Tank Installation Training Guide

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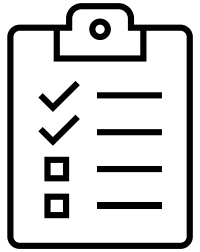
Tank Installation Checklist



- ✓ The installation checklist is found in the back of this manual or found on the NTI website.
- ✓ The checklist must be completed by the installing contractor and given to the tank owner.
- ✓ The tank limited warranty requires this document be retained by the owner to validate any future claim.

Pre- Installation Considerations

- Read, understand, and follow all instructions in the installation manual.
- Review and prepare to complete the tank installation checklist.
- Contact local authorities and review building codes, underground utilities, and any mandated testing requirements.

Tank Unloading

Tank Arrival

First:

✓ Carefully unload all accessories to prevent damage.

✓ All tanks must be mechanically unloaded.

For temporary job site storage.

- Use provided shipping pads or approved tank backfill.
- Place tanks on smooth ground and chock with sandbags.
- Tie down tank in anticipation of high winds.
- Protect collars from freezing conditions.

Lift Configuration

- When tanks arrive at the job site, they must always be mechanically unloaded.
- For 10’ diameter tanks - There are different lift lug orientations for unloading from the truck or lifting into the excavation.
- Identify the tank lift lug orientation and use the appropriate method to lift the tank.

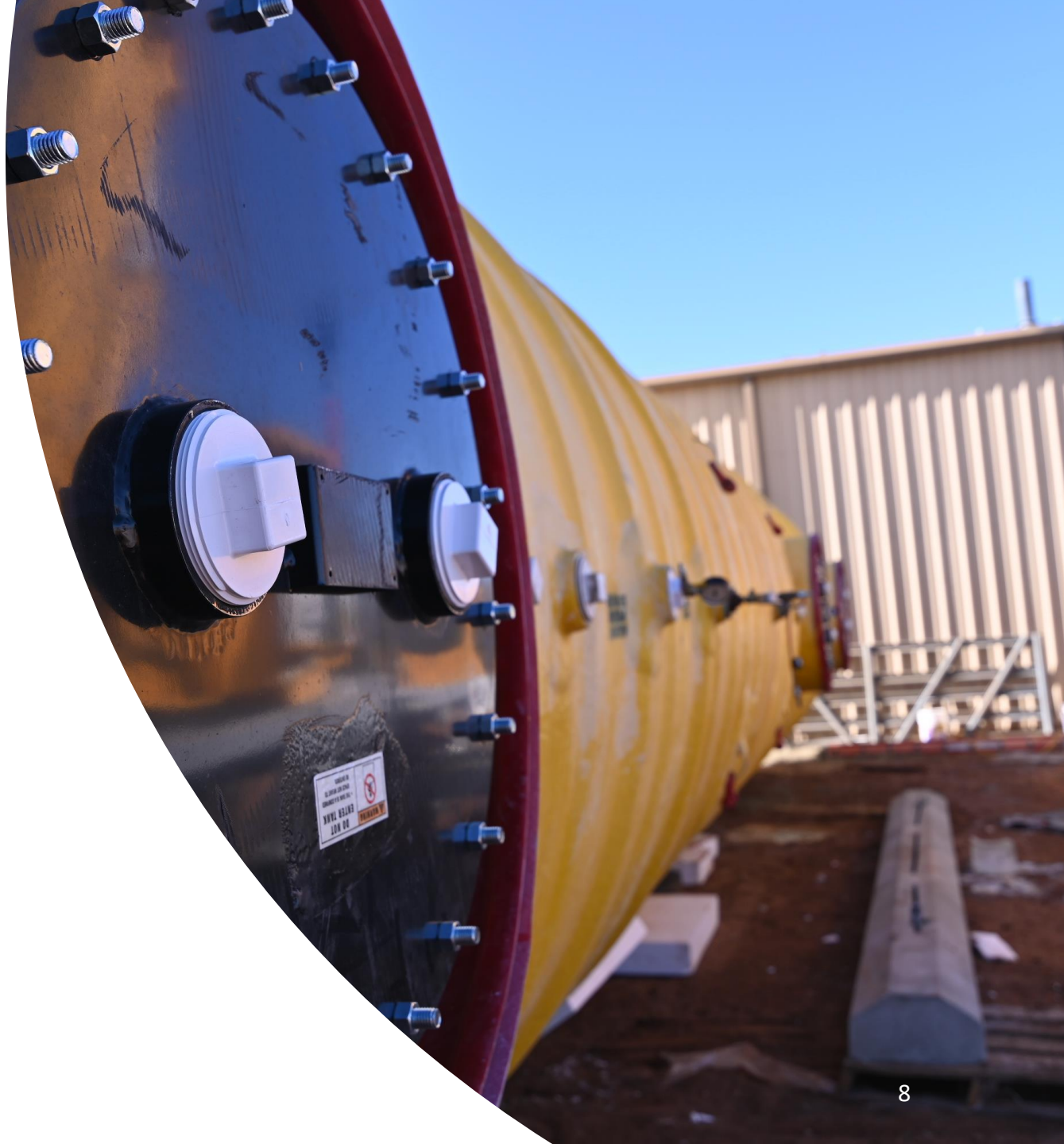
Tank Testing Procedure

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.
- Pressure-relief device must be sized and set to prevent the tank from being pressurized in excess of the maximum allowed test pressure of:

✓ 5 [psig] for double-wall tanks, interstice only.

✓ 1 [psig] for single-wall tanks, main compartment.



Shipped Under Vacuum

1. The Vacuum date precedes the tank installation *by7-days*; and
2. The factory supplied tank gauge reads a minimum of 10" vacuum.

*A tank shipped under vacuum can be immediately installed without additional testing if both of the following conditions are met:

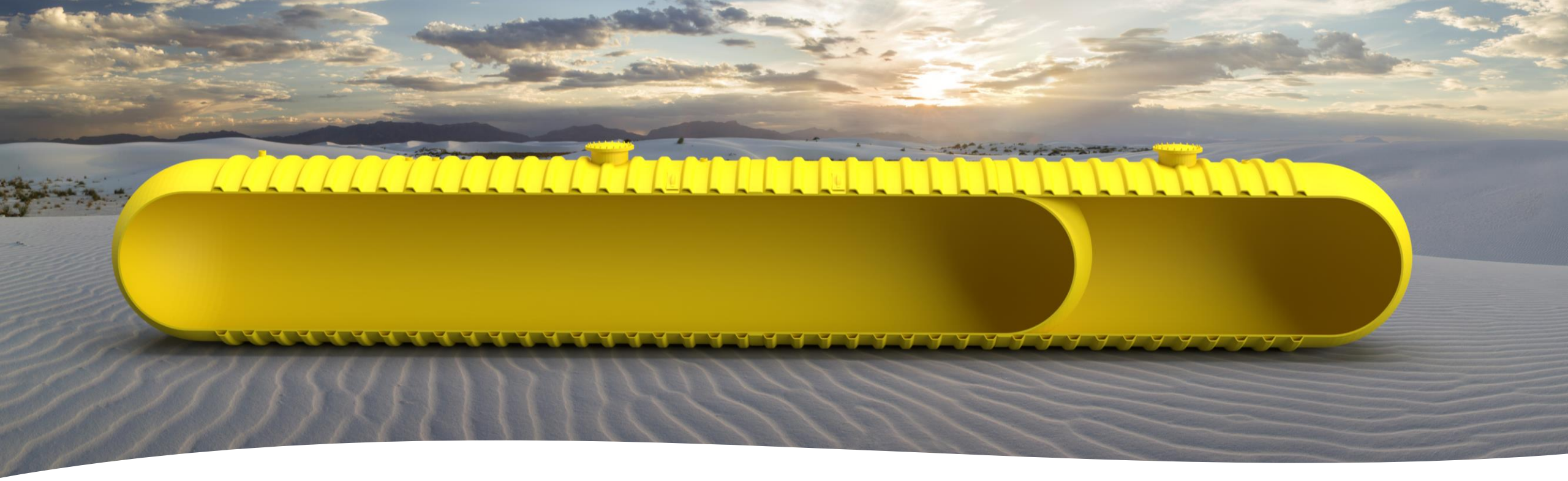
Testing Single Walled Tank(s)

- Comply with Requirements Set in Section 4.0 of IM.
- 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).
- 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 air test, vent/release pressure.

Testing Double Walled Tank(s)

Remove the manufacturer's supplied "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.
- Slowly pressurize the annular space to 5 [psig].
- Soak and visually inspect tank exterior; and monitor the pressure reading for 60 minutes for any loss in pressure from the initial reading.
- While under pressure, cover the Tank outer surface, including fittings and manways, with soap solution and inspect for leakage.
- After completing the air test, vent/release pressure.



Multi-Compartment Tank(s) Testing

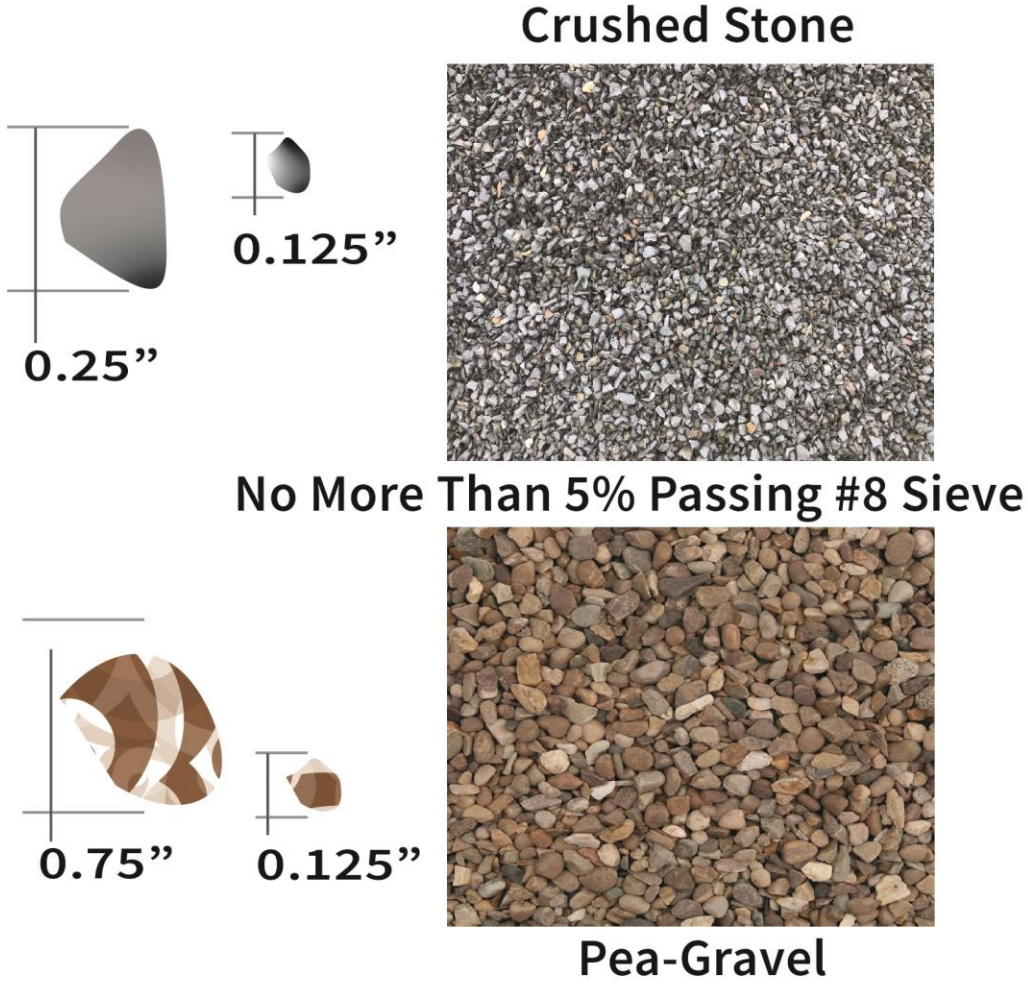
Each individual compartment, delineated by a common bulkhead, have a dedicated annular probe rib and annular space. There is no shared communication, probe rib, etc. between each adjacent compartment.

- Each compartment shall be treated as an individual tank and inspected independently.
- Repeat Section 4.4 for all compartments until complete tank has passed the acceptance criteria.

Tank Excavation & Clearance

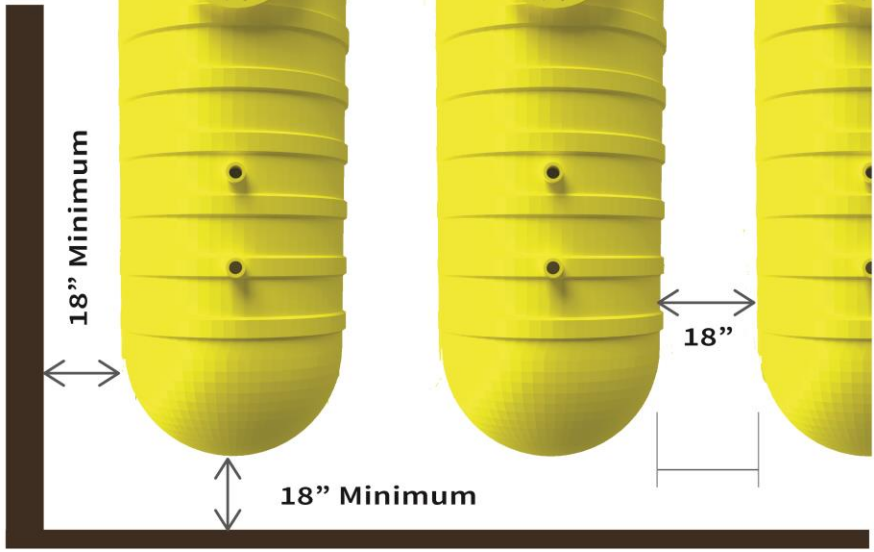
Backfill Requirements

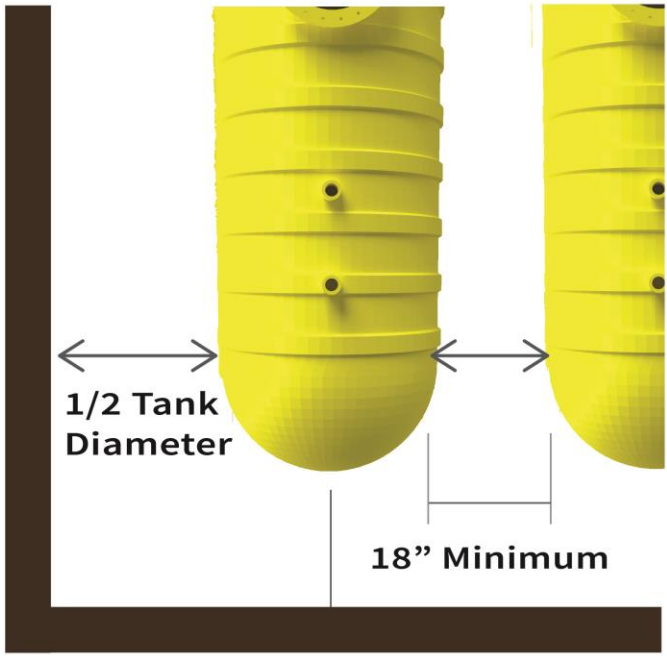
- Always use approved pea gravel or crushed stone.
- Require sieve analysis from your backfill supplier.
- Do not use sand or native soil.
- Alternative materials must be approved in writing by NT Technical Support prior to installation.



Tank Location & Spacing

- It is recommended 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.
- Unstable soil conditions require that the tank(s) be spaced a minimum of ½ of the tank diameter between the excavation wall and the tank sides and endcaps.
- Stable soil conditions require spacing of 18” between the excavation wall and the tank sides and endcaps.
- If two tanks are installed in the same hole, allow for 18” spacing between tanks. If deadmen are used, space the tanks twice the width of the deadmen.





Unstable Excavation Examples

- Any soil that is naturally unstable
- Bog
- Peat Muck
- Quicksand
- Flowing Water
- Landfill
- Swamp
- Soft or highly Expansive Clay
- Underground Stream

Geotextile Fabric

To preserve the integrity of backfill material, it is recommended to utilize 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 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.

Burial Depth & Cover

Appendix A (Anchor Charts)

Reference Appendix A (Anchor Charts) to verify the minimum depths for the following three common methods of anchoring tanks:

- Deadmen Anchors
- Concrete Anchor Pad
- Overburden
  (No mechanical Anchoring)

Tank Anchor Hardware

NOTICE – METAL HARDWARE SHOULD NEVER BE IN DIRECT CONTACT WITH ANY PORTION OF THE TANK. TANK DAMAGE MAY OCCUR.

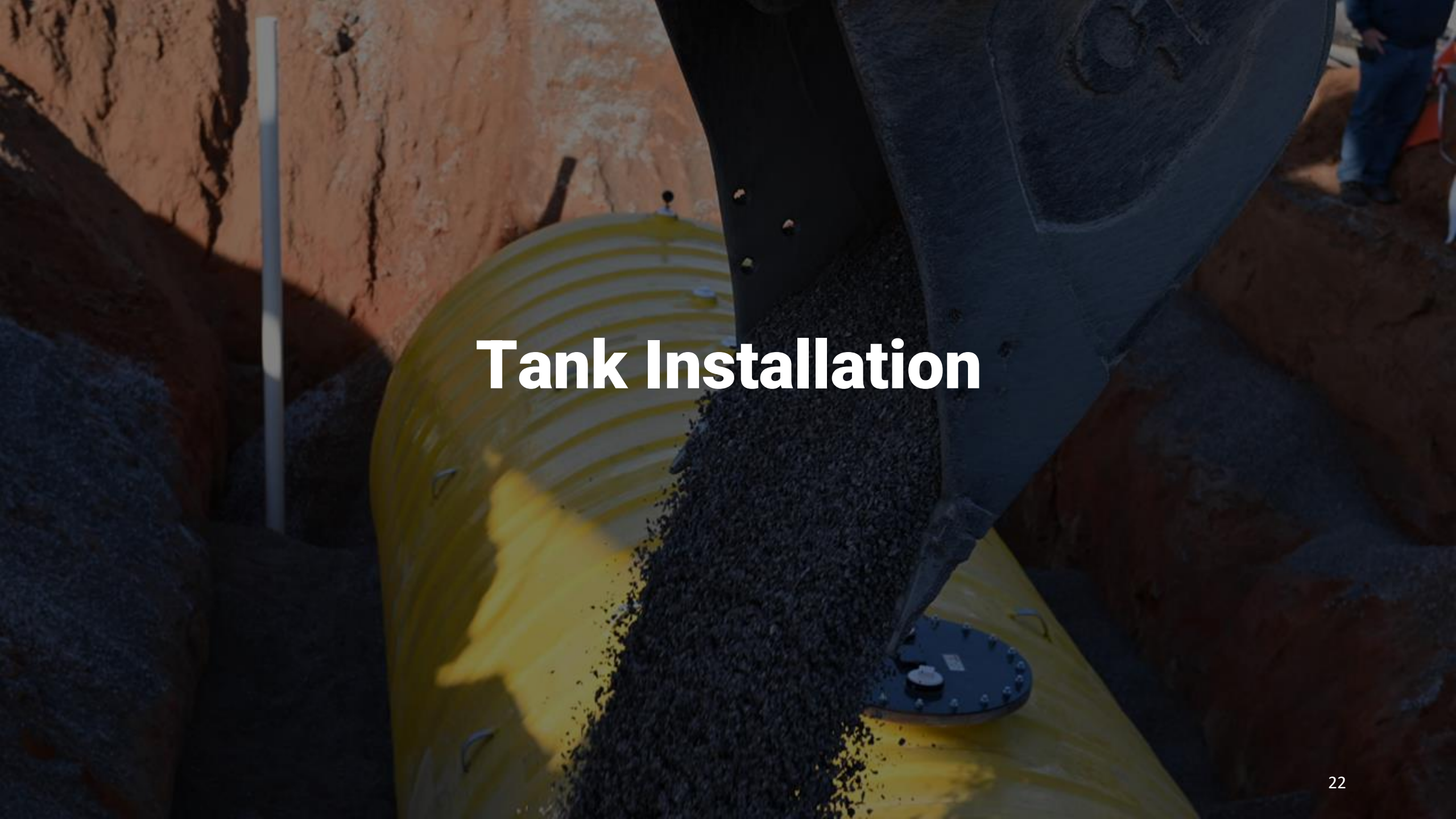
- Use only correct length anchor straps provided by NTI. Anchor points must be aligned with anchor ribs on the tank +/- 1”.
- Do not use straps between ribs.

- ✓ For deadmen anchors, position each anchor on the inside edge of the tank shadow.
- ✓ For bottom anchor pad, position the anchor points 9” from tank shadow,

Ballasting

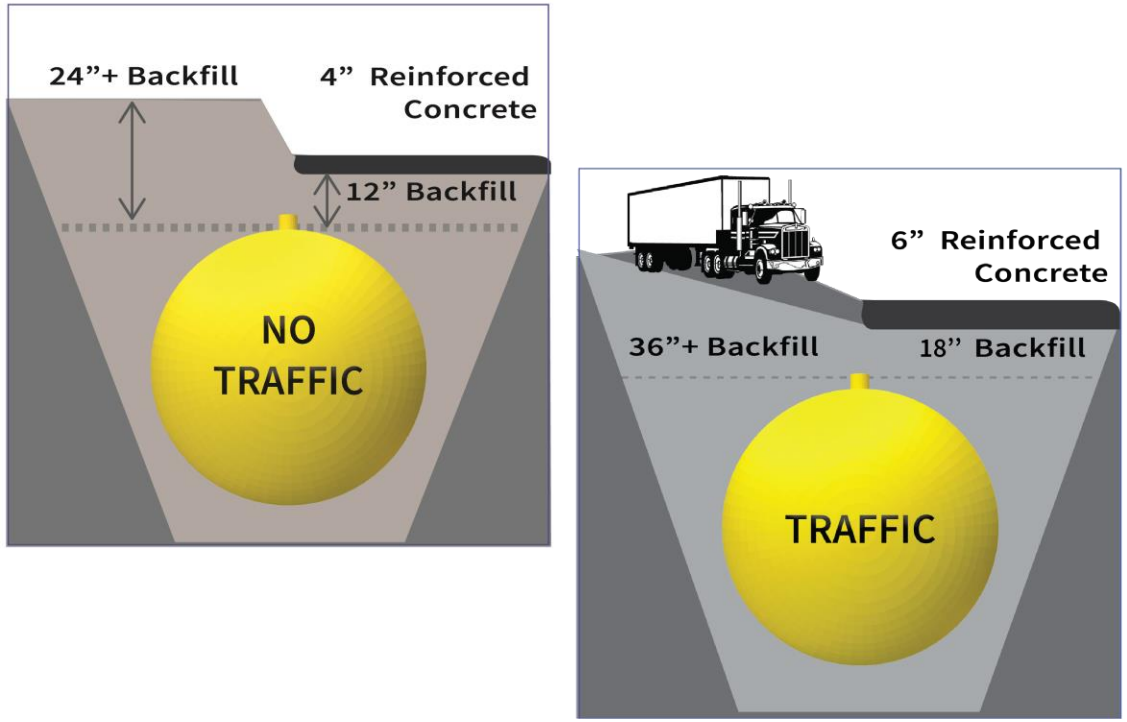
Each individual compartment, delineated by a common bulkhead, have a dedicated annular probe rib and annular space. There is no shared communication, probe rib, etc. between each adjacent compartment.

- Each compartment shall be treated as an individual tank and inspected independently.
- Repeat Section 4.4 for all compartments until complete tank has passed the acceptance criteria.



Tank Installation

Traffic vs
No Traffic Burial

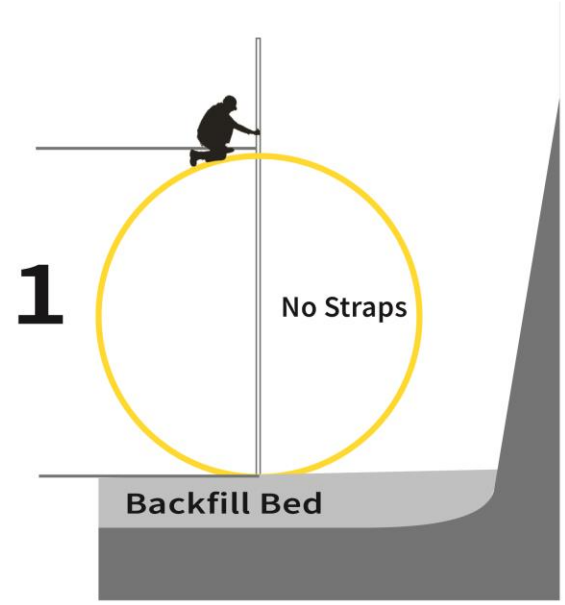


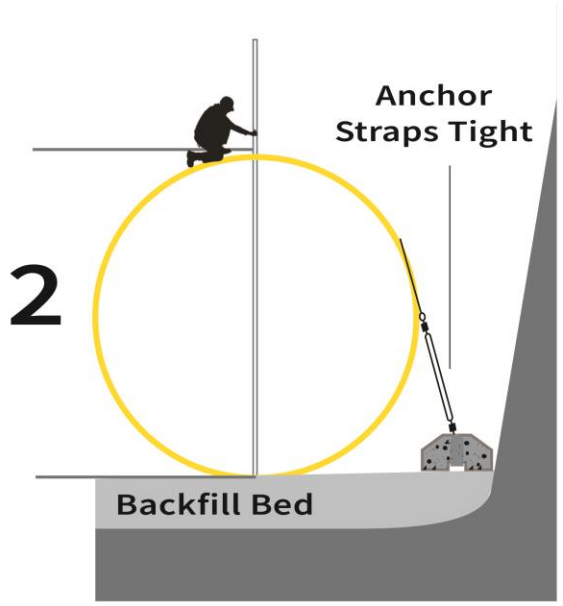
Tank Vertical Diameter Measurements Pt1

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 Nationwide Technical Support when taking corrective action is needed.

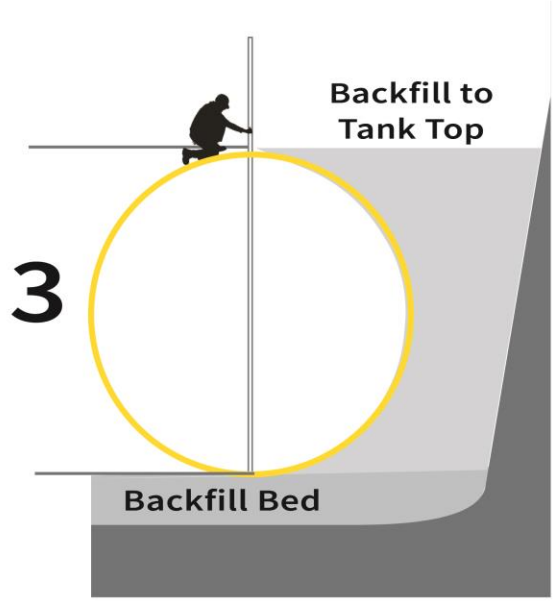


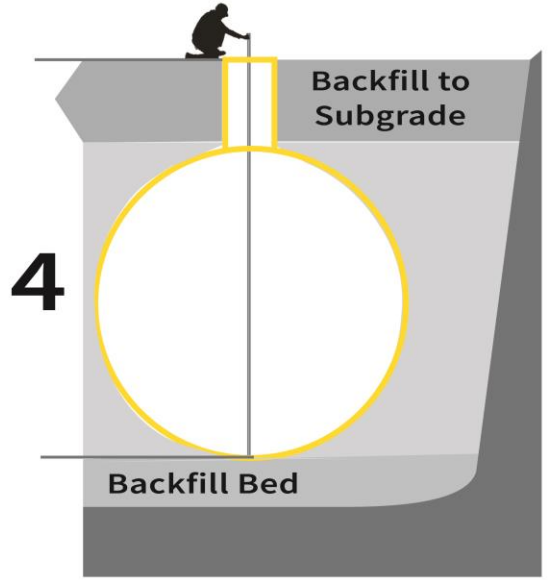


Tank Vertical Diameter Measurements Pt2

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

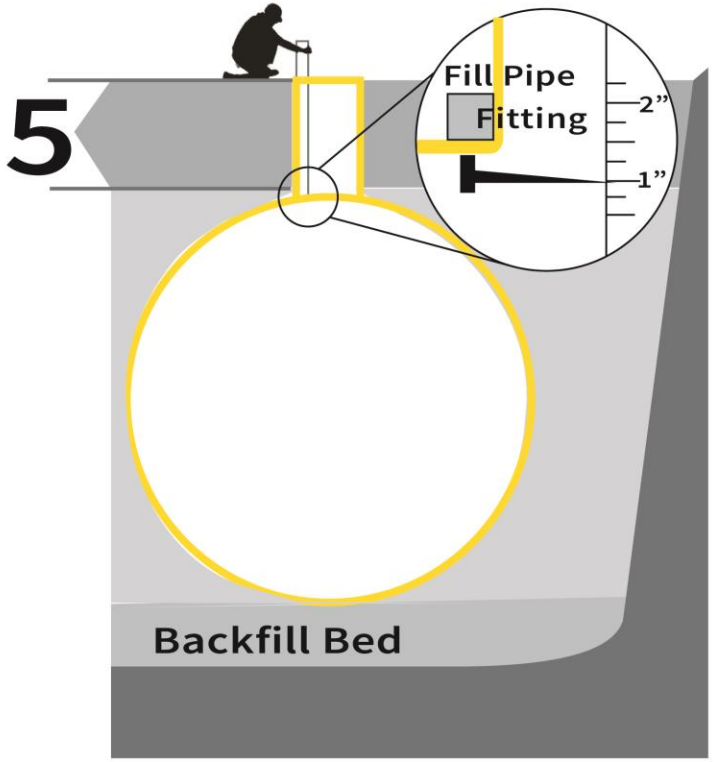
- Take diameter measurement at the centermost location of the tank or compartment.
- First Vertical Diameter Measurement – Placement of tank on backfill bed.
- Second Vertical Diameter Measurement – Anchoring completed (if applicable).
- Third Vertical Diameter Measurement – Backfill to tank top.
- Fourth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





Tank Vertical Diameter Measurements Pt3

- The inner diameter deflection is calculated using the “Fourth Vertical Diameter Measurement” and “Fifth Vertical Diameter Measurement”. Refer to Figure.
- 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.

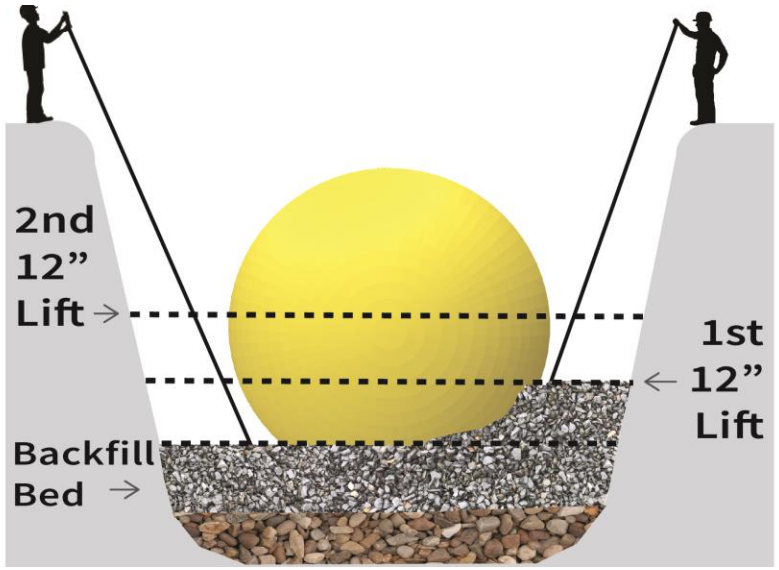


Dry Hole Installation

- Place tank in the excavation with lifting cables attached to lifting lugs provided on the tank. Maintain control of the tank with guide ropes.
- Set tank directly on backfill bed and take the First Vertical Diameter Measurement and record on the Tank Installation Checklist, see Figure 14.
- If mechanical anchoring is used, after anchoring is completed, take the Second Vertical Diameter Measurement, see Figure 14.
- If this measurement is not equal tolerances listed in 7.2, loosen the anchor straps and re-measure.

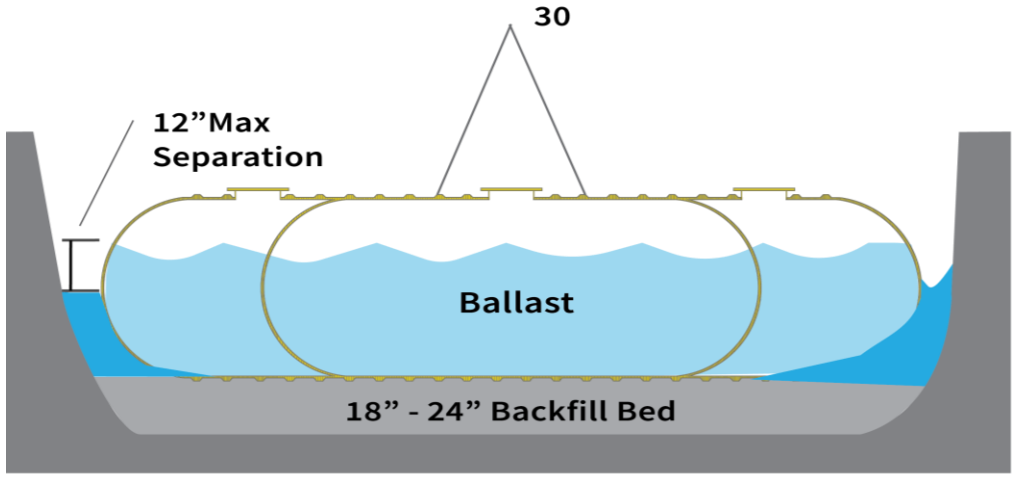
Dry Hole Installation Pt2

- 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. 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 top with no additional handwork.



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.
- Ballast level inside the tank and in all compartments should be equal and not more thank 12” above the ground water level outside the tank, see Figure 13.



Additional Information

Internal & External Piping

Internal piping must terminate at least 4” from the Tank bottom to allow for Tank deflection. External piping must be isolated from the concrete pad.

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.

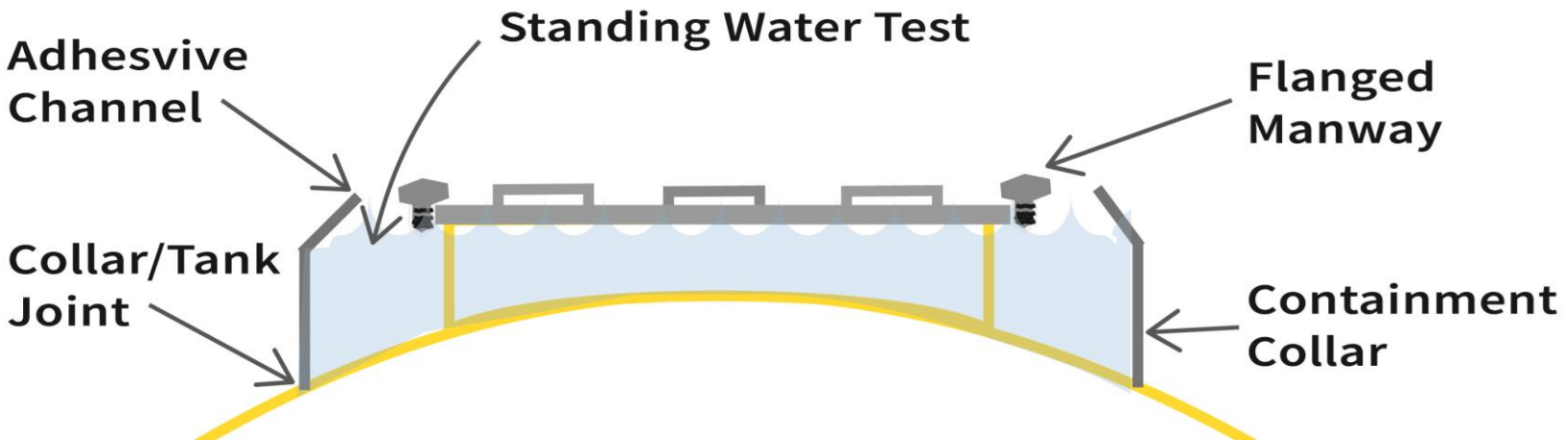
Installing Containment Sumps, Collars & Risers

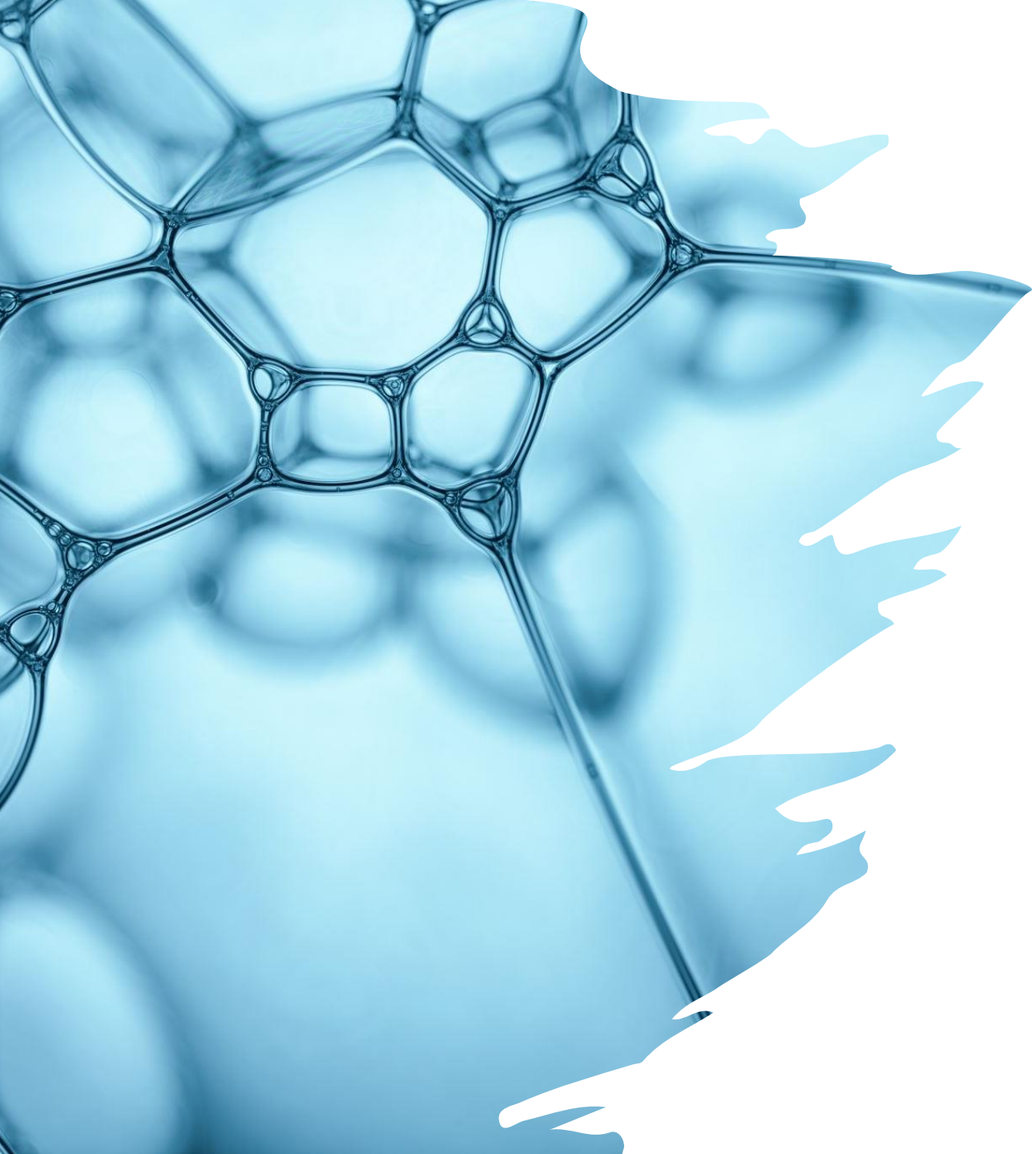
NTI offers sump kits in a variety of models and sizes that are designed for field installation. Instructions for the various models can be found in supplemental materials.

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 adhesive channel joint for leaks.
- ✓ Test liquids must be disposed of properly.





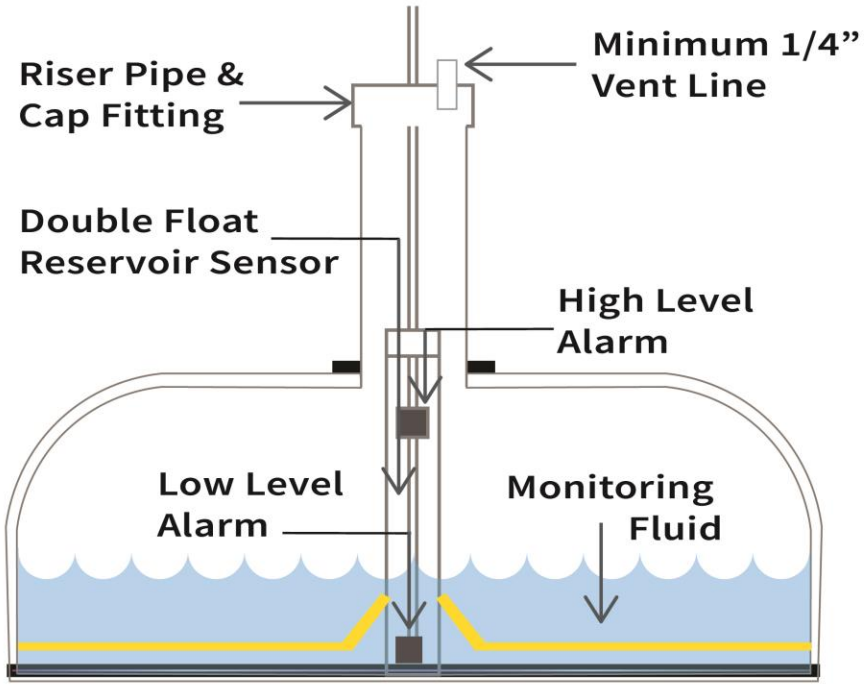
Interstitial Space Monitoring

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.

- ✓ The maximum vacuum for continuous monitoring is -1 psig. Utilize an approved vacuum monitoring system with a vacuum make-up 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.

Interstitial Space Monitoring Pt. 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.
- ✓ Vent the annular space with a minimum ¼” hole at the riser top.
- ✓ When installing a double float sensor, the bottom of the sensor must be in contact with the Tank top.
- ✓ 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.


NATIONWIDE
TANKS