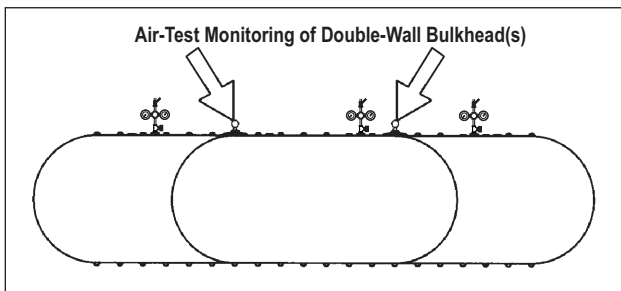


FIGURE 3-9

3.6.5. EXTERNAL SOAP TEST

3.6.5.1. Soap the entire exterior of the tank, checking for leaks. (Follow instructions in Points 3.1.6. through 3.1.8., including Warnings following 3.1.8.) Watch for active air bubbles, which indicate a leak. Pay special attention to fittings and manways.

3.6.5.2. Monitor the pressure for one hour.

3.6.5.3. Monitor all gauges for either a loss in pressure from the tanks or an increase in pressure in the bulkhead interstitial space.

3.6.5.4. After the test is completed, release all tank air pressure and remove gauges.

3.6.5.5. Replace the protective covers in the service fittings.

3.7. TESTING A DOUBLE-WALL MULTICOMPARTMENT TANK WITH A DRY INTERSTITIAL SPACE

CAUTION

Do not connect air supply directly to the interstitial-space monitor fitting. Pressurizing the secondary tank (interstitial space) by itself may damage the primary tank or cause tank failure.

3.7.1. GENERAL

3.7.1.1. Remove all temporary service-fitting plugs.

3.7.1.2. Redope fittings and install plugs in all openings, except one service fitting in each compartment (needed for the test manifolds). Follow instructions in Point 3.1.5. (See FIGURE 3-10 and FIGURE 3-11.)

3.7.1.3. The tank will arrive with a quick-disconnect assembly. (See FIGURE 3-4.)

3.7.1.4. If the tank is not configured as shown in FIGURE 3-4 prior to preinstallation testing, call the UST coordinator at the Xerxes plant nearest you.

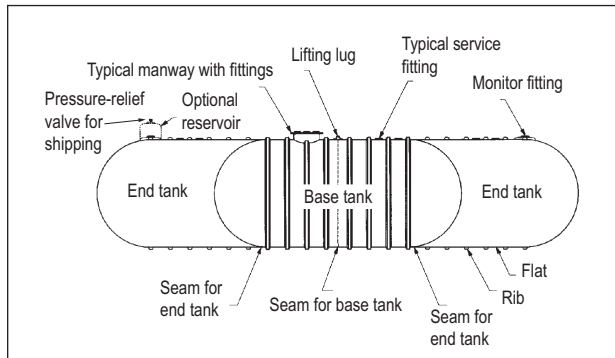


FIGURE 3-10

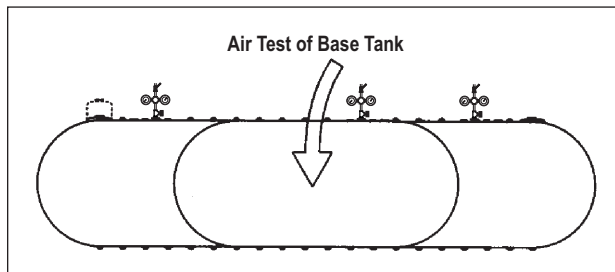


FIGURE 3-11

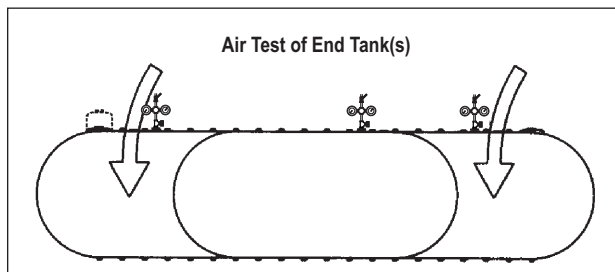


FIGURE 3-12

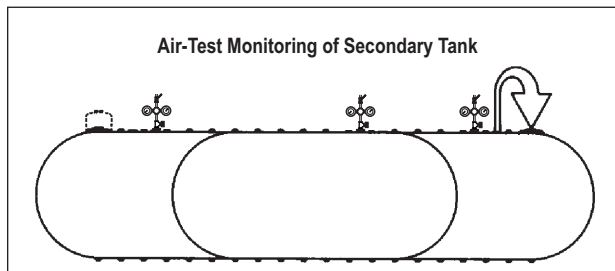


FIGURE 3-13

3.7.2. AIR TEST OF BASE TANK

3.7.2.1. Connect the pressure source to the test manifold on the base tank. (See FIGURE 3-3 and FIGURE 3-11.)

3.7.2.2. Pressurize the base tank to 5 psig. Allow the pressure to stabilize by adding or removing air as necessary.

3.7.2.3. Close the air-supply valve on the test manifold on the base tank. Disconnect the air-supply line.

3.7.2.4. Soap all service fittings and manways on the base tank. Watch for active air bubbles, which indicate a leak.

3.7.2.5. Monitor the pressure for one hour. **Do not release air pressure.**

3.7.3. AIR TEST OF END TANK(S)

3.7.3.1. Connect the pressure source to the test manifold on the end tank(s). (See FIGURE 3-3 and FIGURE 3-12.)

3.7.3.2. Pressurize the end tank(s) to 5 psig. Allow the pressure to stabilize by adding or removing air as necessary.

3.7.3.3. Close the air-supply valve on the test manifold on each end tank. Disconnect the air-supply line.

3.7.3.4. Soap all service fittings and manways on the end tank(s). Watch for active air bubbles, which indicate a leak.

3.7.3.5. Monitor the pressure for one hour.

3.7.4. AIR TEST OF SECONDARY TANK

3.7.4.1. Attach the quick-disconnect hose assembly from the monitor fitting to the primary-tank service fitting (with a female quick-disconnect fitting in place). This will allow air to transfer to the interstitial space. (See FIGURE 3-4 and FIGURE 3-13.)

3.7.4.2. Add air as required and stabilize the air pressure in the total tank system to 5 psig.

3.7.5. EXTERNAL SOAP TEST

3.7.5.1. Soap the entire exterior of the tank, checking for leaks. (Follow instructions in Points 3.1.6. through 3.1.8., including Warnings following 3.1.8.) Watch for active air bubbles, which indicate a leak. Pay special attention to fittings and manways.

3.7.5.2. Monitor the pressure for one hour.

3.7.5.3. When the test is completed, carefully release the air pressure from the tank by opening the air-supply valve.

3.7.5.4. When the airflow stops, remove the test manifold.

3.7.5.5. Replace the protective covers in the service fittings.

3.8. TESTING A DOUBLE-WALL MULTICOMPARTMENT TANK WITH A WET INTERSTITIAL SPACE

CAUTION

Never pressurize a wet interstitial space. Doing so may damage the primary tank or cause tank failure.

3.8.1. GENERAL

3.8.1.1. See FIGURE 3-10 for reference.

3.8.2. BASE TANK'S PRIMARY (INTERNAL) TANK

3.8.2.1. Keep the tank vertical (the reservoir on top) at all times or the monitoring fluid may drain from the reservoir.

3.8.2.2. Remove all temporary service-fitting plugs and the reservoir-fitting plug.

3.8.2.3. Check the monitoring-fluid level in the reservoir. Remove pressure-relief valve used for shipping if present.

3.8.2.4. Visually check the interior of each compartment for monitoring fluid. **There should not be any.**

3.8.2.5. Redope fittings and install plugs in all openings, except one service fitting in each compartment (needed for the test manifolds) and the reservoir fitting. Follow instructions in Point 3.1.5. (See FIGURE 3-6 and FIGURE 3-7.)

3.8.2.6. Before doing the air test of the base tank (described in SECTION 3.8.3.) and the air test of the end tank(s) (described in SECTION 3.8.4.), install a test manifold in the open service fitting on both the base and end tank(s).

3.8.3. AIR TEST OF BASE TANK'S PRIMARY TANK

3.8.3.1. Connect the pressure source to the test manifold on the base tank. (See FIGURE 3-3 and FIGURE 3-11.)

3.8.3.2. Pressurize the primary tank of the base tank to 5 psig. Allow the pressure to stabilize by adding or removing air as necessary.

3.8.3.3. Close the air-supply valve on the test manifold on the base tank. Disconnect the air-supply line.

3.8.3.4. Soap all service fittings and manways. Watch for active air bubbles, which indicate a leak. Look through the laminate for any active air bubbles rising to the top. Their presence would indicate an internal leak. Also, check the reservoir for bubbles in the monitoring fluid. **(The monitoring-fluid level will rise during the air test. It may even overflow from the reservoir.)**

3.8.3.5. Monitor the pressure for one hour. **Do not release air pressure.**

3.8.4. AIR TEST OF END TANK(S)' PRIMARY TANK(S)

3.8.4.1. Connect the pressure source to the test manifolds on the end tank(s). (See FIGURE 3-3 and FIGURE 3-12.)

3.8.4.2. Pressurize the primary tank of the end tank(s) to 5 psig. Allow the pressure to stabilize by adding or removing air as necessary. **(The monitoring-fluid level will rise during the air test.)**

3.8.4.3. Close the air-supply valve on the test manifolds on the end tanks. Disconnect the air-supply line.

3.8.4.4. Soap all service fittings and manways. Watch for active air bubbles, which indicate a leak. Check the reservoir for bubbles in the monitoring fluid. **(The level of the monitoring fluid will naturally rise due to the pressure in the primary tank.)**

3.8.4.5. Monitor the pressure for one hour.

3.8.4.6. When the test is complete, carefully release the air pressure from all compartments by opening the air-supply valve.

3.8.4.7. When the air flow stops, remove the test manifolds.

3.8.4.8. Check the monitoring-fluid level in the reservoir. It should be at approximately the same level as the pretest level.

3.8.5. SECONDARY TANK (EXTERNAL)

3.8.5.1. Check the exterior of the tank for monitoring fluid. (The monitoring fluid is dyed blue to distinguish between moisture and monitoring fluid.) If monitoring fluid is found, wipe the tank dry and verify that the monitoring fluid does not reappear. Lift the tank to check the bottom. Do not roll the tank.

3.8.5.2. Visually check the interior of the tank for monitoring fluid. **There should not be any.**

3.8.5.3. Replace the protective covers in the service fittings and the reservoir fitting.

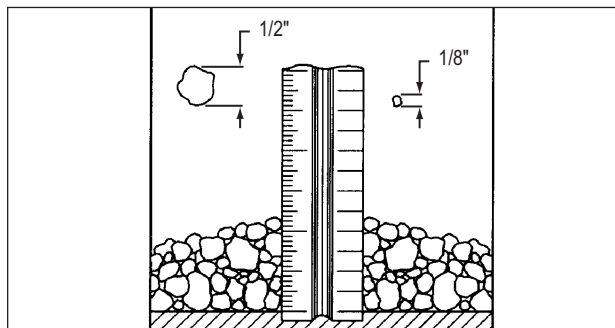


FIGURE 4-2

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.

4.1.4. 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.

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.

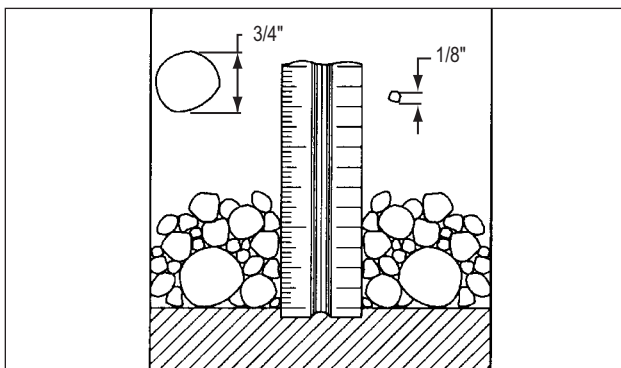


FIGURE 4-1

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.

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 OSHA's Standard, Part 1926, Subpart P (Excavations), 650-652; and "Fall Protection Rules and Regulations."

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; NFPA 30, 30A and 31; API RP 1615; PEI RP100; 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 overburden and/or an appropriate anchoring system must be present to offset buoyancy of the tank.**

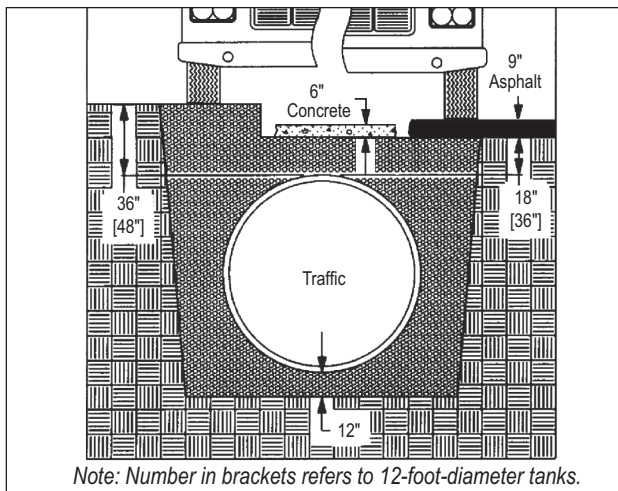


FIGURE 5-1

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.**

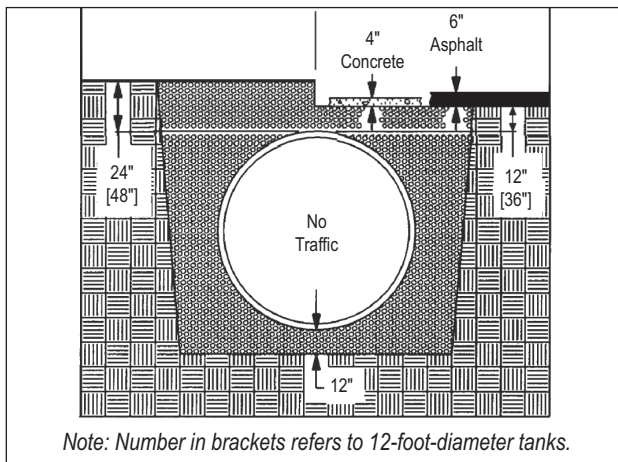


FIGURE 5-2

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. Deviation from this may be permissible with prior written authorization from Xerxes. Call your Xerxes representative for a special quotation prior to tank purchase 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 manway riser, it must not transmit load from the 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 sump or riser. 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 of the tank "shadow." *(See FIGURE 5-3.)*

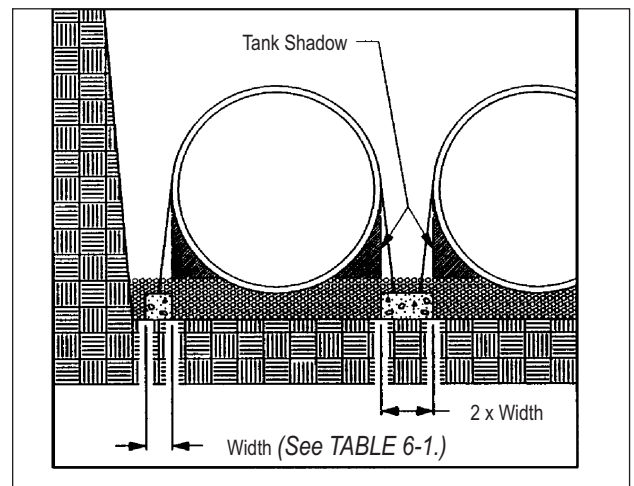


FIGURE 5-3

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.)

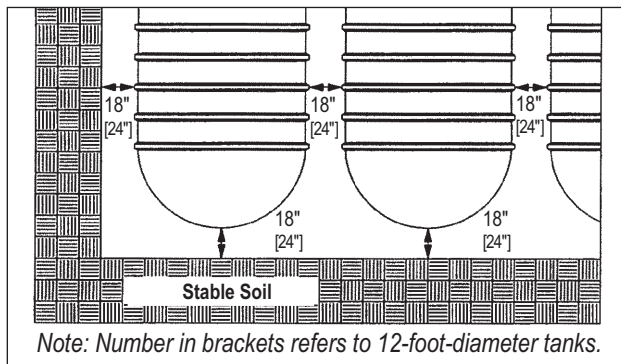


FIGURE 5-4

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 5-5.)

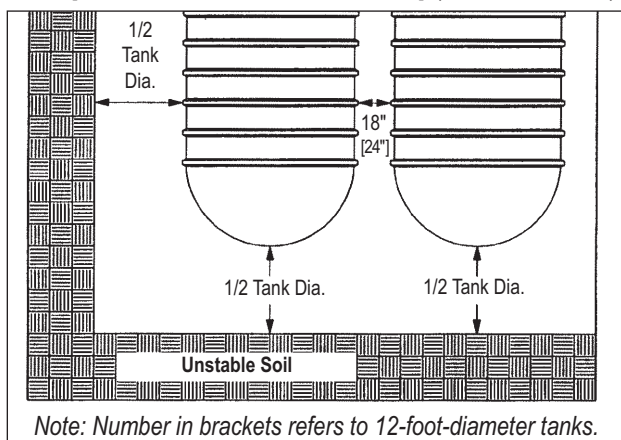


FIGURE 5-5

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.)

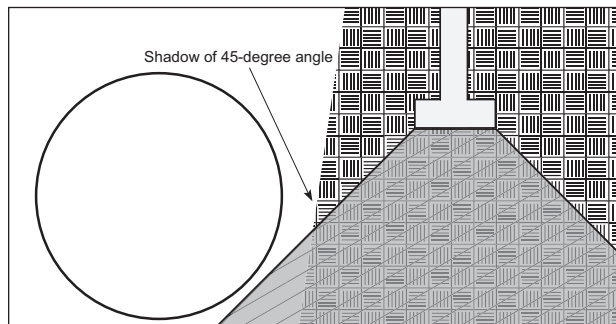


FIGURE 5-6

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
- 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 reinforced concrete beams.

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 containment sumps 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 one containment sump.

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 of 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 containment sumps and burial depth must be considered.

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

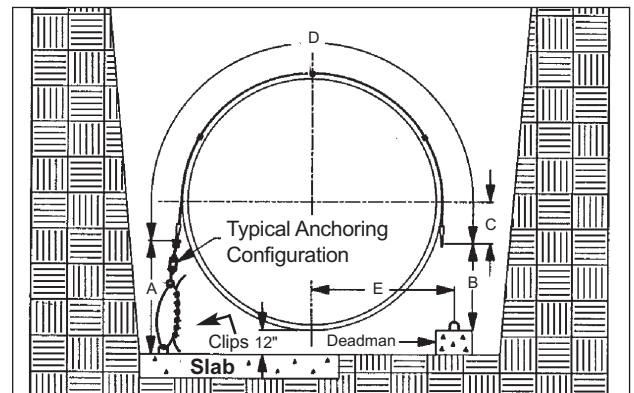


FIGURE 6-1

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 the 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 each side 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 14 of the 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.

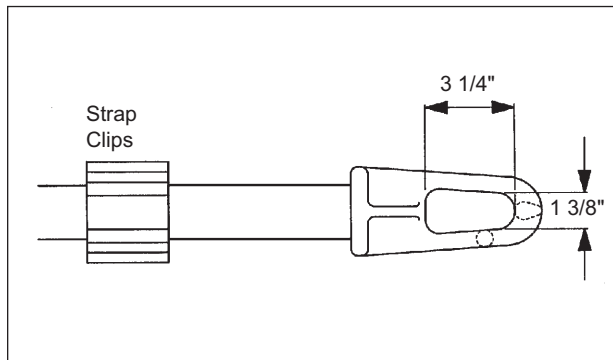


FIGURE 6-2

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).

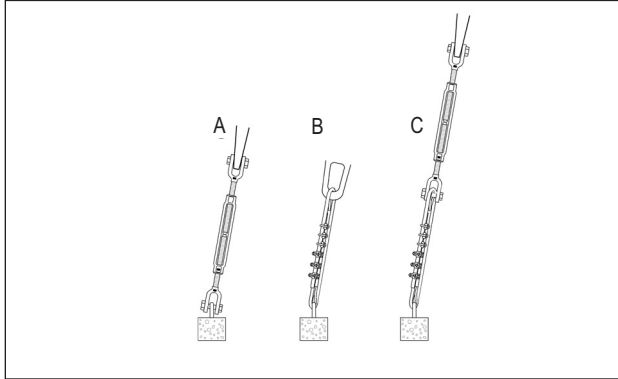


FIGURE 6-3

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.)

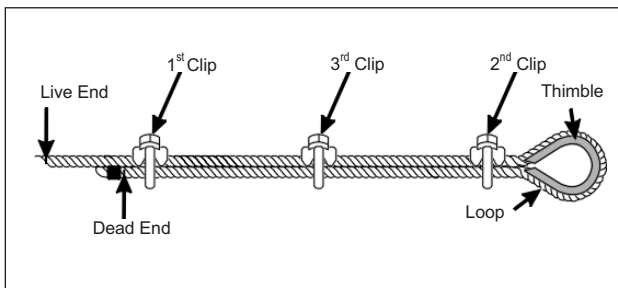


FIGURE 6-4

6.6.13. When two clips are required, apply the second clip as close to 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 close to 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.

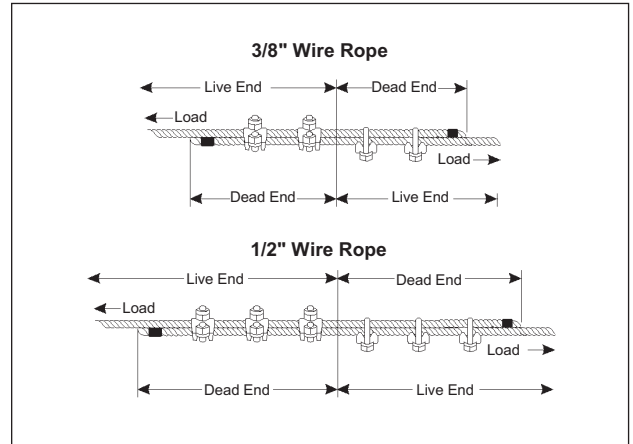


FIGURE 6-5

6.7. MAN-OUT-OF-HOLE (MOH) 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.

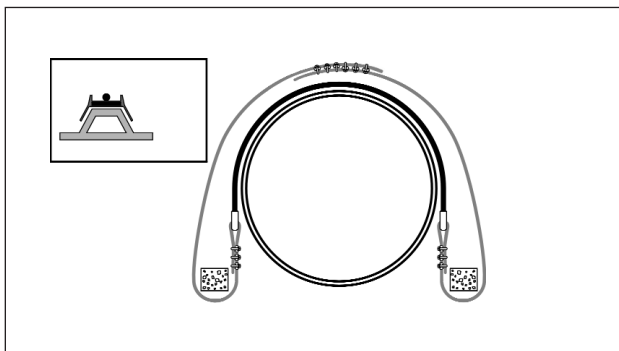


FIGURE 6-6

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.

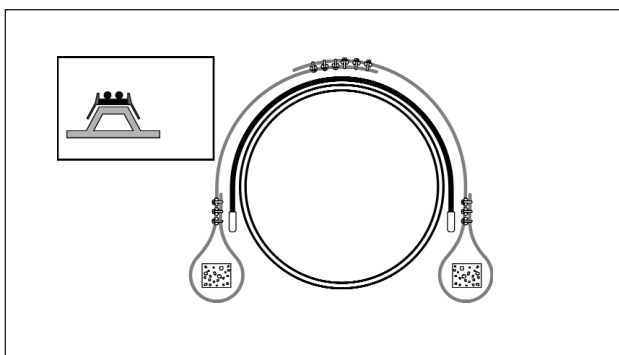


FIGURE 6-7

7. BOTTOM SUMPS AND 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 by contact with any other object, such as the truck bed or the ground.

CAUTION

All connections to the tank must be flexible. Provisions must be made to accommodate movement and misalignment between the piping and the tank.

7.1.2. During installation, provide a clear area in the backfill bedding so that the tank rests on the backfill bedding and the sump or 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

WARNING

If product is used as ballast, exercise special care in handling. Safeguard against sparks, fire or product spills. Improper handling of product could cause a fire or explosion and result in death or serious injury.

WARNING

Do not use air pressure to test tanks that contain or have contained flammable or combustible liquids or vapors. The fuel and air mixture could explode and result in death or serious injury. Tanks should be air-tested before ballasting.

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 is totally 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. Sloping of tanks may affect accuracy of Xerxes calibration charts.

8.2.6. If a double-wall tank is sloped, the monitor should be at the low end.

8.2.7. 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.

8.2.8. When the tank is placed, take a measurement of the internal diameter of the tank. (See SECTION 14 of the Installation Manual for instructions on taking diameter measurements.) Record this measurement as Initial Internal Diameter on the Tank Installation Checklist, SECTION 4.

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

8.2.10. 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.

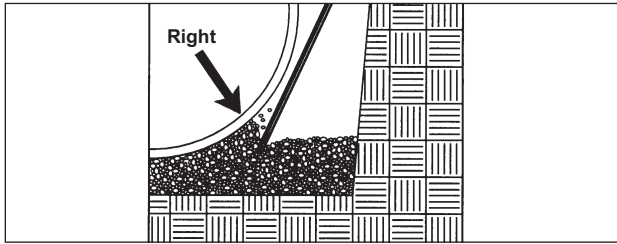


FIGURE 8-1

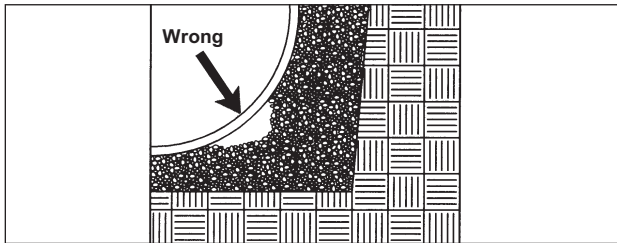


FIGURE 8-2

8.2.11. Repeat Point 8.2.10. with a second 12-inch lift.

8.2.12. 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 14 of the 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 8.2.2. 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 8.2.8.

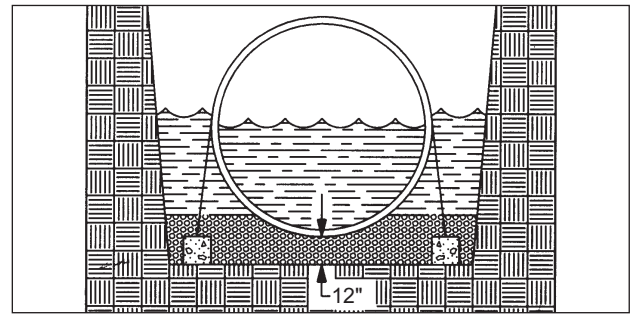


FIGURE 8-3

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

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

9. POSTINSTALLATION TESTING

WARNING

Do not use air pressure to test tanks that contain or have contained flammable or combustible liquids or vapors. The fuel and air mixture could explode and result in death or serious injury. Tanks should be air tested before ballasting.

WARNING

If product is used as ballast, exercise special care in handling. Safeguard against sparks, fire or product spills. Improper handling of product could cause a fire or explosion and result in death or serious injury.

9.1. GENERAL

9.1.1. After backfill is brought to the top of the tank, take a measurement of the internal diameter of the tank as a deflection check. (See SECTION 14 of the Installation Manual for instructions on taking diameter measurements.)

9.1.2. After the internal diameter of the tank has been measured and vertical deflection is determined to be within the limits specified by Xerxes (See table in Tank Installation Checklist, SECTION 4.), the tank must be pressure-tested to ensure that no damage occurred during installation.

9.1.3. Follow the procedure in SECTION 3, soaping all exposed areas of the tank and all fittings, and monitoring the pressure for one hour.

9.1.4. Carefully relieve the pressure in the tank. Remove the quick-disconnect assembly from dry double-wall tanks.

10. BALLASTING (ADDING LIQUID)

WARNING

Do not use air pressure to test tanks that contain or have contained flammable or combustible liquids or vapors, and do not perform any postinstallation pressure tests. The fuel and air mixture could explode and result in death or serious injury. Tanks should be air-tested before ballasting.

⚠ WARNING

If product is used as ballast, exercise special care in handling. Safeguard against sparks, fire or product spills. Improper handling of product could cause a fire or explosion and result in death or serious injury.

⚠ 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 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 and the top slab is in place. Therefore, during the installation process, the tank should be ballasted completely after the backfill is even with the top of the tank and after 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.

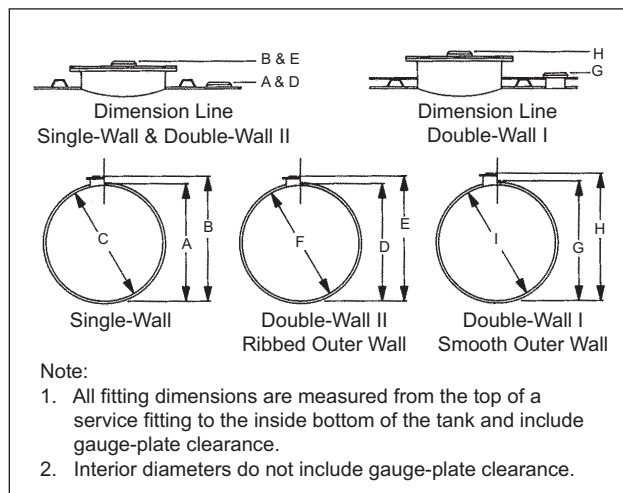


FIGURE 11-1

Interior Dimensions in FIGURE 11-1	Tank Diameter				
	4'	6'	8'	10'	12'
"A"	49 1/4"	73"	92"	121"	138 1/4"
"B"	54 1/2"	78"	98"	126"	143 1/4"
"C"	48"	71 3/8"	91 3/16"	119 3/16"	136 5/8"
"D"	49 1/2"	72 3/4"	91 1/2"	120"	—
"E"	55"	77 3/4"	97 1/4"	125 3/4"	—
"F"	48"	70 5/8"	90 5/8"	118 1/2"	—
"G"	51 1/2"	75 1/8"	95 3/8"	123 1/2"	—
"H"	56 5/8"	80 1/4"	100 1/2"	128 5/8"	—
"I"	48"	71 3/8"	91 3/16"	119 3/16"	—

TABLE 11-1

11.2. EXTERNAL PIPING

⚠ WARNING

When 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

When extending monitoring or vapor-recovery piping to the surface, make sure the at-grade fittings are different from any fill fittings and will not accept standard fill hoses.

11.3. VENTING TANKS

⚠ 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. In the double-wall and triple-wall tank, the primary tank is designed to operate at atmospheric pressure.

11.3.3. 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.

11.3.4. Whenever installing overfill protection, such as alarms, automatic shut-off devices ("flapper valves") or vent-restriction devices ("ball-float valves"), follow the instructions provided by the manufacturer of the overfill-protection device and consult the authority having jurisdiction to determine the level at which the overfill protection should operate.

⚠ WARNING

Overfill protection, such as automatic shut-off devices or vent-restriction devices, should not be installed if owner/operator will allow pump- or pressure-filling of the

tank. Failure to follow this instruction could cause tank failure and result in death or serious injury.

11.4. VENTING INTERSTITIAL SPACES

CAUTION

All reservoirs must be vented for proper operation.

11.4.1. When the tank's interstitial space is filled with a monitoring fluid, the space must be vented. It is sufficient to drill a 1/4-inch-diameter hole in the side or cap of the reservoir standpipe as supplied by the installer. If the groundwater level could be high enough to enter a drilled vent hole, install a vent line from the standpipe to above high-water level.

11.4.2. When the interstitial space is dry, it is not necessary to vent the space to atmosphere.

12. FILLING TANKS

12.1. GENERAL

12.1.1. Xerxes recommends only gravity-filling of tanks.

12.1.2. See SECTION 18, *Operating Guidelines*.

13. BACKFILLING TO GRADE

13.1. GENERAL

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

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

13.1.3. 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.

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

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

13.1.6. 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 14 of the *Installation Manual for instructions on taking diameter measurements*.) Record this measurement as Final Internal Diameter on the Tank Installation Checklist, SECTION 4.

13.1.7. Complete the Tank Installation Checklist.

14. DEFLECTION MEASUREMENT

14.1. GENERAL

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

14.1.2. 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 using a tape measure, etc.)

14.1.3. 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.

14.1.4. Take the initial internal-diameter measurement before backfilling the tank. (See Point 8.2.8.) In a wet-hole installation, take this measurement before the tank is placed in the excavation hole. (See Point 8.3.1.1.)

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

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

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

14.2. INTERNAL-DIAMETER MEASUREMENT WITHOUT A STANDPIPE

14.2.1. Place the dipstick into a service fitting.

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

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

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

14.2.5. 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.

14.2.6. For subsequent measurements of the internal diameter, repeat Points 14.2.1. through 14.2.5. When the measurement is the final diameter measurement, record this measurement as Final Internal Diameter on the Tank Installation Checklist, SECTION 4.

14.3. INTERNAL-DIAMETER MEASUREMENT WITH A STANDPIPE

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

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

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

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

14.3.5. 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.

14.3.6. For subsequent measurements of the internal diameter, repeat Points 14.3.1. through 14.3.5. When the measurement is the final diameter measurement, record this measurement as Final Internal Diameter on the Tank Installation Checklist, SECTION 4.

14.4. CALCULATION AND COMPARISON

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

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

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

15. MONITORING

15.1. SINGLE-WALL TANK

15.1.1. Single-wall tank installations may require release detection monitoring, which can include inventory control, automatic tank gauging, vapor monitoring or groundwater monitoring.

15.1.2. Check with federal, state and local officials for requirements in your area.

15.2. DOUBLE-WALL TANK

15.2.1. A Xerxes double-wall tank has an interstitial space between the wall of the primary (internal) tank and the wall of the secondary (external) tank for the containment and detection of leaked product from the primary tank.

15.2.2. The tank, as supplied, will have a minimum of one monitor fitting that provides access into the interstitial space.

15.3. TANK WITH A DRY INTERSTITIAL SPACE

15.3.1. The monitoring system and method is the responsibility of the tank owner and/or operator.

15.3.2. A safe electronic or mechanical system should be used to detect either product or incoming water.

15.3.3. The monitoring system should detect leakage near the bottom of the tank.

15.3.4. Monitoring can be done through the monitor fitting provided.

15.3.5. If a double-wall tank is sloped, the monitor should be at the low end.

15.4. TANK WITH A WET INTERSTITIAL SPACE

15.4.1. GENERAL

15.4.1.1. With a wet interstitial monitoring system (TRUCHEK®), the interstitial space is typically filled with monitoring fluid at the manufacturing facility.

CAUTION

All wet interstitial spaces must be vented to atmosphere. (See SECTION 11.4.)

15.4.1.2. When the tank is delivered, check the monitoring-fluid level and record it on the shipping/receiving paperwork and Tank Installation Checklist. (See FIGURE 15-1.)

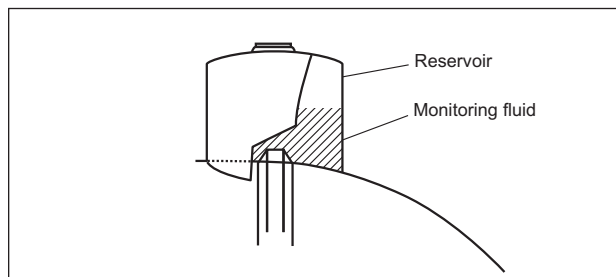


FIGURE 15-1

15.4.1.3. If monitoring fluid is not in the reservoir, call the UST coordinator at the Xerxes plant nearest you.

15.4.1.4. The TRUCHEK system enables the owner to have continuous monitoring or to conduct a tank-tightness test. TRUCHEK meets the EPA criteria for tank-tightness testing. (See the Xerxes TRUCHEK brochure.)

15.4.1.5. In a tank with the interstice filled with monitoring fluid, Xerxes recommends using a nonmetallic standpipe in the reservoir.

CAUTION

Monitoring fluid should not be present in the standpipe except during a TRUCHEK test. (See the Xerxes TRUCHEK brochure.) Monitoring fluid in the standpipe may create excessive pressure on the interstitial space and may result in tank damage.

15.4.1.6. The monitoring-fluid level may fluctuate during shipping and installation. Do not add monitoring fluid until after tank burial is completed and the monitoring system is set up.

15.4.1.7. During the installation process, the monitoring-fluid level in the reservoir will rise naturally under various conditions:

- preinstallation air test
- rise in groundwater level
- backfill compaction
- ballasting.

15.4.1.8. If a tank is sloped, the reservoir will be at the high end.

15.4.1.9. Check and record the monitoring-fluid level during the installation process. (See Tank Installation Checklist.)

15.4.1.10. Any monitoring-fluid leaks will be detected during the preinstallation air test. (See SECTION 3.)

15.4.2. SETTING THE LEVEL OF THE MONITORING FLUID

15.4.2.1. After backfilling and top-slab placement is completed, check the level of the monitoring fluid in the reservoir and set the monitoring fluid to the proper level.

CAUTION

Failure to set the monitoring-fluid level properly may lead to false alarms.

15.4.2.2. Once the tank is installed, the level of the monitoring fluid may fluctuate due to such things as:

- product level
- groundwater fluctuation
- tank filling and emptying
- product-temperature variation.

15.4.2.3. To establish the proper operating level for monitoring fluid, decide what type of monitoring probe will be used in order to determine the initial starting point for the level in the reservoir.

15.4.2.3.1. The typical probe has two sensors (a high-fluid level and a low-fluid level). When using a two-sensor probe, the start point (the proper level for the monitoring fluid) is midway between the two sensors.

15.4.2.3.2. If using something other than a two-sensor probe, use 7 inches from the top of the tank as the start point for the monitoring-fluid level.

Note: When using a probe, do not raise it off the tank to meet the monitoring-fluid level. The probe must remain upright and in contact with the top of the tank at all times. (See FIGURE 15-2.)

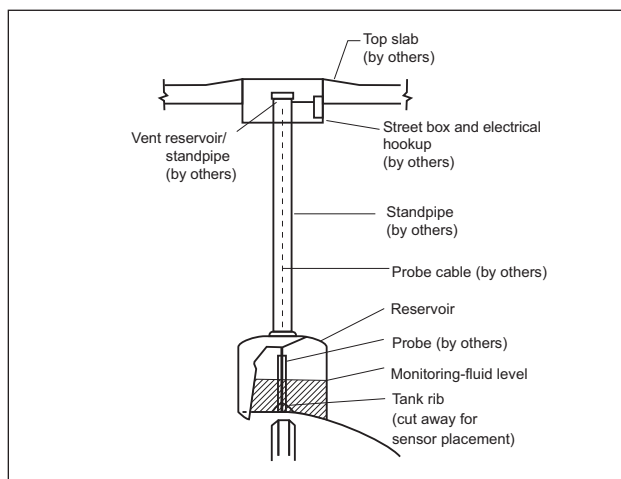


FIGURE 15-2

15.4.2.4. After determining the start point, adjust the monitoring fluid based on the product level:

15.4.2.4.1. If the tank is between 1/4 and 1/2 full of product, the proper operating level for the monitoring fluid is **at** the start point.

15.4.2.4.2. If the tank is between empty and 1/4 full, the proper operating level for the monitoring fluid is about 1 - 1 1/2 inches **below** the start point.

15.4.2.4.3. If the tank is between 1/2 full and full, the proper operating level for the monitoring fluid is about 1 - 1 1/2 inches **above** the start point.

15.4.2.5. Add or remove monitoring fluid to reach the proper operating level for the monitoring fluid.

15.4.3. TRUCHEK®

15.4.3.1. If a TRUCHEK test is required after installation, follow the procedures in the Xerxes TRUCHEK brochure.

15.4.3.2. After this test, reset the monitoring-fluid level to a position based on the product level. (See SECTION 15.4.2.)

16. INSTALLING CONTAINMENT SUMPS

16.1. GENERAL

16.1.1. Xerxes containment sumps come in a variety of models and sizes, including single-wall and double-wall models, and round and flat-sided models. These instructions pertain to Xerxes' single-wall round containment sumps. Instructions for other models are found in Xerxes' supplemental materials. See SECTION 20 of this manual for information on supplemental instructions.

16.1.2. The containment sump is a termination point for secondary piping systems. It is designed to be monitored continuously for leaks using electronic sensors. Consult federal, state and local codes and regulations to ensure proper monitoring compliance.

⚠ WARNING

The containment sump system is a confined space, which may contain hazardous vapors. If work is to be performed inside the sump, test the atmosphere inside and, if necessary, vent the space to prevent the development of vacuum or pressure. Failure to do so could result in death or serious injury.

⚠ WARNING

Use air-powered tools to prevent shock, fire or explosion from flammable liquids and vapors. Failure to do so could result in death or serious injury.

⚠ CAUTION

Always wear gloves when handling containment sump components, and always wear eye protection when grinding, cutting and attaching the sump unit. Failure to do so may result in minor or moderate injury.

⚠ CAUTION

Do not drop the containment sump assembly components or allow the sump body to roll. Since high winds could damage the sump components, protect and secure all pieces if windy conditions arise. Failure to follow this caution may result in minor or moderate injury.

CAUTION

Failure to follow these instructions may cause water-seal failure, and may result in property damage.

16.1.3. Visually inspect all pieces and parts to make sure that no shipping or handling damage has occurred. If any components are missing, contact the UST coordinator at the Xerxes plant nearest you. (See FIGURE 16-1 or FIGURE 16-2.)

16.1.4. Do not attempt any repairs to damaged containment sump components. If damage is detected, contact the UST coordinator at the Xerxes plant nearest you.

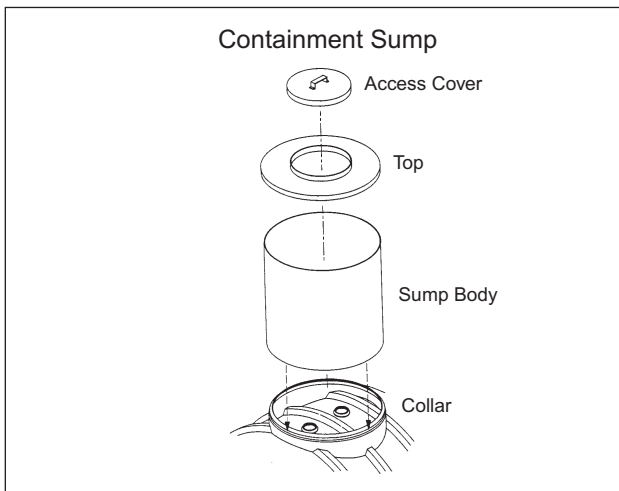


FIGURE 16-1

16.1.5. If conditions may cause groundwater to rise above the containment sump top or may cause surface water to drain into the containment sump top, use a watertight containment sump top and cover. (See FIGURE 16-2.)

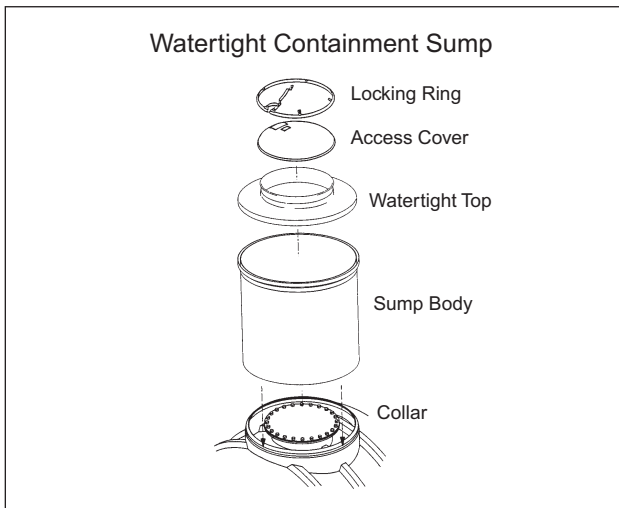


FIGURE 16-2

16.1.5.1. When a watertight system is used, the system must be vented to atmosphere, above the groundwater level.

16.1.6. The installing contractor is responsible for sealing the joint between the collar and the sump body (and the top joint when a watertight containment sump is used).

16.1.7. Xerxes recommends cutting holes for piping connections prior to application of the sealant.

16.1.8. The installing contractor must perform a hydrostatic test after sealing the containment sump. (See SECTION 16.4.)

16.1.9. When using sealant materials supplied by Xerxes and/or when doing the fiberglass lay-up in the field, follow the supplemental instructions supplied by Xerxes.

16.1.10. Typically, an installer will use Bostik 920 to seal the sump body to the collar and/or the sump body to the top. The following instructions are for that sealant material. Follow all instructions on the label of the sealant as well as the following instructions.

16.2. PREPARING CONTAINMENT SUMP BODY AND COLLAR

16.2.1. The burial depth of the tank determines the length of the containment sump body. (See FIGURE 16-3.)

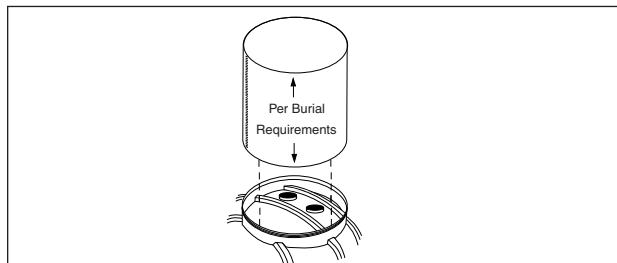


FIGURE 16-3

16.2.2. The containment sump body can be ordered in 6-inch increments starting at 36 inches.

16.2.3. Dry-fit entire containment sump assembly and mark it for proper elevation.

16.2.4. Cut the containment sump body to length and prepare for sealing. If the containment sump body needs to be trimmed, use a carbide-tipped blade or masonry saw.

⚠ **WARNING**

If using any equipment not powered by air to trim the containment sump body, move the containment sump body a safe distance from the tank, piping or any other source of flammable liquids or vapors before beginning the trimming to avoid sparks, fire or explosion. Failure to do so could result in death or serious injury.

16.2.5. Abrade the areas to be joined, removing all glossy finish. All abraded areas should be a uniform shade of white, showing glass fibers.

16.2.5.1. Abrade the entire circumference of the inside surface of the containment sump body a distance of at least 3 inches up from the point where the containment sump body meets the collar. (See FIGURE 16-4, A.)

16.2.5.2. Abrade the entire circumference of the outside surface of the collar lip. (See FIGURE 16-4, B.)

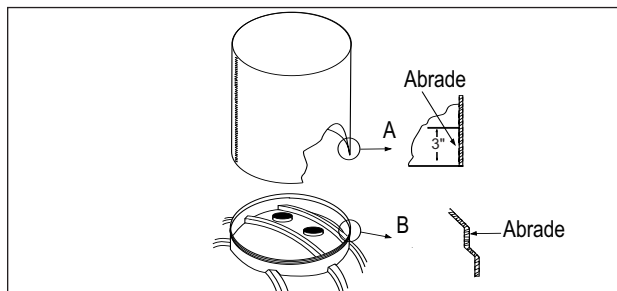


FIGURE 16-4

16.2.5.3. When using the watertight containment sump, abrade the entire circumference of the outside edge of the containment sump top. (See FIGURE 16-5, A.)

16.2.5.4. When using the watertight containment sump, abrade the entire circumference of the inside surface of the channel at the top of the containment sump body. The containment sump top sets into this channel. (See FIGURE 16-5, B.)

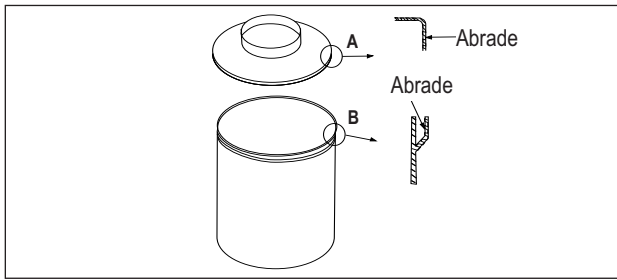


FIGURE 16-5

16.2.6. Wipe the abraded surfaces clean with a clean, dry cloth before applying sealant. Do not use oil-based solvents or water to clean surfaces.

16.2.7. Position the containment sump assembly on the collar to verify fit and elevation (in other words, dry-fit the sump on the collar).

16.2.8. Remove the containment sump assembly and temporarily store it in a location where the abraded areas are protected from dirt, grease and other contaminants.

16.3. SEALING AND ASSEMBLY OF CONTAINMENT SUMP

CAUTION

Read and follow all safety and application instructions for preparation and cure times. Failure to do so may cause water-seal failure and/or result in minor or moderate injury.

16.3.1. GENERAL

16.3.1.1. The sealant must be stored at a minimum of 60° F and used within 6 months of receiving the material.

16.3.1.2. The sealant must be applied at a temperature above 40° F.

16.3.1.3. Apply the sealant and test the containment sump (See SECTION 16.4.) before backfilling to grade.

16.3.1.4. Before applying the sealant, check to see that the surfaces to be sealed are dry and free of contamination or frost.

16.3.1.5. Before applying the sealant, consult the Typical Properties Table for Bostik and factor that information into the sealing process. (See TABLE 16-1.)

Typical Properties	
Property	Time
Working time	70 minutes
Tack-free time	90 minutes
Cure time @ 77° F	1.5 - 3 days

TABLE 16-1

CAUTION

Each sealant step must be allowed to set sufficiently before attempting any further assembly work or testing. Do not bump or move the containment sump assembly and do not work on piping connections before the sealant has set sufficiently. Any movement of the sump body before sealant sets may cause seal failure.

16.3.1.6. Allow the sealant to set (typically four to five hours)

before performing the water test to the containment sump assembly.

CAUTION

Do not stand on any portion of the installed cover. This may result in damage that would prevent proper sealing.

16.3.2. SEALING COLLAR TO CONTAINMENT SUMP BODY

16.3.2.1. The sealant is applied using a standard caulking gun (not supplied by Xerxes). When ready to apply the sealant, cut the tip off the end of the sealant cartridge at the 1/4-inch mark.

16.3.2.2. The first application of the sealant is to place a row of 1/4-inch-diameter beads around the top of the collar radius, where the incline section meets the vertical edge. (See FIGURE 16-6, A.)

16.3.2.3. The second application of the sealant is to place a row of 1/4-inch-diameter beads around the bottom surface of the vertical edge of the collar. (See FIGURE 16-6, B.)

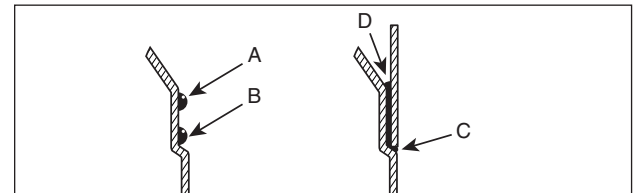


FIGURE 16-6

16.3.2.4. Now, set the containment sump section on the collar and seat it firmly in place. (See FIGURE 16-6.)

16.3.2.5. If the sealant did not flow out at the containment sump joint, apply extra sealant and smooth it out all the way around the joint to ensure sufficient and even coverage. (See FIGURE 16-6, C.)

16.3.2.6. For the next application of sealant, apply 1/4-inch-diameter beads around the inside groove of the containment sump body. (See FIGURE 16-6, D.)

16.3.2.7. Work the containment sump body back and forth, and inspect the sealant for air bubbles. If air bubbles are present, work them out and apply extra sealant material (if needed) so there is sufficient and even coverage.

16.3.2.8. Typically, the sealant will skin over in about 90 minutes. (This varies according to temperature and humidity.)

16.3.2.9. Take care when exiting the containment sump after applying the sealant.

16.3.3. SEALING CONTAINMENT SUMP BODY TO WATERTIGHT TOP

16.3.3.1. To seal the watertight top to the containment sump body, seat the top onto the containment sump body, making sure the top is centered in the channel. (See FIGURE 16-7, A.)

CAUTION

Take care not to damage the top lip when sealing the watertight containment sump top.

16.3.3.2. Fill the space between the top and the outside edge of the channel with sealant. (See FIGURE 16-7, B.)

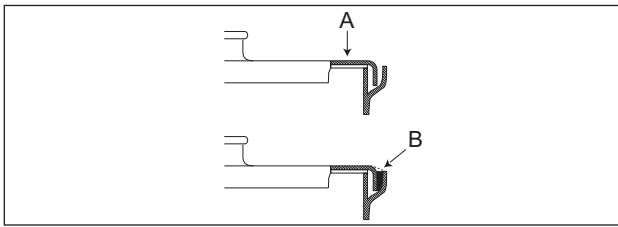


FIGURE 16-7

16.3.3.3. Apply additional sealant around the top edge to form a filler. (See FIGURE 16-7, B.)

16.3.3.4. Inspect the sealant for air bubbles. If air bubbles are present, work them out and apply extra sealant material (if needed) so there is sufficient and even coverage.

16.3.3.5. Work the sealant so there is a tight “seal” of sealant between the edge of the top and the outside edge of the channel. (See FIGURE 16-7, B.)

16.3.3.6. Typically, the sealant will skin over in about 90 minutes. (This varies according to temperature and humidity.)

16.3.3.7. Take care when exiting the containment sump after applying the sealant.

16.4. HYDROSTATIC WATER TEST

16.4.1. GENERAL

16.4.1.1. After allowing the sealant to properly set (typically four to five hours), test the containment sump assembly with water.

16.4.1.2. Seal off any piping penetrations and other penetrations found in the containment sump body.

16.4.2. TESTING CONTAINMENT SUMP (NOT WATERTIGHT MODEL)

16.4.2.1. Fill the containment sump with water to a point 6 inches above the collar/containment sump body seam.

16.4.2.2. Mark and record the water level, and check it after one hour.

16.4.2.3. Inspect all joints and penetrations for leaks.

16.4.2.4. If no leaks are found, remove the water and continue the installation process.

16.4.3. TESTING WATERTIGHT CONTAINMENT SUMP

WARNING

Do not pressurize a watertight containment sump as this could result in death or serious injury.

16.4.3.1. Do not water test the watertight containment sump until after the sealant in the groove at the top of the containment sump has sufficiently set (typically four to five hours).

16.4.3.2. Fill the containment sump with water to a point above this outer groove at the top of the containment sump (in other words, to the top of the access cover lip).

16.4.3.3. Mark and record the water level, and check it after one hour.

16.4.3.4. Inspect all joints and penetrations for leaks.

16.4.3.5. If no leaks are found, remove the water and continue the installation process.

16.4.4. REPAIRING LEAKS

16.4.4.1. If a leak is found in containment sump joints (top or bottom), mark the spot and drain the containment sump.

16.4.4.2. Dry the leak area both inside and out.

16.4.4.3. Prepare the area by abrading around the leak at least 3 inches in each direction.

16.4.4.4. Apply sealant to the abraded area.

16.4.4.5. Retest after sealant material sufficiently sets up.

16.5. WATERTIGHT COVER INSTALLATION

16.5.1. Inspect the gasket in the groove on the underside of the cover. Brush away any debris and make sure the gasket is clean.

16.5.2. Check the top lip of the opening for nicks or cracks, and clean as necessary. If damage is detected, contact the UST coordinator at the Xerxes plant nearest you.

16.5.3. Set the cover on the opening and seat it in place.

16.5.4. Open the clamping ring, and fit it around the cover and top lip of the opening.

16.5.5. Slowly close the clamping ring with the lever making sure both the cover edge and top lip are caught in the ring groove. Lock the lever in place.

CAUTION

Do not force the clamping ring closed, or minor or moderate injury may occur. If the clamping ring binds, rotate the cover and ring, and try again.

Note: The gasket in the watertight cover requires periodic replacement. To purchase replacement gaskets, contact the UST coordinator at the plant nearest you.

16.6. FINAL CONTAINMENT SUMP INSTALLATION

CAUTION

Make sure that no heavy objects are allowed to distort the containment sump top after final assembly. This includes the street box and concrete pad. No weight should be transferred to the tank. Failure to do so may result in property damage.

16.6.1. Backfill to the top of the containment sump system.

16.6.2. Backfill around the outside edge of the containment sump, making sure that no backfill is on top of the containment sump. (See FIGURE 16-8, Area A.)

16.6.3. Isolate the containment sump from all traffic loads.

16.6.3.1. The contractor must install a concrete form/barrier to allow a minimum 3-inch clearance between any load-bearing item (for example, the concrete pad/street-box frame) and the containment sump top.

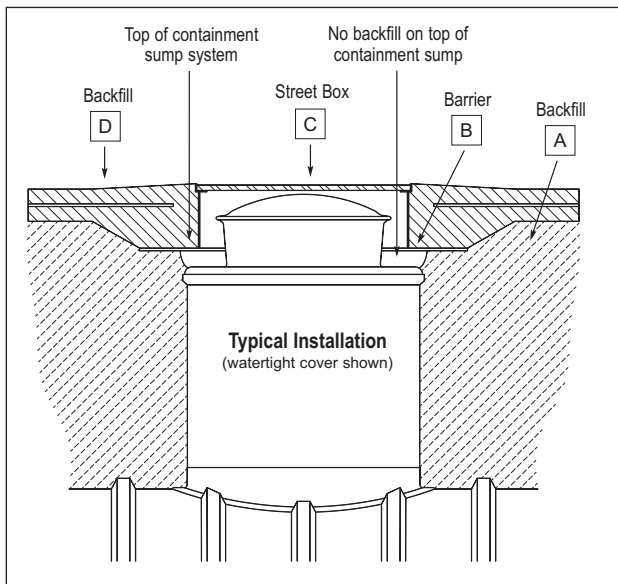


FIGURE 16-8

16.6.3.2. Typically, a sheet of plywood (or other material) is used as a barrier and is set on the pea gravel to ensure that there is at least a 3-inch clearance above the containment sump top. (See *FIGURE 16-8, Area B.*)

16.6.4. Choose a street-box size that allows enough clearance around the containment sump top opening for proper operation of the cover.

16.6.5. Set the street box, and check for clearance to allow access and space to remove the watertight cover. (See *FIGURE 16-8, Area C.*)

16.6.6. Continue with backfill, as required, to subgrade. (See *FIGURE 16-8, Area D.*)

16.6.7. Maintain good drainage of water away from the access opening of the containment sump top.

17. ADDING TANKS AT EXISTING LOCATIONS

17.1. GENERAL

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

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

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

17.2. PREFERRED METHOD

17.2.1. The preferred method (*FIGURE 17-1*) is the following:

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

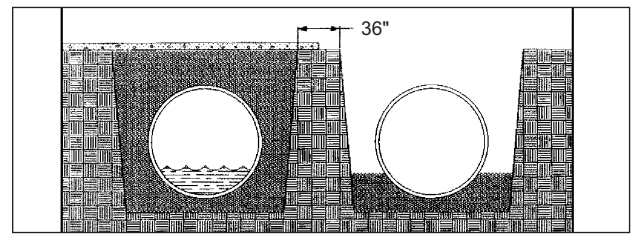


FIGURE 17-1

17.3. ALTERNATE METHOD

17.3.1. If the preferred method outlined above is not practical, an alternate method (*FIGURE 17-2*) 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 Installation Manual
- see *SECTION 5* for excavation parameters.

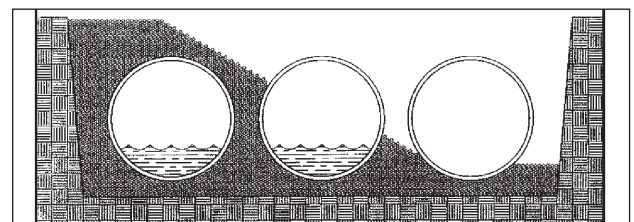


FIGURE 17-2

18. OPERATING GUIDELINES

18.1. GENERAL

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

18.1.2. In addition to these installation instructions 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.

18.1.3. Consult tank brochures, separate system instructions (such as oil/water separators) and separate accessory instructions, which are available upon request from the UST coordinator at the Xerxes plant nearest you. (See *SECTION 20.*)

18.1.4. 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 19.*)

18.2. TEMPERATURE LIMITS FOR STORED PRODUCT

CAUTION

Products must be stored in the tank appropriate for the specific product. Failure to follow this caution may damage the tank and surrounding property.

18.2.1. All products must be stored at ambient temperature except as noted in Points 18.2.2. through 18.2.4.

18.2.2. The maximum temperature for storing fuel oils is 150° F.

18.2.3. The maximum temperature for storing nonpotable water is 150° F. Note: Potable water is to be stored at ambient temperature.

18.2.4. The maximum temperature for storing chemicals is 100° F.

CAUTION

Introducing a product into a tank in excess of the allowable temperature may damage the tank. Failure to follow this caution may damage the tank and surrounding property.

18.3. FILLING TANKS

18.3.1. Never overfill the tank.

18.3.2. Xerxes recommends only gravity-filling of tanks.

WARNING

Xerxes does not recommend pump- or pressure-filling of the tanks because an overfill or overpressurization could occur. Overfilling the tank while under pressure could cause tank failure even if the tank vent is unrestricted. Tank failure could result in death or serious injury.

18.3.3. Each time the tank is filled, the owner/operator must make sure the tank is properly vented. (See SECTION 11.)

18.3.4. Owner/operator must determine whether the tank has overfill protection, such as automatic shut-off devices ("flapper valves") or vent-restriction devices ("ball-float valves"), which will close off the internal piping and reduce the tank's capacity.

18.3.5. Owner/operator must notify whoever fills the tank that it has overfill protection, which reduces the tank's capacity.

18.3.6. Before each tank filling, owner/operator or the delivery service must determine the tank's reduced capacity due to the overfill protection, and consult the instructions or guidelines provided by the installer and manufacturer of the overfill-protection device to determine how much additional product the tank can hold.

WARNING

If owner/operator allows pump- or pressure-filling of the tank, owner/operator must ensure that the tank is not equipped with overfill protection, such as an automatic shut-off device or ball-float valve. Owner/operator must notify whoever will fill the tank that automatic shut-off equipment is required on the delivery truck to prevent an overfill and that overfilling the tank while under pressure could cause tank failure even if the tank vent is unrestricted. Failure to follow these instructions each time the tank is filled could cause an overfill, overpressurization or tank failure, and could result in death or serious injury.

18.4. ENTERING TANKS

18.4.1. 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.

19. LIMITED WARRANTIES

19.1. GENERAL

19.1.1. 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.

20. SELECTED LIST OF SUPPLEMENTAL MATERIALS

20.1. GENERAL

20.1.1. 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.

20.1.1.1. 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
- Watertight Cover Gasket Replacement Instructions
- New York City Double-Wall Tank Installation/Testing Supplement
- Triple-Wall Tank Preinstallation Testing Instructions
- Flexible Dipstick Monitoring Instructions
- Field Fiberglass Lay-Up Instructions for Containment Sumps
- Two-Part Sealant Mixing/Handling Instructions
- Single-Wall Containment Sump Installation Instructions for Flat-Sided Containment Sumps
- Double-Wall Containment Sump Installation Instructions.

20.1.1.2. 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.

21. RETAINING INSTALLATION MANUAL

21.1. GENERAL

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

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

Tank Handling Data

Single-Wall (SW) and Double-Wall (DW) Tanks

(See the Xerxes Multicompartment Tank brochure for multicompartment tank data.)

Nominal Tank Diameter (Ft.) (SW & DW)	Nominal Tank Capacity (Gal.) (SW & DW)	Actual Tank Capacity * (Gal.)		Actual Tank Diameter ** (Ft./In.)		Actual Tank Length (Ft./In.)		Nominal Tank Weight *** (Lb.)		
		SW	DW	SW	DW	SW	DW	SW	DW	DW W/ Monitoring Fluid
4	600	602	602	4'-1/2"	4'-1"	6'-11 7/8"	7'-3 1/2"	500	800	1,000
	1,000	1,009	1,009	4'-1/2"	4'-1"	11'-3 7/8"	11'-7 1/2"	700	1,100	1,400
6	2,000	2,376	—	6'-3 1/2"	—	13'-5 3/4"	—	1,000	—	—
	2,500	—	2,319	—	6'-3 1/2"	—	13'-5 3/4"	—	1,800	2,400
	3,000	2,973	2,904	6'-3 1/2"	6'-3 1/2"	16'-4 1/4"	16'-4 1/4"	1,200	2,100	2,800
	4,000	4,131	3,782	6'-3 1/2"	6'-3 1/2"	21'-11 1/8"	20'-8"	1,600	2,500	3,500
	5,000	5,064	4,952	6'-3 1/2"	6'-3 1/2"	26'-5"	26'-5"	1,900	3,100	4,300
	6,000	5,960	5,829	6'-3 1/2"	6'-3 1/2"	30'-8 3/4"	30'-8 3/4"	2,200	3,600	4,900
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	4,156	8'-0"	8'-0"	15'-1/2"	15'-1/2"	1,400	2,200	3,100
	5,000	5,165	5,049	8'-0"	8'-0"	17'-8 1/2"	17'-8 1/2"	1,700	2,600	3,700
	6,000	6,084	5,998	8'-0"	8'-0"	20'-6 1/2"	20'-6 1/2"	2,000	2,900	4,300
	8,000	7,950	7,841	8'-0"	8'-0"	26'-1/2"	26'-1/2"	2,500	3,600	5,400
	10,000	9,816	9,684	8'-0"	8'-0"	31'-6 1/2"	31'-6 1/2"	3,000	4,300	6,600
	12,000	11,682	11,527	8'-0"	8'-0"	37'-1/2"	37'-1/2"	3,500	5,000	7,700
10	10,000	10,563	10,369	10'-4"	10'-4"	21'-5 1/4"	21'-5 1/4"	3,200	4,500	6,200
	12,000	12,068	11,849	10'-4"	10'-4"	24'-1/4"	24'-1/4"	3,600	5,000	7,000
	15,000	15,248	14,976	10'-4"	10'-4"	29'-5 3/4"	29'-5 3/4"	4,500	6,100	8,600
	20,000	20,055	19,703	10'-4"	10'-4"	37'-8 3/4"	37'-8 3/4"	5,700	7,700	11,000
	25,000	25,783	25,336	10'-4"	10'-4"	47'-6 3/4"	47'-6 3/4"	7,900	10,000	14,300
	30,000	30,590	30,063	10'-4"	10'-4"	55'-9 3/4"	55'-9 3/4"	9,400	11,900	17,000
	35,000	35,397	34,790	10'-4"	10'-4"	64'-3/4"	64'-3/4"	10,500	13,600	19,600
	40,000	41,004	40,304	10'-4"	10'-4"	73'-8 1/4"	73'-8 1/4"	12,100	16,000	23,000
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	—	—

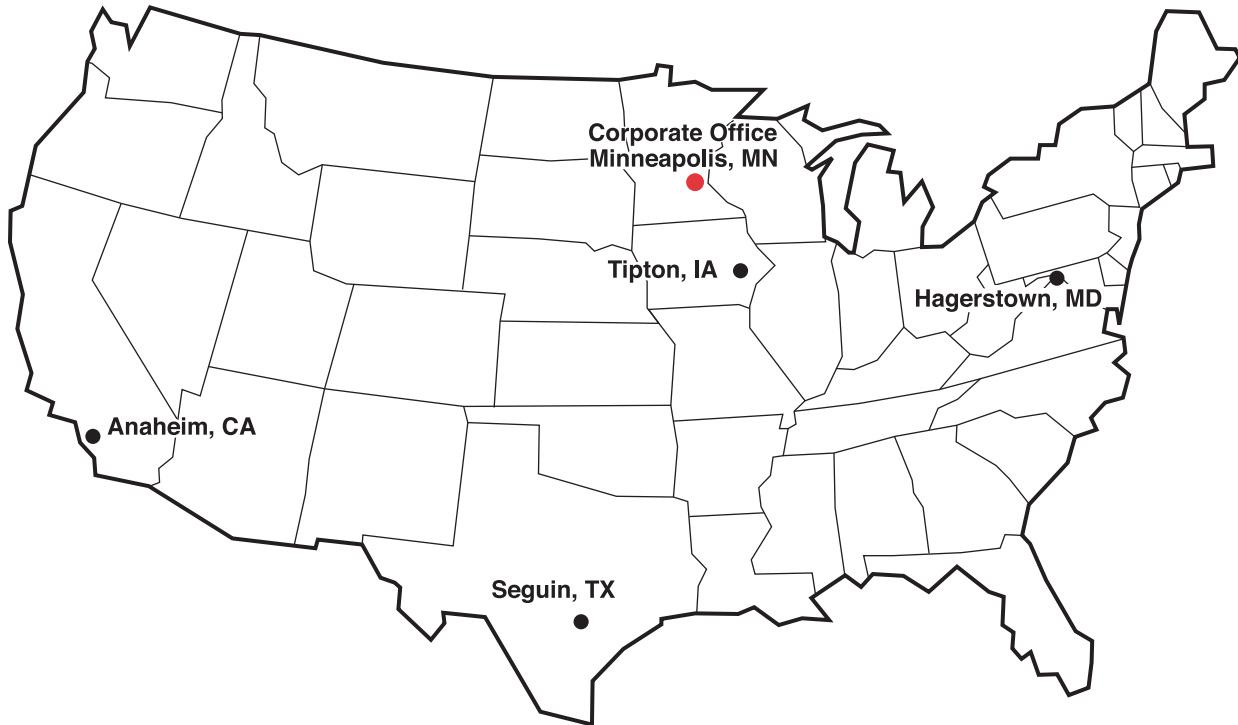
* If an overflow-protection device, such as a ball-float or flapper valve, is installed in the tank, the actual tank capacity will be reduced.

** 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.

XERXES[®]

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