









UNDERGROUND STORAGE TANK

Tank Inspection, Handling, Installation and Operation Guidelines

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1.0 INTRODUCTION

Before beginning the tank installation process, this Underground Storage Tank Installation + Handling Manual ("Installation Manual"), and supplemental materials, must be reviewed. It is the responsibility of the installing contractor, owner, and operator to understand and follow all requirements herein. Proper inspection, installation, handling and operation, in compliance with all provisions of this Installation Manual is required under the Nationwide Tanks, Inc. ("NTI") Underground Fuel Storage Tank Limited Warranty ("Limited Warranty") and to assure long-term performance.

This Installation Manual provides the minimum requirements for the installation of an NTI fiberglass underground storage tank ("Tank"). The owner's engineer may exceed these minimum requirements if desired and will be responsible for the final design. Standard industry practices applicable to tank installations and operations must be followed during installation.

In addition, all work involving Tanks must comply with all applicable federal, state and local laws, codes, rules, regulations, and standards of appropriate governing agencies and authorities, including without limitation:

- 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"); and
- OSHA and all applicable federal, state, and local construction, safety, and environmental regulations.
- For more information, contact the appropriate governmental storage-tank authorities such as building or fire departments, and environmental agencies.
- Any variances from the installation instructions in this Installation Manual must be approved in writing by NTI prior to the Tank installation.

The presence of an NTI representative does not relieve the installing contractor of sole responsibility to follow instructions and complete a proper installation.

1.1 BEFORE YOU BEGIN

- ✓ Read. understand, and follow all instructions in this Installation Manual and all applicable law, codes, rules and regulations.
- Review and prepare to complete the Tank Installation Checklist.
- 1 Contact local authorities and review applicable building codes, underground utilities, and any mandated testing and inspection requirements.
- Contact NTI for any installation questions, alternate installation methods, or information regarding the addition of fittings, manways, or Tank repair.

A federal law (the Solid Waste Disposal Act, as amended), requires owners of certain underground storage tanks to notify implementing agencies of the existence of their tanks. Notifications must be made within 30 days of bringing the tank into use. Consult EPA's regulation at 40 CFR 280.22 to determine if you are affected by this law.

1.2 SAFETY

Keep this Installation Manual available at the installation site as a reference to safety procedures as needed. The following safety definitions apply in this Installation Manual:

WARNING INDICATES AS POTENTIALLY HAZARDOUS SITUATION, WHICH, IF NOT AVOIDED, COULD RESULT IN PROPERTY DAMAGE, SERIOUS INJURY OR DEATH.



NOTICE INDICATES INFORMATION CONSIDERED IMPORTANT BUT NOT HAZARD RELATED. FAILURE TO HEED THIS NOTICE COULD RESULT IN PROPERTY DAMAGE.

1.3 LIMITED WARRANTY

Failure to adhere to these instructions in this Installation Manual and to comply with all applicable laws, codes, rules and regulations will void the Limited Warranty and could result in property damage, serious injury, death or Tank failure.

- ✓ It is the responsibility of the owner and operator to follow all operating guidelines set forth in this Installation Manual.
- ✓ The Tank owner is responsible for retaining the Limited Warranty and Installation Manual. Current NTI documentation is available online at www.nationwidetanks.com.

✓ The Tank Installation Checklist must be used for all Tanks during the installation process. Relevant information for each Tank must be recorded, signed, and retained by both the installing contractor and owner.

✓ The completed and signed Tank Installation Checklist must be provided to process any Limited Warranty claims, in addition to any correspondence regarding variances from the Installation Manual and records kept in connection with the Tank, including without limitation Tank and/or sensor inspection and maintenance records.



Figure 1: Tank Installation Overview

2.0 TANK HANDLING AND STORAGE

2.1 AVOIDING TANK DAMAGE

It is the responsibility of the installing contractor to properly rig, unload and secure the Tank. Move Tanks using a minimum of four lifting lugs provided with the Tank oriented in the upright position such that Tank is lifted vertically. Ensure the lifting load is evenly distributed. Use spreader bars and equal length slings as required. Do not use guide lugs for lifting.

- ✓ Never roll, drag, or drop the Tank.
- ✓ Do not allow Tank to swing or rotate during unloading.
- ✓ Do not wrap a chain or cable around the Tank at any time.
- ✓ Do not allow metal hardware to contact the Tank.
- ✓ Use appropriate guide ropes to guide the Tank as needed.
- WARNING NEVER RELEASE STRAPS SECURING THE TANK TO THE TRUCK UNTIL PROPER LIFTING EQUIPMENT IS SECURED TO THE TANK'S LIFTING LUGS AND ALL PERSONNEL ARE IN A SAFE LOCATION. FAILURE TO DO SO CAN RESULT IN PROPERTY DAMAGE, SERIOUS INJURY, OR DEATH.
- RESULT IN PROPERTY DAMAGE, SERIOUS INJURY, OR DEATH.

2.2 PROPER UNLOADING, LIFTING & GUIDING TANKS

Prior to unloading, installing, or relocating the Tank, NTI requires the Tank owner and/or owner's agent to perform all of the following:

- Inspect the outside of the Tank surface to ensure the Tank was not damaged during handling or delivery. Visible damage, such as cracks or extensive scrapes must be reported;
- 1
- Ensure all Tank lifting equipment is rated to handle the load; and
- Ensure the area selected to set the Tank is leveled, solid, and cleared of any large rocks and debris.

Ensure all items, including tools, are removed from the trailer bed to prevent any damage to the Tank prior to unloading the Tank. Choose suitable lifting slings for the Tank being installed. The angle of the lifting sling should never exceed 30° degrees from vertical.

▲ WARNING - ALWAYS SECURE THE TANK BEFORE MOVING, ROTATING OR LIFTING IT. THIS IS COMMONLY DONE BY PROERTY DAMAGE. SERIOUS INJURY OR DEATH.



WARNING – ALWAYS SECURE THE TANK PROPERLY BEFORE MOVING, ROTATING OR LIFTING. FAILURE TO DO SO CAN

Sign all shipping papers and note any damage observed. Any visual damage observed must be noted in these papers and signed;

CONNECTING A CRANE OR BACKHOE TO THE LIFTING LUGS. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN





Figure 2: Vertical Hoist Lifting Sling

- NOTICE TANKS MUST BE UNLOADED UNDER THE DIRECTION OF A QUALIFIED RIGGER.
- ▲ ALWAYS ENSURE LIFTING EQUIPMENT IS RATED TO HANDLE THE LOAD.

2.3 LIFTING TANK SUMPS, RISERS & DEADMEN

Always visually inspect the sump and all components for shipping damage.

✓ Do not roll, drop, or bounce.

- ✓ Set all components on a smooth surface.
- ✓ Secure sump from high winds if necessary.
- ✓ Use only anchor points when lifting and positioning NTI Deadmen.

| DEADMEN ANCHORS [18" X 8" PROFILES] | | |
|-------------------------------------|-------------|--|
| Lengths [ft] | Weight [lb] | |
| 14 | 1,686 | |
| 18 | 2,100 | |
| 22 | 2,500 | |

TABLE 1: DEADMEN SIZES AND WEIGHTS

2.4 TANK STORAGE

When temporarily storing the Tank above the ground, locate a smooth, solid, level area to temporarily set the Tank. Clear the area of all protruding rocks, hard objects, trash, and debris. Chock the Tank as required.

Take care to ensure no water enters the Tank collar(s). It could freeze and result in damage to the Tank and/or collar. Cover collars or rotate Tank to prevent water accumulation.

3.0 PLANNING FOR INSTALLATION

3.1 BED AND BACKFILL

The use of approved backfill material is critical to long-term Tank performance. Keep backfill dry and free of ice in freezing conditions. Tanks are to be installed using select rounded stones or crushed stones as primary backfill. Reference Figure 3.

Tanks must be installed using approved backfill.

The supplier of backfill material must provide written certification that the material conforms to ASTM C-33, ASTM D-448, AASHTO M-43, in addition to a sieve analysis. Owner/Installing Contractor must retain certification and analysis with the Tank installation checklist.

Materials not allowed for backfilling include:

- ✓ Sand or Sandstone
- ✓ Crushed Concrete
- ✓ Limestone
- ✓ Seashells

Tanks must be backfilled to grade or subgrade with approved pea gravel or crushed stone. As an alternative, a split backfill method may be used, refer to Section 3.2.

Primary Backfill:

- ✓ Use coarse aggregate (rounded stones or crushed stones) as primary backfill material.
- ✓ No more than 5% of this material can be small enough to pass through the #8 sieve.



✓ Primary backfill material should be a mix of well-graded stones, generally conforming to the 6, 67, 7 and 8 sizes of ASTM's C33.



Figure 3: Crushed Stone (Top) & Pea Gravel (Bottom)

 NOTICE: USING OTHER THAN SPECIFIED BACKFILL MATERIAL COULD CAUSE TANK FAILURE OR COULD RESULT IN DAMAGE TO THE TANK AND/OR SURROUNDING PROPERTY.

3.2 SPLIT BACKFILL

Tanks must be installed using primary backfill vertically up to at least 75% of the Tank diameter and secondary backfill above the primary backfill, Reference Figure 4 for backfill split details. The use of geotextile is required in-between the primary and secondary backfill material, refer to Figure 4 and Section 5.5.

Secondary Backfill:

- ✓ Secondary backfill must be compact to achieve a minimum of 85% standard proctor density.
- ✓ 100% of secondary backfill material must pass through a 1-inch [25-cm] sieve.
- ✓ Secondary material must be installed in 12-inch [30-cm) to 24-inch [61-cm] lifts compatible with the compaction equipment used.
- ✓ Requirements of the piping, surface slab or roadway used may determine specifications for secondary backfill material and compaction above the filter-fabric layer.
- Always refer to applicable codes or standards for base course and sub-base course material and compaction requirements.



Figure 4: Split Backfill + Geotextile Fabric

4.0 PRE-INSTALLATION INSPECTION

4.1 VISUAL AIR/SOAP TEST

- Single-Wall Tanks air/soap tests must be performed at job site prior to installation to verify the absence of damage
- Some non-petroleum Tanks are not field air-testable and require a post-installation water test. Refer to section 4.8 Post Installation Water Test
- ▲ WARNING DO NOT PRESSURE TANKS OVER 5PSIG (35KPA). TANK OR OTHER PROPERTY DAMAGE, SERIOUS INJURY OR DEATH CAN RESULT.

4.2 PREPARING FOR TESTING

- ✓ Replace all fitting plugs with plugs suitable for the product to be stored.
- Clean factory pipe dope from all plugs and fittings.
- ✓ Apply pipe dope suitable for the product being stored.
- ✓ Re-install and tighten all fitting plugs.
- ✓ Assemble the required number of "Tank Test Manifolds" Reference Figure 5, one per compartment
- ✓ Use contractor fabricated "Tank test Manifold(s)"
 - ✓ Gauges must have a maximum full-scale reading of 15 [psig] with 1/2 [psig] or smaller increments
 - allowed test pressure of:
 - ✓ 5 [psig] for double-wall Tanks, interstice only
 - ✓ 1 [psig] for single-wall Tanks, main compartment



✓ Pressure-relief device must be sized and set to prevent the Tank from being pressurized in excess of the maximum

4.3 TANK TEST MANIFOLDS EXAMPLE



Figure 5: Contractor Fabricated Interstice Test Manifold

4.4 TESTING SINGLE WALL TANK(S)

- ▼ Comply with Requirements Set in Section 4.0
- Connect "Tank Test Manifold" to a Tank threaded coupling ▼
- ▼ Connect the pressure source to the "Tank Test Manifold"
- ▼ Pressurize Tank to 1 [psig]
- ▼ Close the air supply valve (see Figure 5)
- \mathbf{T} Remove air supply
- ▼ Monitor the pressure reading for 30 minutes for any loss in pressure from the initial reading
- ▼ While under pressure, cover Tank outer surface, including fittings and manways, with soap solution and inspect for leakage
- ▼ After completing the air test, vent/release pressure

4.5 TESTING DOUBLE WALL TANK(S) SHIPPED UNDER VACUUM

For all double wall Tanks, there is no need to apply pressure to the main compartment. The full Tank can be properly inspected through the annular space.

- ✓ NTI Double wall dry annular space Tanks ship from the factory with the annular space under vacuum. The vacuum serves to confirm the integrity of the primary and secondary walls prior to and during shipment and during handling and offloading. This option may expedite Tank installation by minimizing testing procedures.
- ✓ Vacuum monitored Tanks must be under minimum vacuum for at-least 7-days. If this requirement is not met, a soap and water air pressure leak test is required. The date the vacuum was applied to the Tank is located on or near the vacuum gauge.
- ✓ Upon arrival of Tank vaccum reading and date must be recorded on the inspection checklist when the Tank arrives or is offloaded.
 - A Tank shipped under vacuum can be immediately installed without additional testing if both of the following conditions 0 are met:

- The vacuum date precedes the Tank installation by at least 7-days; and
- The vacuum gauge reads a minimum of 10 inHg or -5 [psig]

"Annular Space Gauge and Valve" and do all of the following:

- Release Vacuum Pressure;
- Install contractor fabricated interstice test manifold; refer to Section 4.3; 0
- 0 Slowly pressurize the annular space to 5 [psig];
- Soap and visually inspect tank exterior; and 0
- Monitor the pressure reading for 60 minutes for any loss in pressure from the initial reading. 0 0
- for leakage.
- After completing the air test, vent/release pressure.
- NOTICE INTERSTICE WILL PRESSURIZE QUICKLY BUT IS NOT HAZARD RELATED; HOWEVER, FAILURE TO SLOWLY BLEED IN PRESSURE AND MONITOR WILL RESULT IN TANK DAMAGE.
- WARNING DO NOT STAND ON OR NEAR ENDCAPS, MANWAYS, OR TANK FITTINGS WHILE PRESSURIZING TANKS. DO NOT LIFT OR HOIST TANKS UNDER PRESSURE. FAILURE TO HEED THIS WARNING CAN RESULT IN PROPERTY DAMAGE. SERIOUS INJURY OR DEATH.
- WARNING DO NOT CONDUCT PRE-INSTALLATION TESTING WHILE THE TANK IS ON A TRAILER. FAILURE TO HEED THIS WARNING COULD RESULT IN PROPERTY DAMAGE, SERIOUS INJURY OR DEATH.
 - ✓ Prepare Soap and Solution
 - For Warm Weather:
 - Five gallons of water
 - Eight ounces of dish washing detergent.
 - For Cold Weather:
 - Four gallons of water
 - Eight ounces of dish washing detergent.
 - One gallon of windshield washer solution
 - ✓ Backfill to the top of the Tank
 - Inspect vacuum gauge and verify the annular still reads a minimum of 10 inHg or -5 [psig]
 - and immediately call NTI.
 - ✔ Release vacuum on the annular space and remove the gauge and piping components.
- ✓ If the vacuum level is ever less than 10 inHg (-5 psig), immediately call NTI.

4.6 MULTI-COMPARTMENT TANK(S) WITH COMMON DOME

Each individual compartment, delineated by a common bulkhead, has a dedicated annular probe rib and annular space. There is no shared communication, probe rib, etc. between each adjacent compartment

- ✓ Each compartment must be treated as an individual tank and inspected independently per Section 4.5
- the acceptance criteria.

4.7 PERFORMING VISUAL CHECK ON A TANK WITH A WET INTERSTITIAL SPACE

▲ WARNING - NEVER PRESSURIZE A WET INTERSTITIAL SPACE. FAILURE TO HEED THIS WARNING COULD RESULT IN PROPERTY DAMAGE, SERIOUS INJURY OR DEATH.



✓ For Tanks not meeting the requirements above, with any dry annular space configurations, remove the manufacturer's supplied

While under pressure, cover the Tank outer surface, including fittings and manways, with soap solution and inspect

o In the unlikely event the annular space lost vacuum integrity during installation, discontinue the final installation steps

✔ Repeat the steps in Section 4.0, for the appropriate Tank type and for all compartments until the complete Tank has passed all of

Visually check both the interior and exterior of the Tank for monitoring fluid. The monitoring fluid is dyed to distinguish between moisture and brine fluid.

- ✓ Visually check the interior of the Tank.
- ✓ Inspect each compartment for multicompartment Tank.
- ✓ Visually check the exterior of the Tank.
- Check the exterior of each compartment of a multicompartment Tank, including the Tank bottom.
- ✓ If monitoring fluid is found, wipe the Tank dry and verify that the monitoring fluid does not reappear.

4.8 POST INSTALLATION WATER TEST

- NOTE: THESE INSTRUCTIONS ARE FOR TANKS THAT CANNOT BE AIR TESTED.
 - ✓ Tanks may only be water tested if the backfill is at the Tank top, refer to Figure 15 (Left) in Section 7.
 - ✓ Verify the Tank penetrations are exposed and temporarily remove backfill if required.
 - Plug, cap and seal all fittings except for the manway and access collar.
 - ✓ Completely fill the Tank with water.
 - Continue filling the Tank until the access collar has a minimum of 3" of water.
 - ✓ Wait at least 30 minutes and if the water level has not dropped more than ¼", the Tank is considered acceptable and leak free.
 - ✓ If the Tank level drops more than ¼", ensure that the inlet and outlet pipe caps, plugs and collars are not leaking, then refill and retest.
 - ✓ After the Tank is proven to be watertight, remove the water in the Tank to acceptable levels.

5.0 EXCAVATION & TANK CLEARANCE

5.1 TANK SPACING GENERAL

Always provide sufficient clearance to allow the deadmen to be set outside of the shadow of the tank.

The following are minimum spacings and must be increased as needed to accommodate deadmen or anchor slabs. Always provide sufficient clearance to allow the deadmen to be set outside of the Tank "shadow." Reference Figure 6.



Figure 6: Tank Shadow v. Deadmen Placement

5.2 EXCAVATION & TANK CLEARANCE

NTI recommends that the Tank owner seeks the advice of a local foundation professional engineer to determine the proper location of a tank excavation near any existing buildings or structures.

- and the Tank sides and endcaps.
- ✓ Stable soil conditions require spacing of 18" between the excavation wall and the Tank sides and endcaps.
- width of the deadmen.

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 new or existing buildings or structures.

after tank installation) are not transmitted to the tanks.

Ensure that the Tank is not located within the load distribution of any adjacent slabs or foundations using 45° as the angle of the projected loads. The Tank must not fall within the "shadow" of the 45-degree angle drawn downward from the corner(s) of the footing or foundation that is closest to the Tank. Reference Figure 7.

- WALLS CAN LEAD TO PROPERTY DAMAGE. SERIOUS INJURY OR DEATH.
- TANK.



Figure 7: Tank Location - Nearby Structure

5.3 STABLE EXCAVATIONS

When your excavation is stable, and soil is native/undisturbed; utilize the minimum spacing between the sidewall or endcap of the Tank and the side of the excavation must be 18 inches.

5.3.1 INSTALLING TWO OR MORE TANKS - SAME LOCATION

✓ Space between Tanks placed end to end must follow the minimum spacing value of 18 inches.



✓ Unstable soil conditions require that the Tank(s) be spaced a minimum of ½ of the Tank diameter between the excavation wall

✓ If two Tanks are installed in the same hole, allow for 24" spacing between Tanks. If deadmen are used, space the Tanks twice the

Ensure that downward forces from loads carried by the foundations and supports of nearby structures (constructed before or

▲ WARNING – FOLLOW ALL OSHA REGULATIONS WHEN ENTERING THE TANK EXCAVATION. COLLAPSE OF EXCAVATION NOTICE - IMPROPER PLACEMENT OF THE EXCAVATION MAY RESULT IN PROPERTY DAMAGE AND/OR DAMAGE TO THE



✓ Tank measurements must include Tank sidewalls from the outside diameter of the Tank ribs.

✓ Allow for at least 18 inches between the Tanks.

5.3.2 INSTALLING TWO OR MORE TANKS WITH DEADMAN - SAME LOCATION

- ✓ Space between Tanks must be equal to or greater than two times the width of the deadman or deadmen required between the Tanks. Reference Figure 8.
- ✓ Spacing between Tanks placed end to end must follow the minimum spacing value of 18 inches.



Figure 8: Installation of Two or More Tanks

5.4 UNSTABLE EXCAVATIONS

NTI recommends that the Tank owner consult a professional engineer if the undisturbed soil is soft or inherently unstable. A professional engineer can provide additional recommendations, including when a reinforced pad is needed under the Tank.

- \checkmark When a pad is used, the pad should extend to the excavation walls.
- \checkmark Unstable excavations require geotextile fabric. Reference Section 5.5.
- \checkmark It is recommended that the Tank owner seek the advice of a local foundation professional engineer if unstable soil conditions are present. Stabilizing materials may be required as a foundation over the backfill bedding.
- NOTICE IN CERTAIN EXCAVATIONS WITH UNSTABLE SOIL THE EXCAVATION MAY BE CLASSIFIED AS STABLE IF PROPER SHORING IS PERMANENTLY IN PLACE. THE TANK OWNER SHOULD HAVE A QUALIFIED ENGINEER CERTIFY THAT THE EXCAVATION WOULD REMAIN STABLE FOR THE EXPECTED LIFE OF THE TANK.

5.4.1 TANK EXCAVATION

Tank excavation requires 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 (Reference Figure 9), and one of the following criteria must be met: ✔ Soil must be cohesive soil - less than 750 lbs./sq. ft. [35.9 kPa] as calculated from an unconfined compression test;

- OR
 - ✓ Soil has an ultimate bearing capacity of less than 3,500 lbs./sq. ft. [167.6 kPa].

Unstable Excavation Examples:

- ✓ Any soil is naturally unstable
- 🗸 Bog
- 🗸 Peat
- ✓ Muck
- Quicksand
- Flowing Water
- Landfill
- ✓ Swamp
- ✓ Soft or highly Expansive Clay
- ✓ Underground Stream
- Spacing between each adjacent tank will have a minimum value of 18", refer to Figure 9. ▼





Figure 9: Unstable Soil Excavation



5.5 GEOTEXTILE FABRIC

To preserve the integrity of backfill material, NTI recommends utilizing geotextile fabric when installing tanks. This is a particularly important step for:

- ▼ Areas with a high-water table or fluctuating ground water conditions
- Areas with unstable native soil (soft or highly expansive clay, silt, quicksand, peat, landfill, or underground stream present) ▼
- Soil with less than 250 [lbs/ft2] cohesion or ultimate bearing capacity of less than 500 [lbs/ft2]

When the split backfill, method is being used, a layer of geotextile fabric must be installed between the primary and secondary backfill.

Non-degradable geotextile fabric, either woven or non- woven may be used as defined below:

- ✓ Minimum grab tensile strength of 120lbs (ASTM D-4632)
- ✓ Minimum flow rate of 18 gallons/min/ft2 (ASTM D-4491)
- ✓ Minimum permittivity of .28 sec-1 (ASTM D-4491)
- ✓ Maximum apparent opening size of .3mm #50 US sieve (ASTM D-4751)

Geotextile fabric seams must overlap a minimum of 12" and must overlap onto the tank and excavation surface a minimum of 12". Place the backfill on top of the fabric to hold it in place.

6.0 BURIAL DEPTH & COVER

6.1 BURIAL DEPTH & COVER

If you are in the process of installing a Tank and need to consider a deeper burial than the one given for the Tank that was ordered, contact NTI to discuss available options.

Reference Table 2 to determine minimum depths and type of cover requirements. The maximum burial depth for standard Tanks is 7' from the Tank top to grade. Tanks can be designed for a deeper burial depth.

- ✓ Contact an NTI representative to discuss available options. Local codes may have more stringent depth and type of cover requirements. Always check with your local government agency to verify applicable requirements. Government agencies may require additional depths of cover for extra operational safety.
- \checkmark If a traffic or surface pad is used, it must extend 12" beyond the Tank in all directions.
- \checkmark Tanks with no traffic load must have a minimum of 24" backfill cover, or 12" backfill plus 4" Reinforced Concrete.
- ✓ Tanks with HS20 traffic loads (32,000 lbs./axle) must have a minimum of 36" backfill cover, or 18" backfill plus 6" Reinforced Concrete, Reference Figure 10.

Inadequate depth and/or type of cover will void the Limited Warranty.

It is the responsibility of the Tank owner, in consultation with engineering professionals, to ensure the concrete traffic pad, reinforcement and thickness, including without limitation the depth and type of cover, has been properly designed to meet applicable laws, codes, rules and regulations, along with the specifications herein.



TABLE 2: MINIMUM DEPTH AND TYPE OF COVER REQUIREMENTS



Figure 10: Minimum Burial Depth/Type of Cover Non-Traffic (Left) Traffic Rated (Right)

6.2 GENERAL REQUIREMENTS

 NOTICE – THE INSTALLATION SITE SHOULD BE EVALUATED FOR BUOYANT CONDITIONS, INCLUDING BUT NOT ANCHORING CAN RESULT IN PROPERTY DAMAGE AND TANK FAILURE.

Reference Appendix A Anchor Chart to verify the minimum burial depths for the following three common methods of anchoring Tanks[.]

- Deadmen Anchors
- ✔ Concrete Anchor Pad
- Overburden (no mechanical anchoring)

NTI offers an engineered mechanical anchoring system designed for each Tank size. The system includes deadmen anchors, straps, and hardware. It is the Tank owner's or representative's responsibility to determine the appropriate anchoring method to be used.





LIMITED TO FLOODING, WATER TABLES AND TRAPPED WATER. FAILURE TO PROVIDE ENOUGH OVERBURDEN AND/OR











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- Appropriate anchoring can be achieved with a combination of burial depth, straps, turnbuckles, deadmen anchors and anchor pads. Reference Appendix A for mechanical anchoring methods.
- NOTICE METAL HARDWARE SHOULD NEVER BE IN DIRECT CONTACT WITH ANY PORTION OF THE TANK. TANK DAMAGE MAY OCCUR.
 - ✓ Use only correct length anchor straps provided by NTI. Anchor points must be aligned with the designed anchor ribs within a 1" tolerance. Do not use straps between ribs.
 - ✓ For deadmen anchors, position each anchor on the inside edge of the Tank shadow.
 - ✓ For a bottom anchor pad, position the anchor points 9" from the Tank shadow.
 - All anchor straps must be uniformly tightened down with turnbuckles or come-a-longs. Ensure straps do not cause Tank deflection.

6.3 ANCHOR POINT LOADS

- The Tank strap and all hardware should be designed for a minimum working load of 7,500 lbs.
- \checkmark The installing contractor is responsible for providing hardware and anchor points of sufficient size and strength.
- ✓ For detailed/specific information regarding hardware and usage, it is recommended you consult the hardware manufacturer or supplier.
- ✓ The installing contractor is ultimately responsible for providing hardware and anchor points that are of sufficient strength and size.

6.4 CONCRETE ANCHOR PAD

To counteract buoyancy, the anchor pad for stable excavations must be a minimum of 8" thick with #6 rebar on 12" centers each way, constructed per current ACI code.

▼ The anchor pad must extend a minimum of 18" beyond the Tank shadow for stable excavations. The pad must be at least the same length of the Tank. For unstable excavations, consult with a soil's consultant for proper design specifications. It is mandatory that the anchor pad extend out to the excavation walls in unstable conditions.

Embedded anchor points should be designed for the working load of 7,500 lbf for both 8' and 10' diameter Tanks. When embedding anchor points at the time the pad is fabricated, the following design will meet the minimum required anchor points, refer to Table 3.

| Tank Diameter | Minimum Rebar Loop Size | Rebar* Span |
|--|----------------------------|----------------|
| 8 [ft] | #8 | 10.5" |
| 10 [ft] | #8 | 13.5" |
| * Note: Wider or narrower span will reduce the strength of the anchor points below the required value. | | |

TABLE 3: MINIMUM REQUIRED ANCHOR POINTS

6.5 BALLASTING

- A Tank is not adequately protected against flotation until the Tank is fully backfilled and the top slab is in place.
 - Use caution to ensure the Tank does not completely fill during ballasting. Keep the Tank vented to prevent any pressurization of

the tank when filling.

- especially important for diesel exhaust fluid (DEF) Tanks.
- Dry Hole Add ballast only after backfilling is placed at least 75% of the way up the Tank. \checkmark
- conditions refer to Section 7.4.

7.0 TANK INSTALLATION

▲ WARNING – DO NOT ENTER THE TANK EXCAVATION UNLESS ALL OSHA REGULATIONS ARE FOLLOWED. COLLAPSING EXCAVATION WALLS CAN CAUSE PROPERTY DAMAGE, SERIOUS INJURY OR DEATH.

7.1 BEFORE YOU BEGIN/GENERAL

Review all instructions to ensure compliance with all procedures, including without limitation the following:

- Bed and Backfill
- ✓ Pre-installation testing
- ✓ Excavation size & burial depth
- ✓ Anchoring

7.2 TANK VERTICAL DIAMETER MEASUREMENTS

Over-Deflection of the Tank may result in damage to the Tank. Vertical diameter measurements are taken to determine the Tank's deflection. The maximum tolerances are as follows:

- ✓ 8' Tank 1.25"
- ✓ 10' Tank 1.5"

If at any point the deflection measurements exceed the tolerance, this indicates an improper installation. Stop the installation, and contact NTI Technical Support for corrective action.

Vertical diameter measurements must be taken and recorded on the Tank Installation Checklist after each of the following steps:

- ✓ First Vertical Diameter Measurement Placement of Tank on backfill bed.
- Second Vertical Diameter Measurement Anchoring completed (if applicable). \checkmark
- \checkmark Third Vertical Diameter Measurement – Backfill to Tank top.
- Fourth and Fifth Vertical Diameter Measurements Backfill to subgrade, before the concrete pad.
- Take diameter measurement at the centermost location of the Tank.
- Vertical diameter measurements must be recorded for each Tank compartment.

Use a non-metallic gauge stick to take all measurements from the bottom of the tank to the bottom of the fitting that is closest to the center of the Tank or compartment.

- ✓ Place the backfill material evenly on opposite sides of the Tank so that the Tank does not shift.
- as the primary backfill material
- ✓ During the backfilling process, it is good practice to continue to check Tank deflection.
- NOTICE DO NOT BALLAST THE TANK UNTIL THE BACKFILL IS AT LEAST 75% UP THE TANK OR EVEN WITH THE TANK TOP. TANK DAMAGE CAN OCCUR.



Ensure the ballast will not contaminate the product being stored or clean the tank before product is added to the Tank. This is

✓ Only under wet-hole conditions should the ballast be added before the backfill is 75% of the way up the Tank. For wet-hole

✓ If secondary backfill material is to be used on the perimeter of the installation, it must be placed and compacted at the same time

7.3 DRY HOLE INSTALLATION

Reference back to the Geotextile Fabric guide in Section 5.5 to determine if geotextile fabric is required or recommended for the installation.

- Place the Tank in the excavation with lifting cables attached to the lifting lugs provided on the tank. Maintain control of the Tank with guide ropes.
- Set the Tank directly on the backfill bed and take the First Vertical Diameter Measurement and record on the Tank Installation Checklist, see Figure 13.
- ✓ If mechanical anchoring is used, after anchoring is completed, take the Second Vertical Diameter Measurement, see Figure 13.
- ✓ If this measurement is greater than the tolerances listed in 7.2, loosen the anchor straps and re-measure.

Place the first 12" of approved backfill evenly around the Tank. Push the backfill in place by using a non-metal tamping rod that is long enough to reach beneath the Tank bottom. Work the backfill under the entire length of the Tank, dome ends, and ribs eliminating all voids so that the Tank is fully supported, refer to Figure 11. Take care to not strike the Tank with the probe or Tank damage may occur.

- ✓ Repeat this process with a second lift of 12" backfill.
- After the second lift of backfill has been worked under the tank, between the 5 7 O'clock position, backfill can be brought to the Tank top with no additional handwork



Figure 12: Ballast v. Ground Water Level

7.5 BACKFILL TO SUBGRADE

After the Tank has been placed in the excavation and all testing, backfilling, venting, and piping has been completed, add the remaining backfill to subgrade. Once the Tank has been backfilled to subgrade, but before placement of the surface pad, take the Fourth Vertical Diameter Measurement

Once the Tank has been backfilled to subgrade, but before placement and record on the Tank Installation Checklist, refer to Figure 14.





7.4 WET HOLE INSTALLATION

Follow all steps in the Dry Hole Installation section while taking caution to keep the water level in the excavation at the lowest level possible by using submersible pumps. Ballast the Tank if ground water cannot be lowered.

The ballast level inside the Tank and in all compartments must be equal and not more than 12" above the ground water level outside of the Tank, see Figure 12.



Figure 13: Tank First Measurement (Left) Second Measurement (Right)







Figure 14: Third (Left) and Forth (Right) Vertical Diameter Measurements

- ✓ The inner diameter deflection is calculated using the "Fourth Vertical Diameter Measurement" and "Fifth Vertical Diameter Measurement" Refer to Figure 15.
- ✓ This measurement is taken by:
 - Driving a nail into the 1" point at a right angle to the gauge stick.
 - Lower the gauge stick down the fill pipe far enough to extend below the bottom of the fitting.
 - Lift the gauge stick until the nail catches on the lip of the fitting.
 - Read the measurement at the top of the fill pipe. .
 - Subtract 1" to allow for the point where the nail is in the gauge stick.
 - After recording the final measurement, complete the Vertical Diameter Measurement of the Tank Installation Checklist. Verify that the deflection tolerances have not been exceeded.
- ✓ If the final deflection measurement exceeds the values in Section 7.2 you should stop the installation, prior to pouring the concrete pad, and immediately contact NTI Technical Support for directions.



Figure 15: Fifth Vertical Diameter Measurement

8.0 ADDING TANKS AT EXISTING LOCATIONS

Additional tanks can be installed at existing locations. The provisions of this Installation Manual shall apply equally to any such additional Tanks

8.1 PREFERRED METHOD

Following the procedures outlined in Section 6 of this Installation Manual, install a new Tank in a separate hole at least 36" from the original excavation.

Maintain at least 36" at grade of native/undisturbed soil between the existing and new excavation.

8.2 ALTERNATE METHOD FOR DRY HOLE EXCAVATIONS ONLY

In a dry hole excavation, the existing excavation can be enlarged to add additional Tanks.

- Lower the ballast in existing Tanks to less than 25% capacity.
- Remove the surface slab.
- \checkmark Enlarge the excavation for the new Tanks while leaving as much backfill as possible around the existing tanks.
- \checkmark If necessary, install shoring to ensure the existing Tanks do not move and sufficient backfill remains in place.
- \checkmark
- Follow and complete the Tank Installation Checklist for all new and existing Tanks.

8.3 INTERNAL & EXTERNAL PIPING

- NOTICE ALL PIPING USED IN TANK INSTALLATION MUST CONFORM TO ALL APPLICABLE CODES AND STANDARDS.
- NOTICE ALL METAL FITTINGS AND COMPONENTS MUST BE COATED TO PROTECT AGAINST CORROSION.
- Internal piping must terminate at least 4" from the Tank bottom to allow for Tank deflection.
- V External piping must be isolated from the concrete pad.
- WARNING ISOLATE THE TANK FROM ALL PIPING WHILE THE EXTERNAL PIPING IS BEING PRESSURE TESTED. INJURY OR DEATH.
- NOTICE ALL CONNECTIONS TO THE TANK MUST BE FLEXIBLE TO ACCOMMODATE MOVEMENT AND PIPING OR OTHER PROPERTY.

8.4 VENTING TANKS

Tanks are designed to operate at atmospheric pressure, except for use with a vapor recovery system. The venting system must be designed so that pressure or vacuum at the Tank top will not exceed 1 psig. during normal operation, filling, and emptying.

WARNING – ALL TANKS AND COMPARTMENTS MUST ALWAYS BE ADEQUATELY VENTED. INCLUDING DURING FILLING AND EMPTYING OF THE TANK, EXCEPT AS DEFINED DURING PRE-INSTALLATION TESTING. FAILURE TO DO SO CAN CAUSE TANK FAILURE, PROPERTY DAMAGE, SERIOUS INJURY OR DEATH.



Following the procedures outlined in Section 6 of this Installation Manual, install the new Tanks in the excavation.

EXTERNAL PIPING TEST PRESSURES CAN CAUSE TANK FAILURE AND MAY RESULT IN PROPERTY DAMAGE, SERIOUS

MISALIGNMENT WITH THE TANK. FAILURE TO FOLLOW THIS INSTRUCTION COULD RESULT IN DAMAGE TO THE TANK.

8.5 INSTALLING CONTAINMENT SUMPS, COLLARS & RISERS

NTI offers sump kits in a variety of models and sizes that are designed for field installation. Instructions for the various models can be found in supplemental materials.

- Before beginning installation, consult all applicable laws, codes, rules and regulations to ensure proper monitoring compliance. \checkmark
- \checkmark Conduct a visual inspection of all sump components to ensure no items were damaged during shipping.
- \checkmark Check to make sure the sump is the correct length for the intended burial depth.
- \checkmark Install the containment sump according to the supplemental instructions.
- Once the containment sump is installed, backfill to the top and around the outside edge of the containment sump system. Make sure there is no backfill on top of the containment sump.
- ✓ Install a concrete form or barrier to allow a minimum 3" clearance between any load-bearing item and the top of the containment sump.
- ✓ Set a street box that will allow enough clearance around the containment sump opening for proper operation and removal of the watertight cover.
- \checkmark Continue with backfill to subgrade.
- \checkmark Maintain good drainage of water away from the access opening of the containment sump top when installing the surface pad.

8.6 COLLAR TEST INSTRUCTIONS

- ✔ Before sump assembly, the containment collars must be leak tested.
- ✓ Place and secure measuring stick with 1/16" (0.0626") increments in the sump to measure any changes in the liquid level.
- ✔ Fill collar with water to the highest point and wait 20 minutes.
- Record the liquid level.
- ✓ Wait a minimum of one hour.
- ✓ Re-measure the liquid level. A liquid change of more than 1/8" (0.125") indicates a possible leak.
- ✓ Visually inspect the collar connection to the Tank wall and ahesive channel joint for leaks.
- ✓ Test liquids must be disposed of properly.



Figure 16: Collar Test Overview

9.0 INTERSTITIAL MONITORING

NTI Tanks are supplied with a minimum of one monitoring access fitting that provides access to the interstitial space.

9.1 MONITORING TANKS WITH A DRY INTERSTITIAL

Always consult with the monitoring equipment manufacturer regarding proper sensor installation, servicing and use instructions. Consult with all applicable governmental authorities regarding required inspections and other sensor-related requirements.

- When electronic monitoring sensors are used, the Tank may be sloped at the time of installation.
- ✓ If the Tank is sloped, place the Tank so that the lowest elevation is at the monitoring end.
- WILL AFFECT THE CALIBRATION CHART ACCURACY.

NTI provides a pull cable with its Tanks that are designed to operate with a dry interstitial. Use the pull cable to position the electronic monitoring sensor at the Tank bottom. Monitor the condition of the cable and replace the cable if required.

For ease of installation, the sensor can be inserted in the Tank cavity before installing the monitoring riser pipe to grade. Dry-monitored Tanks do not require the interstitial space to be vented.

- The maximum vacuum for continuous monitoring is -1 psig. Utilize an approved vacuum monitoring system with a vacuum makeup pump.
- ▼ The maximum pressure for continuous monitoring is +1 psig. Utilize an approved pressure monitoring system with a pressure make-up pump. Ensure the system is designed to prevent pressure from exceeding +1 psig or Tank damage may occur.

9.2 HYDROSTATIC MONITORING

Tanks with hydrostatic monitoring systems normally arrive with monitoring fluid installed in the annular space and some fluid in the reservoir.

- ✓ After installation, the fluid level in the reservoir must be filled to the proper level.
- ✓ Additional monitoring fluid is supplied with the Tank for this purpose.
- \checkmark Vent the annular space with a minimum $\frac{1}{4}$ " hole at the riser top.
- ✔ When installing a double float sensor, the bottom of the sensor must be in contact with the Tank top, refer to Figure 17.
- ✓ If a Tank has a reservoir installed, and arrives without monitoring fluid pre-installed, the annular space can be filled with monitoring fluid after the Tank has been placed in the excavation and backfilled to the Tank top.
 - Provisions must be made to access the reservoir for brine filling and the removal of air from the annular space at each end of the Tank.
 - Contact NTI Technical Support for instructions

9.3 SETTING LEVEL OF BRINE FLUID

After the top slab has been placed, check the level of monitoring fluid in the reservoir and set the monitoring fluid to the proper level After the Tank is installed, the level of monitoring fluid may fluctuate due to the following:

- Product level
- ✔ Groundwater fluctuation
- ✓ Tank filling and emptying
- ✓ Product and temperature variation

Check the level of the monitoring fluid in the reservoir and set the monitoring fluid to the proper level.

NOTICE – FAILURE TO SET THE MONITORING FLUID LEVEL PROPERLY COULD LEAD TO FALSE ALARMS.



NOTICE – CALIBRATION CHARTS ARE DESIGNED FOR LEVEL TANK INSTALLATION. TANKS INSTALLED WITH A SLOPE



Figure 17: Wet Interstice - Liquid Level System

Ensure that the monitoring fluid (brine) within the reservoir chamber is set per Table 4. Insert a tape measure, with water paste applied on the end, into the reservoir to determine the brine level. Add or remove brine as indicated by Table 4. During this step, note the length of the riser pipe.

| Tank Diameter & Canacity | Reservoir Fluid Level Measurement | | |
|--------------------------|-----------------------------------|-------------------|--------------|
| Tank Diameter & Capacity | Tank is Empty | Tank is Half Full | Tank is Full |
| 8' & (6M and less) | 4¼" | 4³⁄₄" | 5¼" |
| 8' & (Greater than 6M) | 4¼" | 5" | 6" |
| 10' & (12M and less) | 41⁄2" | 5¼" | 6" |
| 10' & (13M - 20M) | 5¼" | 6½" | 8" |
| 10' & (21M - 35M) | 3¾" | 6½" | 91⁄2 |
| 10' & (36M - 40M) | 4" | 5¾" | 71⁄2" |

TABLE 4: MONITORING FLUID CALIBRATION

- Before placing the sensor in the reservoir, use the measurement of the riser pipe, plus 2 feet to place a mark on the sensor cable. Place the cable through the compression fitting in the riser cap. Tighten the compression fitting on the cable at the mark. This is designed to prevent the sensor cable from being dropped into the reservoir by accident.
- Connect an Ohm meter to the sensor wires before installation and manually move the floats to set off the high- and low-level alarms. ▼
- Attach the sensor connector wire to the alarm panel wire in an acceptable electrical junction box (not supplied by NTI). ▼
- ▼ Once the wiring connections have been completed, but before lowering the sensor into the reservoir, place the sensor in a bucket containing water and push the test buttons at the alarm panel to determine that the system is working properly.
- Lower the sensor into the riser pipe until it rests on the Tank top.
- ▼ Place the riser cap onto the riser pipe and thread down firmly so that the cap fits tightly into place.
- Pull any excessive connector cable through the cable clamp so that the sensor rests on the Tank top. Tighten the cable clamp so that the connector wire does not slip through.
- Check the alarm panel to determine if the status lights are working correctly.

NOTE: THIS SYSTEM SHOULD NOT BE USED WHEN THE WATER TABLE IS EXPECTED TO RISE OVER THE TOP OF THE RISER CAP. THE CAP IS NOT WATERTIGHT. IF CASUAL WATER ENTERS THE TOP VENT HOLE OF THE CONTROLLER

10.0 OPERATING GUIDELINES

10.1 GENERAL

Always retain a copy of this Installation Manual and operating guidelines, and keep them accessible to be referenced readily, along with any other supplemental NTI instructions and documentation.

Follow all applicable federal, state and local laws, codes, rules, regulations and safety precautions regarding underground storage tanks and their associated systems.

Reference NTI Appendices for supplemental documentation, Tank brochures and NTI manufactured accessory instructions. Contact NTI or visit our website for additional copies of documentation.

- products other than those identified in the manufacturer's limited warranty will void the tank manufacturer's obligations under the limited warranty
- Storing fluids in the Tank other than those identified as Approved Fluids in the Limited Warranty will void the Limited Warranty The temperature of the stored fluids must not exceed the temperatures specified therefore in the Limited Warranty.
- V Traffic loads, if any, must not exceed those acceptable based on the depth and type of cover used.
- V Gaskets used in Tank installation must be compatible with the fluids stored in the Tank and must be within the operational temperature limitations specified in the Limited Warranty for the contained fluid.
- Do not allow the accumulation of water or moisture inside the containment sumps as it can freeze and cause damage to the Tank and surrounding appurtenances.

10.2 CONFINED SPACE ENTRY

All tanks, sumps, manways extensions and access risers are considered a confined space.

- Proper permitting, industry standards and all applicable federal, state and local laws, codes, rules and regulations must be followed before entering a confined space. Manways and access risers are for use only by qualified personnel with proper training and safety equipment. ✓ Do not attempt to repair or modify your Tank as this will void the Limited warranty.
 - ✓ If tank entry is required for repair, modification or inspection, you must first contact NTI at 830-387-4027 for instructions.
- ▲ WARNING DO NOT ENTER THE TANK UNLESS FOLLOWING OSHA GUIDELINES FOR CONFINED SPACE ENTRY. FAILURE TO DO SO CAN RESULT IN PROPERTY DAMAGE. SERIOUS INJURY OR DEATH.

10.3 FILLING TANKS

All fluid deliveries must be gravity fed into the Tank unless positive shut-off equipment is installed on the lines and on the truck. For Tanks with inlet and outlet piping that will result in pressure at the Tank top, the pressure should be limited to 1 psig. For Tanks with vapor recovery systems, the pressure or vacuum must not exceed 1 psig.



CAP, IT MAY BE NECESSARY TO RUN A SEPARATE VENT LINE TUBE TO THE CAP VENT NIPPLE TO PREVENT THE BRINE LEVEL FROM INCREASING. THE ANNULAR SPACE OF THE TANK MUST ALWAYS REMAIN VENTED TO THE ATMOSPHERE.

Consult the Limited Warranty for additional conditions and limitations. The tank owner should retain a copy of the Limited Warranty with this Installation Manual and operating guidelines, along with all other supplemental NTI instructions and documentation. Storing

- ✓ The Tank's venting system must be adequately sized and unobstructed to ensure that atmospheric pressure is always maintained, including during Tank filling, and emptying.
- ✓ Regular inspection of the automatic shutoff device for proper operation is required.
- ✓ The drop tube/fill line must be properly grounded to prevent static discharge during filling.
- ✓ If flooding may occur, precautions must be taken to prevent the Tank from floating or causing equipment damage. Reference the EPA's "Underground Storage Tanks Flood Guide" and any other applicable laws, codes, rules and regulations regarding required precautions.
- WARNING TANKS ARE DESIGNED TO OPERATE AT ATMOSPHERIC PRESSURE. OVER-PRESSURIZING THE TANK OR PRESSURIZED FUID DELIVERIES CAN RESULT IN TANK DAMAGE OR FAILURE, PROPERTY DAMAGE, SERIOUS INJURY OR DEATH.

APPENDIX A. ANCHOR CHARTS

| | Tank Diameter & Nominal Capacity | Space Between | Number of Sumps or Risers | | | | | | | |
|------|---|------------------|---------------------------|-----------|-----------|-----------|-----------|--|--|--|
| | (Including all compartments) | Tanks | | Pad) | | | | | | |
| | | | 0 | 1 | 2 | 3 | 4 | | | |
| | < 7,000 with 12"x12" deadmen | 24" | 36" / 32" | 47" / 43" | 53" / 48" | - | - | | | |
| | < 7,000 with 8" anchor pad | 24" | 36" / 32" | 47" / 43" | 53" / 48" | - | - | | | |
| | < 7,000 no mechanical anchoring | 18" | 58" / 55" | 73" / 69" | 82" / 78" | - | - | | | |
| | 7,000 - 12,000 with 12"x12" deadmen | 24" | 39" / 35" | 45" / 41" | 47" / 43" | 65" / 60" | 65" / 60" | | | |
| anks | 7,000 - 12,000 with 8" anchor pad | 24" | 38" / 35" | 42" / 39" | 42" / 39" | 65" / 60" | 65" / 60" | | | |
| ter | 7,000 - 12,000 no mechanical anchoring | 18" | 61" / 58" | 72" / 68" | 76" / 72" | 84" / 81" | NA | | | |
| ame | 13,000 - 16,000 with 12"x12" deadmen | 24" | 41" / 38" | 46" / 42" | 47" / 43" | 52" / 47" | 68" / 61" | | | |
| | 13,000 - 16,000 with 8" anchor pad | 24" | 38" / 35" | 42" / 39" | 42" / 39" | 52" / 47" | 68" / 61" | | | |
| | 13,000 - 16,000 no mechanical anchoring | 18" | 62" / 59" | 71" / 68" | 73" / 70" | 80" / 76" | 84" / 81" | | | |
| | 17,000 - 20,000 with 12"x12" deadmen | 24" | 42" / 38" | 46" / 42" | 47" / 43" | 50" / 42" | 52" / 48" | | | |
| | 17,000 - 20,000 with 8" anchor pad | 24" | 34" / 31" | 38" / 35" | 41" / 37" | 41" / 37" | 41" / 37" | | | |
| | 17,000 - 20,000 no mechanical anchoring | 18" | 63" / 60" | 70" / 66" | 71" / 67" | 76" / 72" | 79" / 75" | | | |
| | < 10,000 with 18"x8.75" deadmen | 36" | 44" / 39" | 50" / 44" | 57" / 51" | - | - | | | |
| | < 10,000 with 8" anchor pad | 24" | 33" / 29" | 39" / 35" | 57" / 51" | - | - | | | |
| | < 10,000 no mechanical anchoring | 18" | 78" / 75" | NA | NA | - | - | | | |
| | 10,000 - 18,000 with 18"x8.75" deadmen | 36" | 47" / 43" | 53" / 49" | 55" / 50" | 76" / 70" | 80" / 75" | | | |
| | 10,000 - 18,000 with 8" anchor pad | 24" | 47" / 43" | 53" / 49" | 55" / 50" | 76" / 70" | 80" / 75" | | | |
| nks | 10,000 - 18,000 no mechanical anchoring | 18" | 83" / 80" | NA | NA | NA | NA | | | |
| r a | 19,000 - 23,000 with 18"x8.75" deadmen | 36" | 44" / 40" | 49" / 45" | 51" / 47" | 62" / 60" | 72" / 67" | | | |
| nete | 19,000 - 23,000 with 8" anchor pad | 24" | 41" / 37" | 51" / 47" | 51" / 47" | 62" / 60" | 72" / 67" | | | |
| Diar | 19,000 - 23,000 no mechanical anchoring | 18" | 84" / 81" | NA | NA | NA | NA | | | |
| 10, | 24,000 - 35,000 with 18"x8.75" deadmen | 36" | 51" / 47" | 57" / 53" | 70" / 66" | 70" / 66" | 70" / 66" | | | |
| | 24,000 - 35,000 with 8" anchor pad | 24" | 51" / 47" | 57" / 53" | 69" / 65" | 69" / 65" | 69" / 65" | | | |
| | 24,000 - 35,000 no mechanical anchoring | 18" | 84" / 81" | NA | NA | NA | NA | | | |
| | 36,000 - 40,000 with 18"x8.75" deadmen | 36" | 49" / 46" | 54" / 51" | 59" / 55" | 60" / 56" | 60" / 56" | | | |
| | 36,000 - 40,000 with 8" anchor pad | 24" | 49" / 46" | 54" / 51" | 59" / 55" | 62" / 58" | 65" / 60" | | | |
| | 36,000 - 40,000 no mechanical anchoring | 18" | 84" / 81" | NA | NA | NA | NA | | | |



APPENDIX B. TANK CAPACITY, SIZE AND STRAP QUANTITY

| | Nominal Capacity [US Gallons] | Fluid Volume [US Gallons] | Tank Total Length [Feet] | Weight [Pounds Mass] | Number of Straps [Total Quantity] |
|--------|----------------------------------|------------------------------|--------------------------------|-------------------------|--|
| ß | 5,000 (min) | 5,127 | 16' | 3,405 | 2 |
| Tank | 6,000 | 6,155 | 19' | 3,902 | 2 |
| l Fuel | 7,000 | 7,183 | 22' | 4,399 | 2 |
| rounc | 8,000 | 8,135 | 24' | 4,730 | 2 |
| nderg | 9,000 | 9,163 | 27' | 5,227 | 2 |
| ter Ui | 10,000 | 10,191 | 30' | 5,723 | 2 |
| iame | 11,000 | 11,143 | 32' | 6,054 | 4 |
| ő | 12,000 | 12,171 | 35' | 6,551 | 4 |
| | 13,000 | 13,199 | 38' | 7,048 | 4 |
| | 14,000 | 14,151 | 40' | 7,379 | 4 |
| | 15,000 | 15,179 | 43' | 7,876 | 4 |

| | Nominal Capacity [US Gallons] | Fluid Volume [US Gallons] | Tank Total Length [Feet] | Weight [Pounds Mass] | Number of Straps [Total Quantity] |
|-------|----------------------------------|------------------------------|-----------------------------|-------------------------|--------------------------------------|
| | 10,000 (min) | 10,177 | 20' | 4,886 | 2 |
| | 11,000 | 11,077 | 21' | 5,092 | 2 |
| | 12,000 | 12,152 | 23' | 5,505 | 2 |
| | 13,000 | 13,127 | 25' | 5,918 | 4 |
| | 14,000 | 14,190 | 27' | 6,331 | 4 |
| | 15,000 | 15,190 | 28' | 6,537 | 4 |
| ks | 16,000 | 16,153 | 30' | 6,950 | 4 |
| Tan | 20,000 | 20,245 | 38' | 8,395 | 6 |
| iuel | 21,000 | 21,065 | 38' | 8,601 | 6 |
| nd F | 22,000 | 22,240 | 40' | 9,014 | 6 |
| linou | 23,000 | 23,115 | 42' | 9,427 | 6 |
| lerg | 24,000 | 24,190 | 44' | 9,840 | 6 |
| Unc | 28,000 | 28,115 | 50' | 11,078 | 8 |
| eter | 29,000 | 22,290 | 52' | 11,491 | 8 |
| ame | 30,000 | 30,265 | 54' | 11,904 | 8 |
| O' Di | 33,000 | 33,203 | 59' | 12,936 | 8 |
| 1 | 34,000 | 34,178 | 61' | 13,349 | 8 |
| | 35,000 | 35,166 | 62' | 13,555 | 8 |
| | 36,000 | 36,241 | 64' | 13,968 | 8 |
| | 41,000 | 41,041 | 72' | 15,619 | 8 |
| | 42,000 | 42,216 | 74' | 16,032 | 10 |
| | 43,000 | 43,191 | 76' | 16,445 | 10 |
| | 44,000 | 44,166 | 78' | 16,858 | 10 |
| | 45,000 | 45,153 | 79' | 17,064 | 10 |
| | 46,000 | 46,328 | 81' | 17,477 | 10 |
| | 50,000 | 50,141 | 88' | 18,922 | 10 |



TANK INSTALLATION CHECKLIST

TO INSTALLING CONTRACTOR: Deliver the Installation Manual with the completed and signed Tank Installation Checklist to the Tank owner after tank installation. Retain a copy for your records.

TO OWNER: Retain the Limited Warranty, Installation Manual and completed and fully-executed Tank Installation Checklist. A completed and fully-executed copy of this Tank Installation Checklist will be required and must be provided to NTI when making a claim under the Limited Warranty.

| Dwner Name: |
|----------------------|
| nstallation Date: |
| nstallation Address: |
| nstalling Contractor |

| TANK INFORMATION | Tank #1 | Tank #2 | Tank #3 | Tank #4 |
|---|---------|---------|---------|---------|
| Tank Type - Single-Wall (SW), Double-Wall (DW) | | | | |
| Tank Usage (Fuel, Water & Wastewater) | | | | |
| Nominal Tank Diameter (Feet) | | | | |
| Nominal Tank Capacity (Gallons) | | | | |
| Interstitial Monitoring (hydro, dry, vacuum, pressure, N/A) | | | | |
| UL Label # (if applicable) | | | | |

| SITE INFORMATION | Tank #1 | Tank #2 | Tank #3 | Tank #4 |
|--|---------|---------|---------|---------|
| Primary backfill meets requirements - yes/no | | | | |
| Secondary backfill will be used - yes/ | | | | |
| Secondary backfill meets requirements - yes/no/N/A | | | | |
| Geotextile filter fabric will be used - yes/no | | | | |
| Excavation - shored/not shored | | | | |
| H20 or HS20 traffic loads apply - yes/no | | | | |
| Hole condition - dry or wet | | | | |
| Anchoring system will be used - yes/no | | | | |
| Type of anchoring system - deadmen/anchor slab/N/A | | | | |

| PRE-INSTALLATION INSPECTION & TESTING | Tank #1 | Tank #2 | Tank #3 | Tank #4 |
|--|---------|---------|---------|---------|
| Shipping damage - yes/no | | | | |
| Loss of vacuum - yes/no | | | | |
| Record Vacuum Level | | | | |
| Requirements met for double-wall Tanks shipped under | | | | |
| interstitial vacuum - yes/no | | | | |
| Record Vacuum Date | | | | |
| Monitoring fluid visible on Tank interior - yes/no | | | | |
| Monitoring fluid visible on Tank exterior - yes/no | | | | |
| Record monitoring fluid level in reservoir if applicable | | | | |
| Tank passed pressure/soap test if applicable - yes/no | | | | |

| INSTALLING TANKS | Tank #1 | Tank #2 | Tank #3 | Tank #4 |
|--|---------|---------|---------|---------|
| Record Tank diameter measurement #1 (pre-installation) | | | | |
| Record final backfill bedding depth under Tank (inches) | | | | |
| Record final Tank spacing between Tanks (inches) | | | | |
| Record final Tank spacing from endcap to excavation walls (inches) | | | | |
| Record Tank diameter measurement #2 (after straps are installed) | | | | |
| Subtract diameter measurement #2 from #1 and record | | | | |
| Deflection measurement meets tolerance requirements - yes/no | | | | |
| Voids under Tank between ribs and under domes filled with backfill and tamped - yes/no | | | | |
| Backfill placement and compaction meet requirements - yes/no | | | | |
| Flexible piping connections meet requirements - yes/no | | | | |
| Fittings and other metal components are coated for corrosion protection - yes/no | | | | |
| Record diameter measurement #3 (after backfilling to tank top is complete) | | | | |
| Subtract diameter measurement #3 from #1 and record | | | | |
| Deflection measurement meets tolerance requirements - yes/no | | | | |
| Tank was ballasted prior to bringing backfill to Tank top - yes/no | | | | |

Complete below section after bringing backfill to the Tank top

| Hydrostatic testing was completed - yes/no/N/A | | |
|--|--|--|
| Containment sump testing was completed - yes/no/N/A | | |
| Record final depth of backfill over Tank (inches) | | |
| Record Tank diameter measurement #4 (after backfilling is brought to subgrade) | | |
| Subtract diameter measurement #4 from #1 and record | | |
| Final deflection measurement meets tolerance requirements - yes/no | | |
| Type of surface pad used | | |
| Thickness of surface pad used | | |
| Record monitoring fluid level when backfilling and surface pad installation are complete | | |



| Site Sketch | | | | | | | | | | | Additional Notes | | | | |
|-------------|--|--|--|---|--|--|--|--|--|--|------------------|--|--|--|--|
| | | | | | | | | | | | | | | | Record any variances or deviations from instructions and attach written |
| | | | | | | | | | | | | | | | authorization from NTI |
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| SIGNATURE | | | | | | | | | | |
|--|---|--|--|--|--|--|--|--|--|--|
| VERIFI | CATION | | | | | | | | | |
| INSTALLING CONTRACTOR | TANK OWNER/AUTHORIZED REPRESENTATIVE | | | | | | | | | |
| I hereby verify that the information recorded herein and attached hereto is a true, accurate and complete record regarding installa- tion of the listed Tank(s) at the installation address listed above, and that I have received a copy of the Installation Manual and this Tank Installation Checklist. | I hereby verify that I have signature authority to submit this form as or on behalf of the owner listed above, the information recorded herein and attached hereto is a true, accurate and complete record regarding installation of the listed Tank(s) at the installation address listed above, and that I have received a copy of the Instal- lation Manual and this Tank Installation Checklist. | | | | | | | | | |
| Name: | Name: | | | | | | | | | |
| License/Certification #: Exp. Date: | I am the (mark one): | | | | | | | | | |
| | Owner | | | | | | | | | |
| | Legally authorized representative of owner | | | | | | | | | |
| Telephone: | Telephone: | | | | | | | | | |
| Email: | Email: | | | | | | | | | |
| Address: | Address: | | | | | | | | | |
| Signature: | Signature: | | | | | | | | | |
| Date: | Date: | | | | | | | | | |





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