

Installation Instructions for ZCL Filament Wound Fiberglass Underground Vessels

Double Wall Filament Wound Fiberglass Underground Process Vessels for Oilfield Service
(50 barrel and 99 barrel vessels)

These instructions apply to ZCL's Double Wall Filament Wound Heavy Wall Underground Vessels only. They are intended to provide a summary and quick check of the critical procedures and requirements to ensure a trouble free installation. *If you are installing underground tanks with ribs, use ZCL's "Quick Guide for Installation of Oilfield Service Tanks" or the "ZCL Installation Manual" for ULC – S615 tanks.*

Important: To validate ZCL's Warranty, the vessel owner or his representative must complete and return the installation checklist and inspection report provided with the installation instructions for ZCL Filament Wound Fiberglass Underground Vessels.

- 1) Shipping & Handling
 - Use lift lugs provided. Do not use chain or cables around the vessel.
 - Use shipping saddles for transportation & storage.
 - Do not drop or roll vessels.
- 2) Site Selection
 - Site for vessel should be in well-drained undisturbed soil. Avoid unstable soil conditions and wet areas with high water table.
 - Provide access all around vessel excavation to allow even backfilling.
- 3) Leak Testing
 - ZCL Filament Wound Fiberglass Underground Vessels are shipped with a vacuum applied to the interstitial space.
 - Observe the compound pressure gauge attached to the monitor fitting.
 - A leak is indicated when the gauge registers 15" Hg vacuum or less. *Contact ZCL if a leak is suspected.*
- 4) Acceptable Backfill
 - Crushed road gravel, or selected native backfill including sand, granular soil, and pit run gravel (2" minus) are acceptable as backfill. Frozen materials may be used if they are pulverized sufficiently (2" minus). Pea gravel and crushed stone are also acceptable materials.
 - Use acceptable backfill material from the base of the excavation to a level 45 cm above the vessel shell, including around the perimeter of the excavation.
 - Materials retained on a 2" mesh, materials contaminated with ice, snow, or organic debris are not acceptable backfill materials.
- 5) Hole Size
 - Stable Walls – Excavate the hole to required depth allowing 60cm minimum clearance around the sides and ends of the vessel.
 - Unstable Soil Conditions – Slope the excavation walls as required for safety.

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- 6) Burial Depth
- ❑ The minimum depth of backfill above the vessel is 0.9m. The maximum depth of backfill above the vessel is 2.5m. Factors that may decide the burial depth are frost level, pipeline grades, water table, and anchoring system.
- 7) Anchoring
- ❑ If water accumulation in the hole is anticipated from ground water or surface runoff, use ZCL's pre-cast anchor system. When ZCL's anchors are used, allow for 40 cm of backfill below the vessel bottom at each end. Set the pre-cast anchors on the base of the excavation. Then carefully level and space the anchors with the center to center distance to match the outside diameter of the vessel (185 cm for 50 bbl. vessels and 250 cm for 100 bbl. vessels).
- 8) Installation (dry)
- ❑ Level the base of the excavation and remove any loose soil, snow, ice or debris. Place acceptable backfill in the bottom of the hole to a compacted depth of 30 cm (40 cm if dead-men anchors are being used).
 - ❑ Set the vessel onto the bed and when applicable align the hold-down strap locations with the dead-men. Use the anchor straps and turnbuckles provided. Hand-tighten the turnbuckles to provide a snug fit – *do not over-tighten!*
 - ❑ Place the first 30-cm lift of acceptable backfill evenly around the vessel. To avoid settlement of the backfill, it is recommended that a suitable probe, such as a 1"x4" board be used to push backfill under the haunches of the vessel
 - ❑ Place additional 30-cm lifts of acceptable backfill and evenly distribute around the perimeter of the vessel. To avoid settlement of the backfill, it is recommended that each lift be compacted
 - ❑ When backfilling has progressed to the midline of the vessel, measure and record the first deflection reading. This is the vertical distance from the face of the pump-out flange to the bottom inside of the vessel.
 - ❑ Continue placing and compacting 30 cm lifts of backfill to the top of the vessel, then measure and record the second deflection reading in the same manner as before. The two measurements should agree within one centimeter of each other.
 - ❑ At this point, all piping connections and riser attachments should be made while the flanges of the vessel are still accessible. Attach the Leak Indicator Vacuum Assembly to any convenient riser and tie wrap the tubing to the riser pipe. Backfilling and compaction with acceptable backfill material may then continue to grade.

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- 9) Installation (wet)
- If soft conditions exist at the bottom of the excavation, increase the depth of the bed to 45 cm using acceptable backfill materials and set the anchors 5 cm above the bottom of the excavation.
 - Using pumps, maintain the water level below the bottom of the vessel and proceed with the installation as per the dry method above. If the water level cannot be maintained below the bottom of the vessel, ballast the vessel with sufficient water to allow it to settle onto the bed, then continue with the installation as per the dry method above.
- 10) Piping Connections
- Commence piping connections and installation of risers when backfilling has been completed to the top of the vessel.
 - All horizontal pipe runs that connect to the vessel must be self-supporting. Flexible connectors must be used to absorb differential settlement.
 - All connections to fiberglass flanges must use elastomer gaskets with hardness not exceeding 65 Durometer (Shore A). Torque all studs to 25 ft-lbs. ZCL recommends the use of flat face steel flanges when making connections to fiberglass flanges. Raised face steel flanges may be mated with a fiberglass flange, only if a 1/16" thick elastomer support ring is used between the raised face flange and the elastomer gasket.
 - A threaded grounding stud is provided on the pump-out nozzle, for draining off static charges from inside the vessel. This grounding stud must be connected to a suitable grounding rod.
 - Measure and record the length of the pump-out riser for future deflection measurements.
- 11) Pressure Relief
- Install the pressure relief device. A pressure relief valve set at 103 kPa or less must be in place at all times when the vessel is in service.

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