



Double Wall Fibreglass Tanks

INSTALLATION MANUAL



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INTRODUCTION

It is important to follow the procedures and instructions in this manual in order to safely and properly install a Tank Solutions Underground Storage Tank. Failure to follow these instructions will void the tank warranty and may cause tank failure, serious personal injury, or property damage.

The Tank Solutions warranty applies to a tank installed according to these instructions. Since Tank Solutions does not control the parameters of any installation, our sole responsibility in any installation is that presented in our warranty. Use the Tank Installation Checklist, accompanying this manual, as the installation proceeds. Retain a copy of the checklist, along with any deviation – authorization letters, certification etc. in your files and return the original to Tank Solutions. For Warranty to be effective, the completed Installation Checklist must be returned to Tank Solutions within 30 days (refer to Installation Checklist for more details). Consult your Tank Solutions representative for any additional checklist forms. Comply with all applicable regulations and standards, such as:

- national, state and local construction, health, safety and environmental codes
- Industry standard practices (e.g. PEI/RP100, API RP1615 & EPA, AS4897, AS1692, AS1940)
- Installations must be completed by an accredited installer. Installations performed with no accreditation will void the warranty. The Installation Accreditation test can be completed on our website at www.tanksolutions.com.au
- It is the responsibility of the owner and operator to always follow the operating guidelines set forth in our applicable limited warranty.
- It is the responsibility of the owner and operator to always follow the operating guidelines set forth in this Installation Manual
- It is the responsibility of the owner to retain the limited warranty and Installation Manual provided with the tank for future reference.
A copy of the current limited warranty is available on our website. www.tanksolutions.com.au
- Use the Tank Installation Checklist - TD_IM_001 for all underground storage tanks throughout installation process.
- Record the relevant information for each tank installed on the Tank Installation Checklist. Additional copies are available on our website. www.tanksolutions.com.au
- The tank installer must retain a copy of the completed Tank Installation Checklist and provide both the tank owner and Tank Solutions with a copy in order to facilitate any warranty claim.
- The tank installer is to supply a sieve analysis report of rock to be used as backfill. (A copy of this report should this been retained for warranty purposes and sent to Tank Solutions, along with the installation checklist.
- The tank installer is to send to Tank Solutions a copy of any 3rd party test reports conducted on the tank(s) when they become available along with the Installation Checklist and backfill sieve analysis report for warranty purposes.

For additional information, contact your state and local government authorities, including health, fire or building departments, and environmental agencies. All work must be performed according to standard industry practices and OH&S regulations. A Tank Solutions requirement will never take precedence over a requirement imposed by any federal, state

or local code or regulation. In all cases, any such requirement takes precedence over any provision of the Tank Solutions manual. Tank Solutions must authorize in writing any variation to, or deviation from, these instructions. This authorization must be made in writing, prior to tank installation. Tank Solutions recommends that all personnel carrying out works installing the tanks should have current accreditation.

DEFINITIONS: Throughout this text, these definitions will apply:

- **Socket fitting:** a fitting, either on a manway or on the tank shell, which opens into the primary containment vessel, where the tank's contents are normally stored;
- **Monitor fitting:** a fitting, located on the tank shell, which opens into the secondary containment vessel, which is the normal monitoring location on the tank. Known as the interstitial space

For additional terminology, see Figure 0-1.

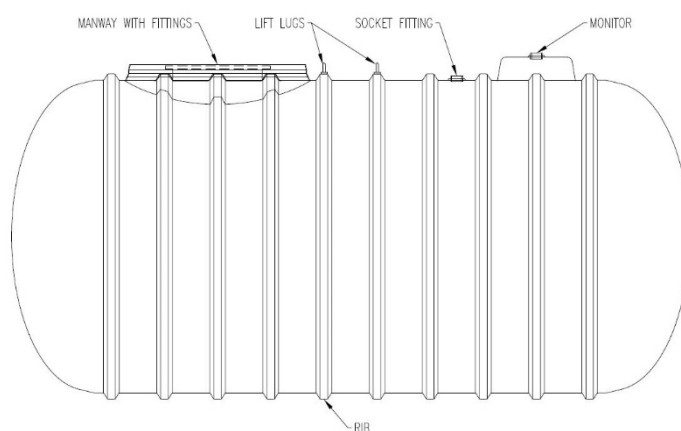


FIGURE 0-1

If you have any questions or encounter any situations not covered in these installation instructions, contact the Tank Solutions Technical Service Department on (02) 4964 8270 or local representative.

SAFETY

Before beginning the tank installation, read through the entire installation manual. It is the installer's responsibility to comply with all safety precautions, codes and regulations. No instructions or procedures presented in this manual should be interpreted as to put at risk any person's health or safety or to harm any property or the environment. Keep the Installation Manual available at the time of installation to refer back to safety procedures as needed.

Tank Solutions recommends that all personnel carrying out works installing the tanks should have current accreditation, but as a minimum, the installation contractor's supervisor on site MUST be accredited in order for the tank(s) to be warranted.

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

WARNING: indicates hazards which, if not avoided, could cause death, serious personal injury or significant property

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damage.

CAUTION: indicates hazards which, if not avoided, may cause personal injury or property damage.
NOTE: indicates areas of importance during the installation.

1. PREPARATION FOR INSTALLATION

WARNING: Working in excavations is dangerous and is regulated by safety codes. Careless activity or operation of equipment can cause death or serious personal injury.

Although the corrosion-resistant Tank Solutions tanks are rugged, care must be taken that they are not dropped or damaged during delivery, unloading and handling on the job site.

WARNING: The tanks are heavy and have a large surface area. The tanks will roll on sloped surfaces and can be blown about by the wind. Uncontrolled movement of the tanks can cause death, serious personal injury and property damage.

- Before the tanks are unloaded or relocated on the job site:
- Be sure that all equipment used to lift the tanks is rated to handle the load.
 - Prepare the unloading and/or storage site by removing all rocks and debris.
 - Arrange for sandbags or tyres to be used as chocks or foam cradles provided.

Use the lifting lug(s) when hoisting the tank.

Do NOT wrap chain or cable around the tank. Use all of the lugs to move the tank. (See Fig. 1-1). **Use guy ropes to guide the tank when needed. Do not move the tank by rolling.**

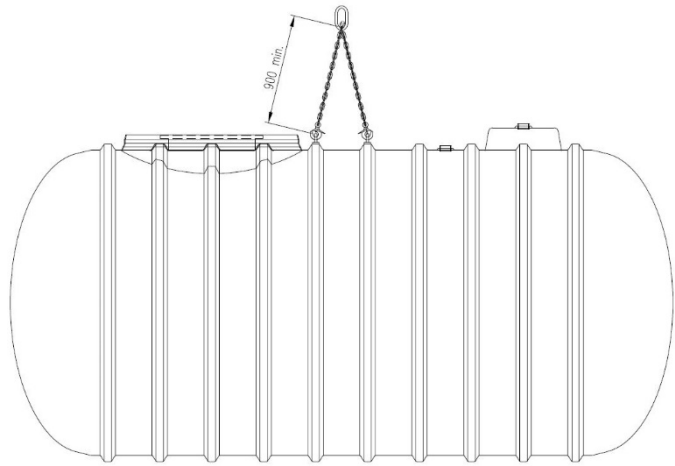


FIGURE 1-1

Whenever the tanks are stored at the site, chock them in place to prevent rolling. Tie them down if high winds are expected. Lifting lug position may vary depending on tank size but regardless of the location of lug location, the angle on lifting chains must not exceed 60 degree from the horizontal.

2. PREINSTALLATION TEST

GENERAL

Tank Solutions tanks are tested prior to shipment, but the tank must be checked at the site prior to installation in order to verify the absence of shipping and handling damage.

Visually inspect the tank exterior and interior of the primary tank for damage and the presence of blue marker dye including external shell of the tank or on the tray of the vehicle. Any damage should be documented and Tank Solutions contacted immediately. If no damage is found, complete the appropriate section on the Installation Checklist. The Brine level should also be checked at this point. Record the brine level on the Installation Checklist. It is normal for the brine level to drop somewhat during transport, however if no brine is visible in the monitor, contact Tank Solutions.

WARNING: Always secure the tank before moving or lifting it. This is commonly done by connecting a crane to the lifting lugs or slings if provided. Failure to do so could result in death or serious injury. Always use guide ropes attached.

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.

If damage is detected, do not attempt repairs. Contact Tank Solutions on (02) 4964 8270 or your local representative.

After installation and before backfilling to grade, conduct another visual inspection to verify that no damage has occurred during installation.

Remove all temporary service fitting plugs and the Monitor fitting plug. Check the monitoring fluid level in the reservoir. It should be about ½ full. If the Monitor brine level has settled during transport top up and record on the checklist.

Visually check the interior of the tank for monitoring fluid. No fluid should be present inside the vessel.

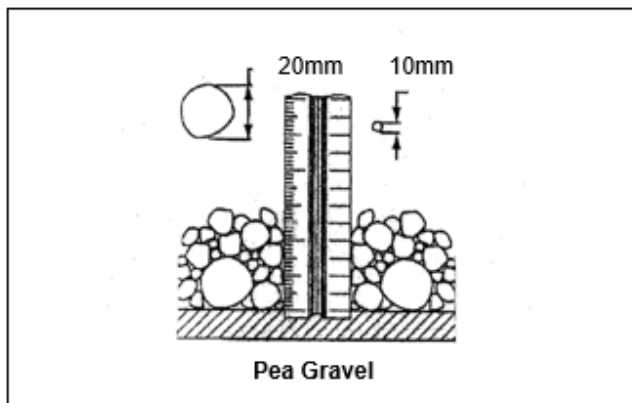
Replace the protective covers/plugs in the socket fittings prior to backfilling.

3. BACKFILL AND BEDDING

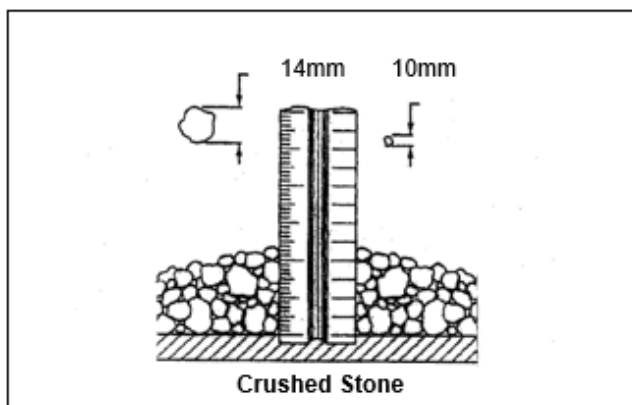
Tank Solutions recommends tanks be installed using either pea gravel or crushed stone which meets the following specifications.

GENERAL: The material is washed and free flowing and confirms to the specification of AS2758 and AS1141. No more than 5% (by weight) of the material may pass through a 2.36mm sieve - See Backfill Guidelines - TD_IM_014.

Use of automated backfill delivery method i.e. rock slingers are permitted for use, however care must be taken not to direct rock at FRP tanks as this may cause damage to outer shell and void warranty. Wherever possible, sling rocks in line with or parallel with tanks. Prior to using the Rockslinger, cover the tank with Geofabric to help protect the surface. Whilst the use of a Rockslinger is permitted, Tank Solutions' preferred method of backfilling is a rock conveyor with chute or the use of a kibble bucket.



PEA GRAVEL: Mix of rounded particles – sizes between 10mm and 20mm.



CRUSHED STONE: Mix of angular particles – sizes between 10mm and 14mm.

Dry density of Backfill must reach 1500kg per m³.

It is recommended that the supplier certify that the material conforms to AS2758 and any other applicable specifications. For additional information, refer to the Tank Solutions pamphlet *Fibreglass Tank Backfill Guidelines* - TD_IM_014. Please ensure a copy of the sieve analysis is sent with checklist to Tank Solutions as this will also be required to validate warranty

NOTE: If material which meets these specifications is not available, contact the Tank Solutions Technical Service Department for information on approved alternate materials and installation instructions.

NOTE: Using other than approved bedding and backfill materials without Tank Solutions prior written approval will void the tank warranty and may result in tank failure – See Backfill Guidelines - TD_IM_014.

4. EXCAVATION PARAMETERS

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:

- Location and protection of any utilities near the excavation before breaking ground;
- Means of securing the walls of the excavation;

- Appropriate benching of the excavation.
- Means of preventing exposure of employees to hazardous fumes from the excavation;
- Protection of employees from hazards associated with water accumulation in the excavation;
- Barricades, etc. to prevent unauthorized vehicle or pedestrian traffic;
- Inspection of the excavation and surrounding area at least daily.

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.

TANK SOLUTIONS Minimum Burial Depths

FUEL TANKS

NO TRAFFIC	
(Dry Hole)	600mm Backfill or 300mm Backfill + 100mm Reinforced Concrete
(Wet Hole)	Contact TS for details
TRAFFIC	
(Dry Hole)	1000m Backfill/ or 450mm Backfill + 150mm Reinforced Concrete
(Wet Hole)	Contact TS for details

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

The minimum depths of cover given here are important to the successful installation of a tank. They may not be sufficient to counteract buoyancy in wet-hole conditions.

In installations where it is not possible to pump the ground water to below the anchor depth during the excavation, contact Tank Solutions for guidance on installation process if required..

In these cases, buoyancy calculations may need to be conducted in consultation with the fuel system designer and appropriate engineer, prior to installation.

It is the responsibility of the tank owner / UPSS Designer to establish the needs and requirements for burial depth.

WARNING: In a non-traffic installation, ensure that the areas above the tanks will never be subject to traffic load, which could cause tank damage and result in death or serious injury.

NOTE: These depths of cover are Minimum's in all cases.

NOTE: Maximum burial depth is 2.1m of cover over top of tank.

NOTE: Any Manway/Turret Riser (if present) must not transmit load from the slab to the tank.

NOTE: Traffic loads are considered to be loadings for highway

vehicles up to H-20 or HS-20 as defined in the AASHTO Standard specifications for Highway Bridges.

NOTE: Traffic loads from the top slab must not be transmitted to the riser. A minimum space of 75mm is required between the riser and the slab.

5. TANK SPACING

NOTE: The following are minimum spacing's and must be increased as needed to accommodate deadmen or anchor slabs refer to Section 6 on tank anchoring. Always allow sufficient clearance to allow the deadmen to be set outside of the tank shadow.

STABLE SOIL CONDITIONS

Where shoring is not required to maintain a vertical wall from top to bottom of the excavation, the minimum spacing between the sidewall and endcap of the tank/s must be at least 450mm. If more than one tank is to be installed in the same hole, there must be at least 2 x Deadman between the tanks. Standard excavation batter requirements apply to all excavation to meet local and national safety standards.

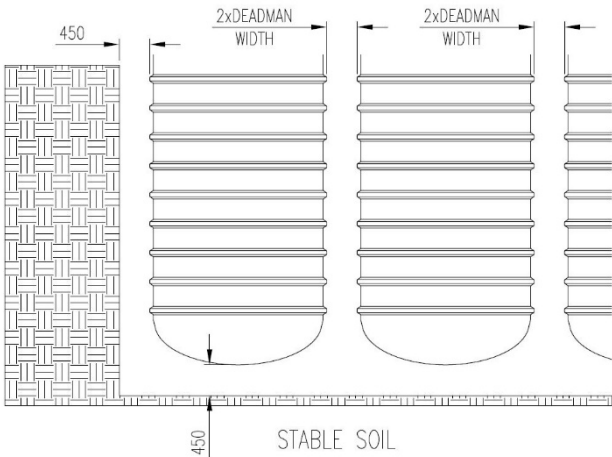


FIGURE 5-0

UNSTABLE SOIL CONDITIONS

If the soil has less than 36 kPa/m² cohesion as calculated from an unconfined compression test; or soils having an ultimate bearing capacity of less than 168 kPa/m² or where soil will not maintain a vertical wall, the excavation must allow a minimum space equal to ½ the diameter of the tank between the side and endcap of the tank and the excavation wall. The spacing between adjacent tanks, 2x Deadman remains the same.

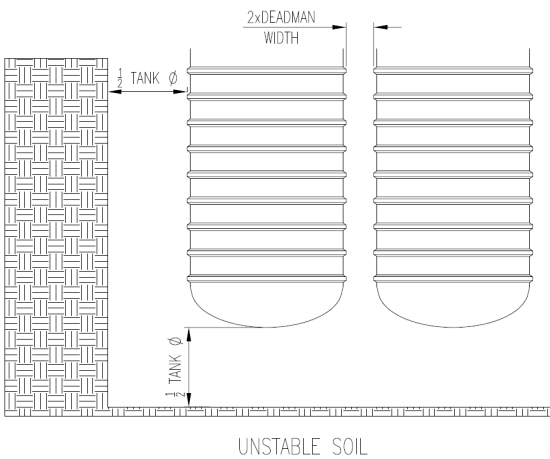


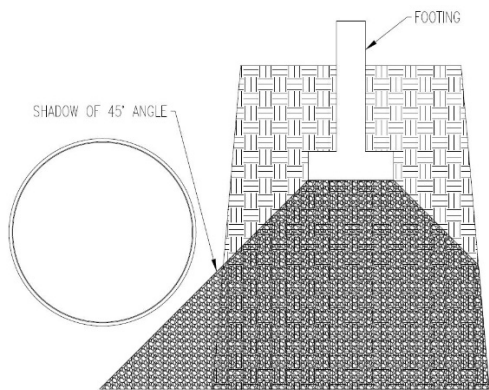
FIGURE 5-1

We recommend that the tank owner seek the advice of a local foundation professional engineer if the in-situ soil is soft or inherently unstable (for example, peat, quick-sand, muck, landfill, soft or highly expansive clay, underground stream, etc.).

Stabilizing materials, such as a reinforced concrete slab, may be required under the tank as a foundation in addition to the required 300mm of bedding in an excavation where the bottom is unstable.

SHORING

In order to reduce the ½ diameter standoff to the standard minimum of 450mm, sacrificial shoring can be used if engineered to last the effective 30 year lifespan of the tank. Tank solutions will require a copy of a Geotechnical Engineering Report that states the shoring will remain in place and effective for the duration of the tank warranty (30 years).



The location of the tank can be affected by the location of nearby structures. When selecting a tank position, care must be taken to avoid undermining the foundations of existing structures or new buildings and boundaries.

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.

Typically the way to check the placement of the tank in relation to a nearby structure is to do the following:

- Determine the depth of burial needed for the tank.
- Locate the footing of the structure to be considered.
- 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.

The tank must not fall within the “shadow” of the 45 degree angler line drawn from the foundations footing (see figure above).

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.

It is recommended 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).

FILTER FABRIC

The tank owner or his technical representative is responsible for determining whether filter fabric is appropriate for a specific installation. If used, filter fabric must conform to AS3706-6-212

Filter fabric allows the passage of water but prevents the migration and mixing of native soil and backfill material. It preserves the integrity of the backfill envelope which supports the tank. Polyethylene film is not considered an effective material to prevent migration of pea gravel and native soil; it may tear or degrade while in service.

Tank Solutions requires that filter fabric be used when the tank may be installed in.

- Areas with frequently changing ground water conditions or areas subject to tidal fluctuations,
- Unstable soils such as bog, swamp, landfill or mud,
- Wet conditions with silty soil.
- Split Backfill Method.

For further information concerning fabric specifications and installation procedures, consult the filter fabric supplier's installation guides or instructions.

To install filter fabric: Typically filter fabric manufacturers recommend that the installer line the excavation sides and bottom with the fabric, overlapping adjoining panels by at least 300 mm. Place backfill materials on the panels around the edge of the hole to anchor them in place.

In wet-hole conditions, use backfill material to sink and hold the fabric in place on the bottom of the hole.

anchor may damage the tank or surrounding property.

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

DEADMAN ANCHOR

A deadmen is a reinforced concrete beam with a total length that is typically equal to the overall tank length .A deadmen may be fabricated in multiple sections as long and each section contains at least two anchor points. The width of the anchor depends on the tank diameter.

NOTE: Approximate weight of the deadmen anchors per lineal metre is as follows:

150mm x 150mm	65kg per metre
300mm x 300mm	250kg per metre
300mm x 450mm	375kg per metre

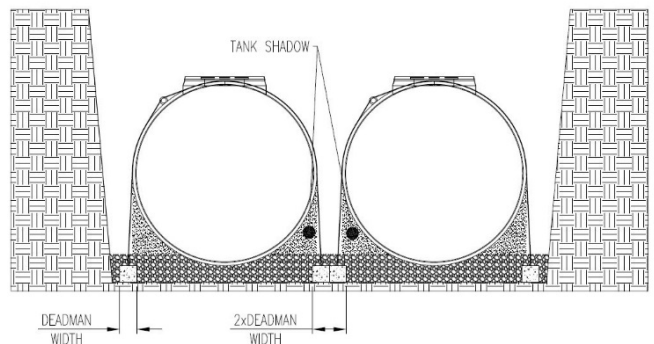
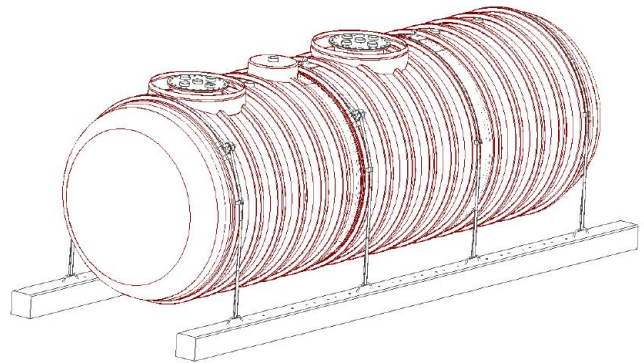


FIGURE 6-1

Lay the deadmen in the excavation parallel to the tank and outside of the tank “shadow” (see Figure 6-1). In multiple tank installations, each tank will require its own deadmen.

The minimum spacing between tanks must be equal to twice the width of a single Deadman.

Deadmen are to be butted together where multiple sections are used. Place A to A and AA to AA (Marked on Deadmen).

6. ANCHORING TANK HOLD DOWN STRAPS

CAUTION: Tank Solutions recommends that every site be thoroughly evaluated for the potential to trap water or otherwise subject the tank to a rise in the local water table. Tank Solutions recommends that all tanks be anchored in installations in which water may enter the hole. Failure to

ANCHOR SLAB

An anchor slab is a reinforced concrete base. The total length of the slab is 460mm greater than the overall length of the tank. The minimum slab thickness is 200mm. The width of the slab depends on the tank diameter. Provide a separate anchor point for each hold down strap. When using a concrete base slab, allow sufficient depth in the excavation for 300mm of bedding material below the tank.

NOTE: The tank owner is responsible for the design of anchor slabs.

HOLD DOWN STRAPS

Tank Solutions Hold down Straps should be used when a tank is to be anchored. The locations of the straps are marked on the tank by the ►◄ symbols. An installation guide is provided as a separate document

CAUTION: Place the straps only in the locations designated by the arrow symbols ►◄.

A measurement must be taken of the tank diameter before the straps are tightened (Measurement “1” on the Installation Checklist - Refer to Section 14 for methodology). To evenly distribute buoyancy loads tighten all hold down straps uniformly but cause no deflection of the tank. A second measurement should be taken of the tank diameter after the straps have been tightened (measurement 2). This should be compared with measurement 1 to ensure tank is inside the deflection allowance (see Deflection Allowance table on Installation Checklist and Section 14 for methodology)

NOTE: All exposed metal on the hold down straps, buckles and/or threaded rod must be coated or galvanized to prevent corrosion.

NOTE: Installation check list must be filled in completely during installation – See Installation Checklist - TD_IM_001.

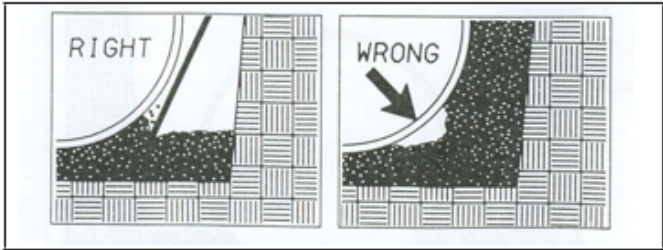
no damage is found, note this on the Installation Checklist and continue to follow these instructions. If damage is found, contact Tank Solutions.

BACKFILLING

Use only approved backfill material (See Section 3). Do not mix approved material with sand or native soil. Do not use native soil as backfill material. All excavated native soil must be replaced with approved material. Place one 300mm lift of material evenly around the tank. From the side of the excavation or the top of an adjacent tank, work the material by hand completely beneath the tank body and domes to provide full support. Use a probe long enough to reach beneath the tank and push the backfill in place. Repeat this setup with a second 300mm lift. After the second lift of material has been placed and probed, the backfill can be brought to the top of the tank without further hand work.

CAUTION: Do not strike the tank with the tamping bar. The tank may be damage and require repair.

CAUTION: Do not use a mechanical compaction machine with 2m of the tank side wall or 45 degrees from finished surface and tank base.



When the tank is backfilled to the tank top:

- Take a third deflection reading (deflection reading “3” on the Checklist) and compare to the original measurement “1” to ensure the tank does not lie outside the maximum deflection range outlined on the Installation Checklist.
- DO NOT proceed to grade if the deflection is excessive.

SUMMARY

1. Prepare the tank bed
2. Set and level the tanks
3. Measure the tank internal diameter - deflection reading 1
4. Install hold down hardware (refer to Section 6)
5. Conduct a visual inspection of the tank
6. Measure the tank internal diameter - deflection reading 2
7. Place and probe the first two lifts of backfill material
8. Add backfill to the top of the tank
9. Measure the tank internal diameter - deflection reading 3
10. Complete the Tank Test
11. Backfill to sub grade (prior to concreting)
12. Measure the tank internal diameter - deflection reading 4

After measurements of tank deflection are successfully completed, it is recommended that the tank be ballasted until piping installation and final backfilling to grade is completed. When filling the tank make sure that the tank is adequately vented. The vent must be large enough to allow the displaced air to escape.

NOTE: Do not ballast the tank until the backfill is even with the

7. DRY HOLE INSTALLATION

CAUTION: Tank Solutions recommends that every site excavation be thoroughly evaluated for the potential to trap water and/or a rise in the local water table. Tank Solutions recommends that all tanks be anchored and ballasted in installations in which water could rise in the hole. Failure to anchor and ballast the tank in a wet hole or one that can hold water may damage the tank or surrounding property.

Following installation of anchors, prepare a smooth level bed, 300mm thick (to top of anchors), of approved backfill material. Place the tank or tanks onto the bed. Do not set Tank Solutions tanks directly onto a concrete slab or on timbers, cradles or directly onto the excavation base. If a double wall tank is pitched, the interstitial monitor should be at the low end of the excavation. Use the tops of the ribs to establish longitudinal level. Establish lateral level by placing the level across the top of a fitting, a manway or a collar. When the tank is placed, take the first internal diameter reading (Deflection reading “1” on the checklist). See Section 14 for instructions on taking deflection readings. Before backfilling, do a visual inspection on the tank, if

top of the tank, unless in a wet hole installation.

WARNING: If product is used as ballast, exercise special care in handling. Safeguard against sparks, fire or product spills. Improper handling of product can cause a fire or explosion, and death, severe personal injury or property damage. The site becomes live once fuel is onsite.

8. WET HOLE INSTALLATION

CAUTION: Tank Solutions recommends that every site excavation be thoroughly evaluated for the potential to trap water and/or a rise in the local water table. Tank Solutions recommends that all tanks be anchored and ballasted in installations in which water could rise in the hole. Failure to anchor and ballast the tank in a wet hole or one that can hold water may damage the tank or surrounding property.

CAUTION: Never allow an empty tank to remain in a wet hole, or a dry hole that may become wet unless anchoring and backfilling have been completed. Failure to anchor and backfill may damage the tank or surrounding property.

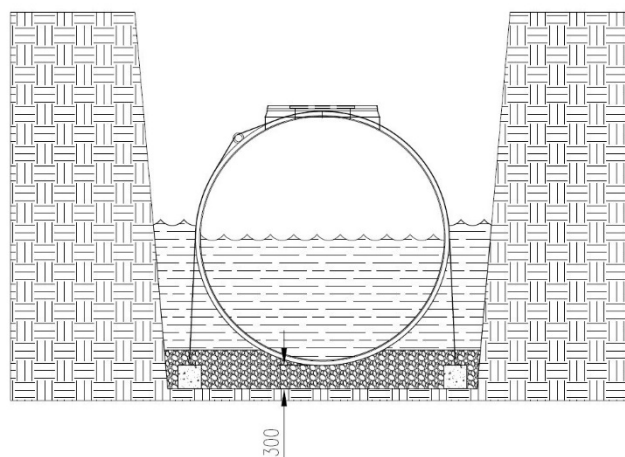
Pump the water from the hole to maintain minimum water level. Position anchors, refer to Section 6. Add a minimum of 300mm of well-placed backfill material to the hole and level the bed to assure uniform bottom support for the tank. Position the tank in the hole. Partially ballast tank until it settles firmly on the prepared bed. Ballast level in a tank must never exceed water level in hole during installation. Use only enough ballast to sink the tank until backfill material is even with the top of the tank.

WARNING: If product is used as ballast, exercise special care in handling. Safeguard against sparks, fire or product spills. Improper handling of product can cause a fire or explosion, and death, severe personal injury or property damage.

After levelling tanks, the anchoring procedures in Section 6 must be followed. Backfill must be added evenly after anchoring, and remaining dry hole backfilling procedures should be followed.

NOTE: Cover depth must exceed minimum depth specified in these installation instructions.

NOTE: It is recommended that the tank be completely ballasted once backfill is even with the top of the tank.



9. POST INSTALLATION TESTING

WARNING: Do not use air pressure to test tanks that contain flammable or combustible liquids or vapours. The fuel/air mixture may explode and cause death, severe personal injury or property damage.

SECOND INTERMEDIATE DEFLECTION MEASUREMENT

After backfill is brought to the top of the tank, make an intermediate measurement of vertical deflection (deflection reading "3" on the Checklist) according to the instructions in the Section 14 (see Installation Checklist for deflection allowance)

TEST

After the tank has been measured and vertical deflection is determined to be within the limits specified by Tank Solutions, the tank must be tested to ensure that no damage occurred during installation. Post concrete 3rd party testing is required, and is a condition of warranty. For warranty activation, a copy of the 3rd party test report must be sent to Tank Solutions. The test is to be carried out by 3rd party contractor such as Leighton Obrien or Tanknology in accordance with both AS4897 and USEPA.

10. BALLASTING

WARNING: If product is used as ballast, exercise special care in handling. Safeguard against sparks, fire or product spills. Improper handling of product can cause a fire or explosion and may result in death, severe personal injury or property damage.

The tank may be ballasted after the backfill is even with the top of the tank and post-installation deflection testing has been successfully completed.

Only under wet-hole conditions as described in Section 8, should ballast be added before the backfill is even with the top of the tank. When filling the tank, make sure the tank is properly vented. The vent must be large enough to allow the displaced air to escape. In general a tank is not adequately protected against floatation until the tank is fully backfilled and the top slab is in place. Therefore, during the installation process, the tank should be fully ballasted after the backfill is level with the top of the tank

and after the post installation testing has been successfully completed.

Care must be taken so that the use of ballast does not contaminate the product being stored.

11. PIPING AND VENTING

CAUTION: All internal piping must be at least 100mm from the tank bottom.

When the tank's interstitial space is filled with a liquid, the space must be vented. A 6mm diameter hole MUST be drilled in the top cap of the monitor system riser pipe to allow the interstitial space to vent.

When the groundwater level will be high enough to enter a drilled vent hole, install a separate vent line from the riser pipe to above grade level. 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. If necessary, remove, clean and re-dope all plugs.

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 and may void the warranty.

WARNING: Tank Solutions does not allow pump-or pressure-filling of its tanks as an overflow or over pressurization could occur. Over filling 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.

WARNING: An AdBlue compartment must be free vented at all times and not a part of the manifolded Vent stack fitted with a PV vent.

WARNING: If owner/operator allows pump or pressure-filling of the tank, owner/operator must ensure that the tank is not equipped with overflow 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 overflow and that over filling 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 overflow, over pressurization or tank failure, and could result in death or serious injury.

WARNING: The tanks venting systems must comply with AS1940 Section 5.4 and AS4897.

The tanks venting system must be adequately sized and designed by a qualified fuel systems designer to ensure that atmospheric pressure is maintained at all times, including when filling & emptying the tank.

NOTE: PV–VR2 Vents and their use are to be advised to Tank Solutions at the time of installation, make sure appropriate venting has been calculated by a qualified fuel systems designer.

If a PV vent is to be installed on a tank please record on the checklist, including the model and date installed.

WARNING: PV vents not maintained could cause catastrophic failure and void the tank warranty.

NOTE: All piping must conform to all applicable codes and standards. See INTRODUCTION.

WARNING: When pressure testing the piping, the tank must be isolated from the piping systems. The test pressures for piping may cause the tank to explode and cause death, severe personal injury or property damage.

CAUTION: When extending monitoring or vapour recovery piping to the surface, be sure that the at-grade fittings are different from any fittings and will not accept standard fill hoses.

12. SUMPS/BOTTOM FITTINGS

If the tank has a sump or a bottom fitting, take extra care that the tank does not rest on it prior to installation. During installation, provide a clear area in the bedding material, so that the tank rests on the bedding and the sump or bottom fitting is clear. After setting the tank, fill and tamp the resulting void by hand before continuing the backfilling.

13. BACKFILLING TO GRADE

When the tank has been set, tested and backfilled, and all piping and venting has been completed, the balance of the backfill material may be added.

When the tank has been backfilled to Sub Grade (before concrete or asphalt), take the final diameter reading (Deflection reading "4" on the checklist).

The same material as specified in Section 3 must be used to completely fill excavation. The backfill must be free of debris. Any blocks or bricks used as support material during piping must be removed prior to completion of backfilling. Safety measures, such as placing barricades until installation is complete, should be used around the excavation site.

Check and record the level of brine in the monitor fitting. If the level has dropped significantly from the level recorded at the beginning of the installation process, contact Tank Solutions immediately.

Be sure that the installation meets all of the requirements of minimum cover as specific in Section 4. Be sure that the checklist is properly completed.

14. DEFLECTION MEASUREMENT

Four deflection measurements should be taken:

1. Initial measurement on placement of the tank in the hole (measurement "1" on the Installation Checklist) – See

Installation Checklist - TD_IM_001.

2. An intermediate measurement when straps are tightened to ensure uniform tightening (Measurement "2" on the checklist)
3. When backfill to top of tank is completed (Measurement "3" on the checklist)
4. At Sub Grade - before Concrete or asphalt topping (Measurement "4" on the checklist) – See Installation Checklist - TD_IM_001.

15. MONITORING

DOUBLEWALL TANKS

Tank Solutions double wall tank has an interstitial space for the containment of leaked product from the primary tank. The tank, as supplied, will have a minimum of one fitting that provides access into the space between the primary (internal) and secondary (external) tank shell walls. If a double wall tank is installed with fall, the monitor should be at the low end.

HYDROSTATIC MONITORING SYSTEM

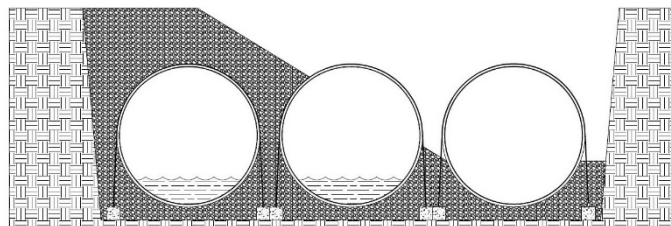
In a liquid filled monitoring system, the interstitial space is filled with liquid at the point of manufacture. The system provides continuous leak protection and it enables the owner to conduct a visual tank tightness test. The monitor riser pipe cap has a 6mm breather hole and over extended time evaporation can lower the level in the monitor reservoir, it also provides the ability to use an electronic monitoring system.

16. ADDING TANKS AT EXISTING LOCATIONS

Additional Tank Solutions tanks can be installed at existing locations if proper foundation support exists. The method of installation is the responsibility of the owner / fuel system designer. It is required, however, that one of the following methods be used.

The preferred method is to install a new tank in a separate hole at least 1 Meter from the original hole.

Caution must be exercised in keeping unusual surface loads off existing tanks. The natural barrier of undisturbed soil between tanks must be maintained.



If this method is not practical, additional tanks may be buried in the same installation hole. After emptying existing tanks to less than one-quarter capacity, remove the surface pad. Enlarge the excavation for the new tank, leaving as much backfill as possible around existing tanks.

It may be necessary to install shoring to make sure that existing tanks do not move and that sufficient backfill remains. The new tanks must be installed by following the procedures in this guide.

CAUTION: If any existing tank(s) should move during the installation of new tanks, they must be removed and reinstall according to the tank manufacturer's instructions. Failure to follow this Caution could result in minor or moderate injury.

Remember to leave minimum of 2 x Deadman width as spacing between tanks. The backfill material must be the same as that specified in Section 3.

17. INSTALLATION OF FRP RISER / TURRETS

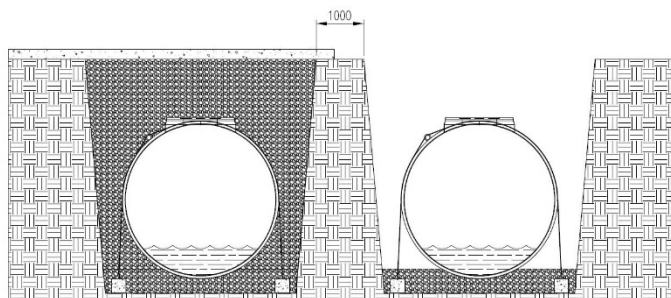
Each tank is supplied with 1200mm collar/riser assemblies as standard if ordered as a pressure system – For detail on the installation of the riser, See Riser Installation - TD_IM_005.

NOTE: if a different riser is required to meet Oil company specifications please speak to Tank Solutions, prior to quoting.

NOTE: Testing of a riser other than Tank Solutions own version should be done to the OEM detail and specification. assemblies if ordered as a pressure system – For detail on the installation of the riser, See Riser Installation - TD_IM_005.

NOTE: if a different riser is required to meet Oil company specifications please speak to Tank Solutions, prior to quoting.

NOTE: Testing of a riser other than Tank Solutions own version should be done to the OEM detail and specification.





Double Wall Installation Checklist

An electronic version of this form is available on www.tanksolutions.com.au

Date of Installation: _____

Site Owner: _____

Site Address:

_____ *Street* _____ *City* _____ *State* _____ *Postcode*

Installing Contractor:

Installation On-Site Supervisor:

Supervisor Accreditation Number and Expiry Date: _____

Contractor Address:

_____ *Street* _____ *City* _____ *State* _____ *Postcode*

TANK INFORMATION	Tank # 1	Tank # 2	Tank # 3	Tank # 4
Tank Number				
Total Capacity				
Compartments: Single (SC), Dual (DC) or Triple (TC)				
Configuration (Compartment)				
Tank Diameter				

Fibreglass Tanks

Fibreglass Tanks

SITE INFORMATION (See Sections 3 - 8)		Tank # 1	Tank # 2	Tank # 3	Tank # 4
1	Primary backfill meets Backfill Guideline requirements (Form TD_IM_014) – Yes or No				
2	Secondary backfill material will be used – Yes or No				
3	(Must advise Tank Solutions prior to using Split Backfill procedure)				
4	If Secondary backfill material is used, does it meet manufacturer's requirements (Form TD_IM_020) – Yes or No				
5	Geotextile Fabric will be used – Yes or No				
6 a)	Is the excavation shored – Yes or No				
6 b)	Will the shoring be removed or remain in place following installation? Yes or No				
6 c)	Has a suitably qualified Engineer confirmed the Shoring will remain effective for 30 years? – Yes or No				
7	Tanks in trafficable area – Yes or No				
8	Hole Condition – Wet or Dry Dry: Water not anticipated to reach tank. Area not subject to Flooding. Wet: Excavation may trap water. Area subject to Flooding				
9	Additional Comments				
PRE Installation Inspection and Testing (See Section 2 of the Installation Manual)		Tank # 1	Tank # 2	Tank # 3	Tank # 4
10	Visual Inspection – Is there evidence of damage (holes, cracks, gouges) in the tank – Yes or No (If yes, document any damage found and send, with pictures to Tank Solutions prior to Installation)				
11	Brine Check – Is Interstitial fluid visible on the outside of the tank – Yes or No				
12	Brine Check – Is Interstitial fluid visible on the inside of the tank – Yes or No				
13	Brine Check – Record Interstitial fluid level inside monitor				
14	Pre Installation Test – Has a Pre Installation Test been conducted – Yes or No (Note: The Pre Installation Test is highly recommended but is not a condition of Warranty)				

Fibreglass Tanks

15	Pre Installation Test – If a Pre Installation Test has been conducted by a 3 rd party, please nominate the name of the 3 rd party				
16	Pre Installation Test – If a Pre Installation Test been conducted, did the tank pass – Yes or No (Please forward a copy of Test Report to Tank Solutions				

	DURING INSTALLATION (See Sections 3 – 10)	Tank # 1	Tank # 2	Tank # 3	Tank # 4
17	Anchoring performed in accordance with Installation Instructions – Yes or No				
18	Backfill material bed is level and a minimum of 300mm deep, over native soil or slab before setting tank				
19	Record Internal Diameter Measurement #1 (before installation)				
20	Tank Spacing - Tanks are spaced correctly from each other and excavation walls as per the Installation Instructions – Yes or No				
21	Record final tank spacing between tanks				
22	Record final tank spacing between tanks and excavation walls				
23	Record Internal Diameter Measurement #2 (after straps are installed)				
24	Subtract diameter measurement #2 from #1 and record				
25	Deflection measurements are within acceptable limits (see Table 1 below) – Yes or No				
26	Voids under tank between ribs and domes filled with backfill and tamped – Yes or No				
27	Backfill placement meets requirements – Yes or No				
28	Record Internal Diameter Measurement #3 (after backfilling to top of tank is complete)				
29	Subtract diameter measurement #3 from #1 and record				
30	Deflection measurements are within acceptable limits (see Table 1 below) – Yes or No				
31	Tank was ballasted prior to bringing backfill to top of tank – Yes or No				

Fibreglass Tanks

	AFTER BACKFILLING IS BOUGHT TO TOP OF TANK (See Sections 9 – 17)	Tank # 1	Tank # 2	Tank # 3	Tank # 4
32	Tank was ballasted after to bringing backfill to top of tank – Yes or No				
33	Post Installation Test – Has a Post Installation Test been conducted – Yes or No (Note: The Post Installation Test must be completed in order to validate Tank Warranty)				
34	Post Installation Test – If a Post Installation Test been conducted, did the tank pass – Yes or No				
35	Post Installation Test – Please nominate the name of the 3 rd party who conducted the Tank Test. (Note: A copy of the Test Certificate must be sent to Tank Solutions in order to validate Warranty)				
36	Record final depth of backfill over the tank				
37	Record Internal Diameter Measurement #4 (after backfilling is bought to sub-grade)				
38	Subtract diameter measurement #4 from #1 and record				
39	Final Deflection measurement are within acceptable limits (see Table 1 below) – Yes or No				
40	Thickness of concrete surface slab				
41	Brine Check – Record Interstitial fluid level inside monitor				
42	Are PV-VR2 vents to be fitted to tank				
43	If PV-VR2 vents are fitted, please advise type and date of installation				

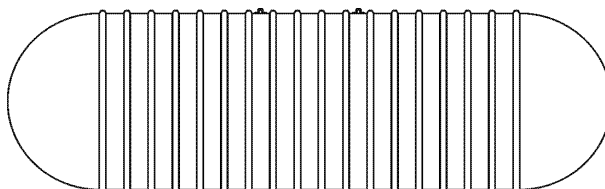
Fibreglass Tanks

Table 1 – Maximum Allowable Deflections

***Note: If Deflection is 75% of Maximum, notify Tank Solutions Technical Department immediately.**

Tank Diameter mm	Maximum Deflection mm	Nominal Inside Diameter mm		Deflection Measurement Process	Deflection Measurement Readings			
		SW	DW		Tank 1	Tank 2	Tank 3	Tank 4
1470	19	1500	1500	ID Reading 1				
2140	24	2026	2017	ID Reading 2				
2438	30	2316	2304	Deflection Check 1 Reading 1 - 2				
2600	30	2466	2452	ID Reading 3				
3275	38	3150	3134	Deflection Check 2 Reading 1 - 3				
3280	38	3150	3134	ID Reading 4				
				Deflection Check 3 Reading 1 - 4				

Deflection Measurements Verified by: _____



Mark Location of Deflection Readings

Measured at:

☐ End ☐ Centre

Tank Warranty

In order to validate Tank Warranty, please send the completed Installation Checklist along with the following documents back to Tank Solutions within 30 days of the Tank Installation:

- Backfill Sieve Analysis
- Post Backfill Third Party Test Report

Whilst not a condition of Warranty, for completeness of our records Tank Solutions would appreciate it if the following were also sent through if available:

- Pre-Installation Third Party Test Report
- Site Tank and Pump Layout
- Pictures of Installation

Single Wall & Double Wall

Backfill Guidelines

BACKFILL MATERIAL – CRUSHED STONE OR PEA GRAVEL

The backfill material surrounding a Fibreglass tank is a critical part of the installation. This data sheet provides guidelines for choosing the best material when installing Fibreglass tanks.

Tank Solutions Pty Ltd recommends that either crushed stone or pea gravel is used as a backfill material.

1. CRUSHED STONE should be washed and free flowing. Angular particle size should be between 10 mm and 14 mm.
2. PEA GRAVEL (rounded particles, river gravel deposits) must have a nominal diameter of 10 mm and a maximum diameter of 20 mm.

Australian Standards AS2758.1, AS1141.11, AS1141.12, AS1141.24 and AS1141.34 have been used to specify the aggregate required for backfill.

The standard sizes of coarse aggregate that meet Tank Solutions' crushed stone or pea gravel specifications are given in the table on the back page of this data sheet.

Suppliers should be able to provide a specification that identifies the size or gradation of the material. If a specification for the material is not available, an independent testing laboratory can provide a sieve analysis on a sample of the backfill material. The sieve analysis or material specification can then be compared against size requirements for the crushed stone or pea gravel.

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

If in doubt about backfill, contact Tank Solutions Pty Ltd.


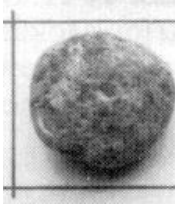


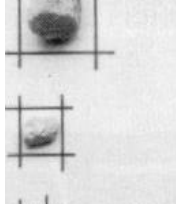
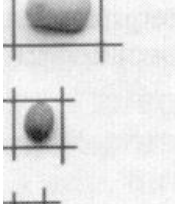
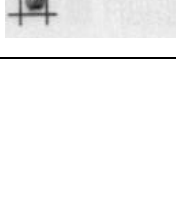
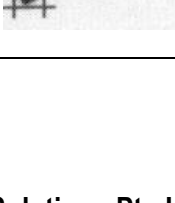


Single Wall & Double Wall

STANDARD SIZES OF COARSE AGGREGATE THAT MEET CRUSHED STONE OR PEA GRAVEL SPECIFICATIONS

The first column of each table identifies the standard sieve sizes that are used to grade aggregate material. The remaining two columns have a standard aggregate size range.

For each aggregate size, the amount of material finer than each laboratory sieve (square openings) is given as percentage of the total weight of the sample. These percentages give an indication of the particle size distribution within the given aggregate size.

For example: 20 mm pea gravel aggregate size, 20% to 55% of the sample (measured by weight) should pass through a 13.2 mm sieve.

Crushed Stone				Pea Gravel			
Sieve Size	Aggregate Size	Aggregate Size		Sieve Size	Aggregate Size	Aggregate Size	
		14mm	10mm			20mm	10mm
	19 mm	100 %	100 %		19 mm	90 to 100 %	100 %
	13.2 mm	90 to 100 %	100 %		13.2 mm	20 to 55 %	90 to 100 %
	9.5 mm	40 to 70 %	85 to 100 %		9.5 mm	0 to 15 %	40 to 70 %
	4.75 mm	0 to 15 %	10 to 30 %		4.75 mm	0 to 5 %	0 to 15 %
	2.36 mm	0 to 5 %	0 to 5 %		2.36 mm	-	0 to 5 %

Tank Solutions Pty Ltd

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Queensland: Unit 3, 40 Ingleston Road, Wakerly, Qld 4154. p 61 7 3390 4800 f 61 7 3390 4667

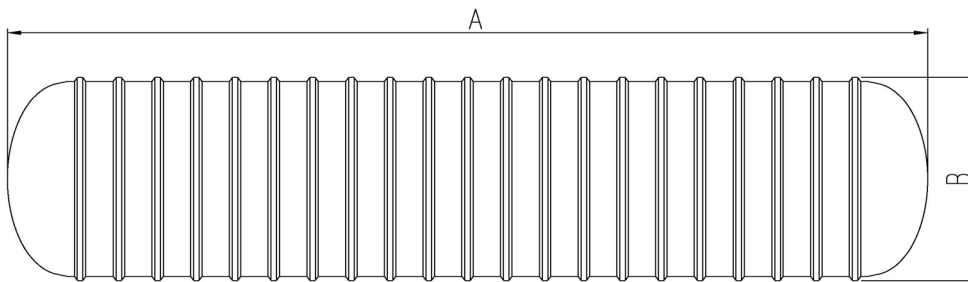
Victoria: Factory 23, 167 Princes Highway, Hallam, VIC 3803. p 61 3 9702 3044

Western Australia: (GRP Tank Solutions) 7 Kalmia Road, Bibra Lake, WA 6163. p 61 8 9434 1707 f 61 8 9434 2425

Fibreglass Double Wall Semi Ellipsoidal End

Technical Data Sheet

DIMENSIONS AND CAPACITIES



1500mm Diameter

Type	Nominal Capacity Litres	Double Wall Actual Capacity Litres	Length Overall 'A' mm	External Diameter 'B' mm	Double Wall Shipping Weight Kg	No. of Straps
DWIII T2	2,000	2,500	1,700	1500	300	2
DWIII T5	5,000	5,400	3,400	1500	500	2

2140mm Diameter

Type	Nominal Capacity Litres	Double Wall Actual Capacity Litres	Length Overall 'A' mm	External Diameter 'B' mm	Double Wall Shipping Weight Kg	No. of Straps
DWIII T10	10,000	10,200	3,570	2140	700	2
DWIII T15	15,000	15,600	5,270	2140	1,000	2
DWIII T20	20,000	21,000	6,970	2140	1,200	4
DWIII T25	25,000	25,100	8,245	2140	1,500	4
DWIII T30	30,000	30,500	9,945	2140	1,800	4
DWIII T35	35,000	36,000	11,645	2140	2,100	5

2600mm Diameter

Type	Nominal Capacity Litres	Double Wall Actual Capacity Litres	Length Overall 'A' mm	External Diameter 'B' mm	Double Wall Shipping Weight Kg	No. of Straps
DWIII T10	10,000	13,800	3,300	2600	900	2
DWIII T15	15,000	15,900	3,720	2600	1,000	2
DWIII T20	20,000	22,000	4,995	2600	1,300	2
DWIII T25	25,000	26,100	5,845	2600	1,400	2
DWIII T30	30,000	30,200	6,695	2600	1,600	4
DWIII T35	35,000	36,300	7,970	2600	1,900	4
DWIII T40	40,000	40,400	8,820	2600	2,100	4
DWIII T45	45,000	46,500	10,095	2600	2,400	4
DWIII T50	50,000	50,600	10,950	2600	2,600	4
DWIII T55	55,000	56,700	12,220	2600	2,900	6
DWIII T60	60,000	60,800	13,070	2600	3,100	6
DWIII T70	70,000	71,000	15,195	2600	3,600	7

3280mm Diameter

Type	Nominal Capacity Litres	Double Wall Actual Capacity Litres	Length Overall 'A' mm	External Diameter 'B' mm	Double Wall Shipping Weight Kg	No. of Straps
DWIII T60	60,000	59,900	8,320	3280	2,700	4
DWIII T70	70,000	69,800	9,590	3280	3,100	4
DWIII T80	80,000	79,600	10,870	3280	3,400	5
DWIII T90	90,000	89,500	12,140	3280	3,900	6
DWIII T100	100,000	99,300	13,400	3280	4,500	6
DWIII T110	110,000	109,200	14,700	3280	4,800	7

Weights, Capacities & Dimensions are nominal only

Custom manufactured tanks can be supplied upon request

Single Wall & Double Wall

Performance Warranty

Tank Solutions Pty Ltd warrants that our underground storage tanks, if used in accordance with our specifications and installed according to our published installation instructions:

1. Will not fail for a period of thirty (30) years from date of original delivered by Tank Solutions due to internal corrosion, provided the Tank is used solely, with or without tank water bottoms, to store the following products at ambient temperature, or fuel oils at temperature not to exceed 150°F:
 - a. Gasoline, jet fuel, aviation gasolines, motor oils, motor vehicle waste oils, kerosene, diesel fuels, or fuel oils
 - b. Alcohol, alcohol-gasoline blend, and oxygenated motor fuels
 1. Ethanol and ethanol blends
 - 100% ethanol
 - E10 (90% gasoline and 10% ethyl alcohol)
 - E85 (85% ethanol and 15% gasoline)
 2. Methanol and methanol blends
 - 100% methanol
 - M85 (85% methanol and 15% gasoline)
 3. Other oxygenated fuels
 - gasoline with up to 20%, by volume, of methyl tertiary butyl ether (MTBE), ethyl tertiary butyl ether (ETBE), di-isopropyl ether (DIPE), tertiary amyl methyl ether (TAME), or tertiary amyl ethyl ether (TAEF).
 - c. Blended fuel up to 20% by volume of refined Bio diesel as defined by:
 1. ASTM® D975-08a (diesel fuel oils)
 2. ASTM® D396-08b (fuel oils)
 3. ASTM® D7467-08 (diesel fuel oil and biodiesel blend B6-B20)
2. Will not fail for a period of thirty (30) years from date of original purchase due to internal corrosion, provided the tank is used solely for the storage of petrol products, jet fuel; av-gas; kerosene; diesel; motor oil; water and sewage at ambient underground temperatures.
3. Will not fail for a period of thirty (30) years from date of original purchase due to structural failure (defined as breaking or collapse) provided the installation is performed and validated by a qualified installation contractor and the tank is used as stated above
4. Will meet our published specifications and will be free from material defects in materials and workmanship for a period of one (1) year following date of original delivery by us

If any tank(s) is to be removed from an installation, moved to another location and is intended for active service at a new location, the tank(s) must be recertified by Tank Solutions in order to maintain the warranty as originally extended. The foregoing warranties do not extend to tank failures caused by earthquakes, hydrological or geological changes or other extraordinary natural forces which may act upon the Products.

If any tank is repaired, re-lined or altered without written authorisation from Tank Solutions, this warranty will be null and void.

Tank Solutions liability under this warranty shall be limited to, at Tank Solutions option:

1. Repair of the defective product
2. Delivery of a replacement product to the point of the original delivery, or
3. Refund of the original purchase price,

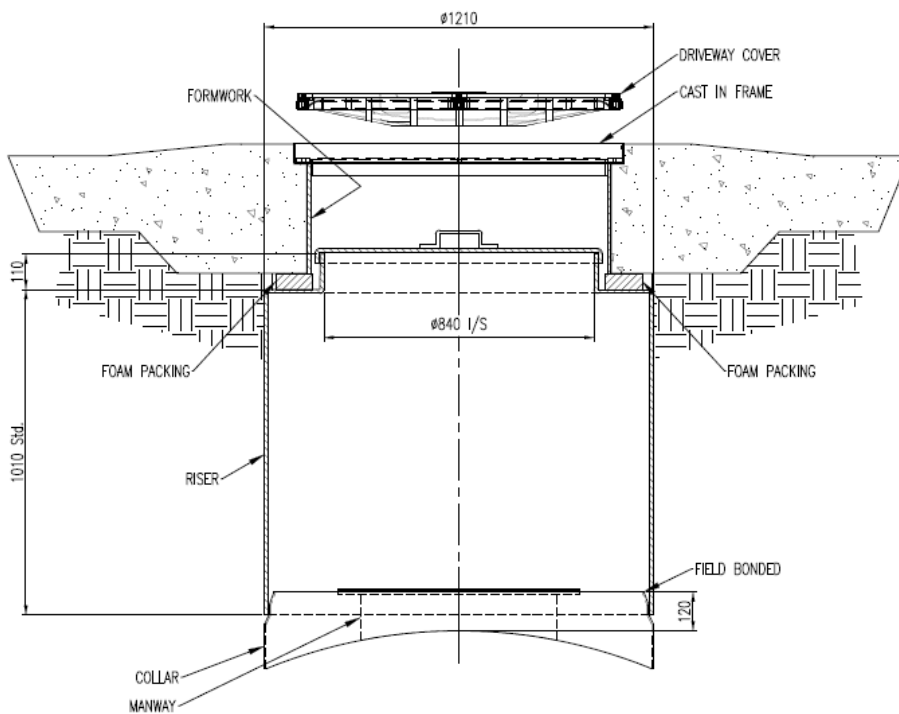
and we shall not be liable for any labour, other installation costs, indirect or consequential damages or other damages in connection with such tanks. A claim must give Tank Solutions the opportunity to observe and inspect the tank prior to removal from the ground or the claim will be barred. All claims must be made in writing within one year of tank failure or be forever barred.

The foregoing warranty constitutes Tank Solutions exclusive obligation and Tank Solutions makes no warranty or representation, express or implied, with respect to the product or any service, advice or consultation, if any, furnished to customer by Tank Solutions or its representatives, whether as to merchantability, fitness for a particular purpose, or otherwise the remedies set forth in the above warranties are the only remedies available to any person for breach of the warranty or for breach of any covenant, duty, or obligation on the part of Tank Solutions hereunder, Tank Solutions shall have no liability for incidental, consequential or punitive damages of any description, whether any such claim be based upon warranty, contract, negligence, strict liability or other tort, or otherwise.

This Warranty Is Only Valid If The Installation Checklist Is Returned to Tank Solutions Within 30 Days Of The Initial Installation Of The Tank.

FRP Riser Installation

Purpose: Instructions for the on-site installation for the FRP Riser to the underground tank.



Items supplied with tank: -

1. FRP Riser
2. FRP Lid to suit 1. Above
3. 4 x quadrants of foam
4. Adhesive Kit

Method:

1. Calculate height of riser to suit burial dimensions, ensuring that all of the proposed pipe/boot penetrations are clear of the field joint. Cut riser to length.
2. Position riser over FRP collar on the tank and tap gently into place ensuring a mechanical lock of the joint. Ensure that the riser is level and that there is an equal spacing around the circumference of the internal joint.

FRP Riser Installation

3. Seal the outside circumferential joint with duct tape to prevent loss of adhesive.
4. Prepare the adhesive as per the package instructions and apply to the internal circumferential joint. Allow curing time as per package instructions.

Testing:

1. After joint has cured, ensure that the manway fittings are sealed and proceed to fill containment sump (Riser) with water.
2. Allow test to continue for one hour and observe joint for leaks.

Conclusion:

The riser is now ready for piping installation. On completion of pipework and before back filling to grade, repeat Testing 1 and 2 above. The containment sump (Riser) should be water tight to eliminate ingress of ground water and the egress of any pipe leaks to the environment.

Note:

1. In trafficable areas, you **MUST** ensure that the foam quadrants are installed to prevent weight transfer to the riser/tank.
2. Install the driveway cover as per OEM instructions.