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Underground Installation Instructions
Anchor Kit Assembly
Table of Contents

1.0 Introduction .................................................................................................................. 3
2.0 General.......................................................................................................................... 3
3.0 Handling......................................................................................................................... 3

3.1 Tank Inspection ............................................................................................................. 3
3.2 Unloading of Tanks ....................................................................................................... 4
3.3 Storing Tanks ................................................................................................................ 5

4.0 Bed and Backfill Material ............................................................................................ 6

5.0 Excavation Parameters ................................................................................................. 7

5.1 Tank Spacing ............................................................................................................... 7
5.1.1 Unanchored Tanks .................................................................................................. 7
5.1.2 Anchored Tanks ..................................................................................................... 7
5.2 Tank Location – Nearby Structures ............................................................................. 8

6.0 Geotextile Fabric ......................................................................................................... 8

6.1 Geotextile Fabrics Required ....................................................................................... 8
6.2 Geotextile Fabric Installations .................................................................................... 8

7.0 Placing Tank in Hole ................................................................................................... 9

8.0 Cover ............................................................................................................................ 9

8.1 Minimum Cover – No Traffic ..................................................................................... 9
8.2 Minimum Cover – Traffic Loads (Light) ..................................................................... 9

9.0 Installation Dry Hole .................................................................................................... 10

9.1 Backfill Bed .................................................................................................................. 10
9.2 Side/ End of Tank ......................................................................................................... 10
9.3 Top of Tank .................................................................................................................. 11

10.0 Installation - Wet ........................................................................................................ 11

10.1 Ballasting ................................................................................................................... 12
10.2 Backfill Placement ...................................................................................................... 12

11.0 Installation – Freezing Weather .................................................................................. 13

12.0 Anchoring ................................................................................................................... 13

12.1 General ....................................................................................................................... 13
12.2 Use of Deadman ......................................................................................................... 13
12.3 Use of Anchor Pads .................................................................................................... 14
12.4 Hold Down Straps ....................................................................................................... 14
12.5 Tie Down Kit Contents............................................................................................... 15
1.0 INTRODUCTION

- It is the responsibility of the owner, installer, and the operator to follow all requirements contained in this Installation Manual. In addition, they must comply with all Local, Provincial/State and Federal safety regulations that may apply to tank installations and operations.
- Instructions or procedures in the Installation Manual should not be interpreted to place any person’s health or safety at risk. **Working in and around excavations can be dangerous!**
  - If you do not have the proper experience, contact a licensed contractor.
  - Proper installation is required to assure the longevity of GFI Storage Tanks. These instructions **must** be followed.

2.0 GENERAL

- Follow the directions provided by this manual for safe and proper installation of fiberglass underground tanks. **Failure to follow these instructions will VOID the tank warranty and may cause tank failure.**
- It is necessary to retain all correspondence regarding variations to installation requirements for a valid warranty claim. **Photographs are required.**
- Your tank warranty registration form must be completed and returned to GFI Composites Ltd. Within ten (10) days of date of installation. Return a copy of the completed form for your records. (See Appendix)
- All returns must have an RMA (Return Material Authorization) provided from GFI Composites Ltd. Returned goods must be shipped and prepaid and will be subjected to a 20 percent restocking fee. Special made-to-order fiberglass products and/or components are non-refundable.
- GFI Composites Ltd. Does not design or engineer the actual installation. It is the owner’s responsibility to hire a licensed Professional Engineer and that Engineer may provide specifications that exceed these minimum requirements and is responsible for the final installation design.

3.0 HANDLING

3.1 Tank Inspection

- Prior to unloading the tank, visually inspect the tanks entire exterior surface to ensure that shipping or handling damage has not occurred. Then sign the shipping document to accept the tank as delivered. **DO NOT ATTEMPT REPAIRS**, for any damaged areas, contact your Factory Sales Representative immediately.
3.2 Unloading of Tanks

- **Warning:** Do not release the ratchet straps securing the tank to the truck or flatbed trailer until the lifting equipment is secured to the tank’s lifting lug(s). **FAILURE TO DO SO COULD RESULT IN DEATH OR SERIOUS INJURY.**

- Tank **must** be lifted by using the lifting lugs only. Use a spreader bar for lifting a tank that has two or more lifting lugs. Use a lifting cable instead of a spreader bar if the angle between the cable and the tank top exceeds 60 degrees (from horizontal).

- **Do Not** drop, impact, roll the tank or cause sudden stops while lifting the tank. Handle the tank with care.

- Some tanks may be rotated on the truck for shipping purposes. They may have extra lifting lug(s) to aid in the loading and unloading. When the tank is rotated and has extra lifting lugs, use all the lifting lugs that are located on the top of the tank in its rotated position to unload the tank.

- Install the tank using all lifting lugs that are located on top of the tank in its upright position.
- Be sure to use equipment that is load related to handle the weight of the tank

3.3 Storing Tank
- Select a solid, level area to place the tank. Make sure the area is clear of rocks and debris.
- Securely anchor the tank at each end with rope to prevent it from moving in high wind.

![Diagram of tank with labels for sandbags, tires, and tie downs.](image)
4.0 BED AND BACKFILL MATERIAL

The object of backfill is to construct a uniform, homogenous envelope of firm, aggregate material around the tank.

Approved Backfill Material

- **Pea Gravel**: A natural, rounded, aggregate, clean and free flowing with particle size not less than 1/8 inch or more than ¾ inch diameter. Backfill should be well graded (Uniform distribution in size of material).
- **Stone or Gravel Crushings**: Stone or gravel crushing, clean and free flowing with angular particle size not less than 1/8 inch or more than ½ inch diameter.
  
  **NOTE**: Using other than approved bedding and backfill materials without prior written authorization from GFI Composites Ltd. Will void the tank warranty.
- Use only specified backfill material throughout. The backfill material must not contain any foreign materials, such as but not limited to rocks, brick, clay, wood, native soil, ice or other foreign debris.
- Sharp objects must not contact the tank at any time. Remove any supports used for the installation of piping prior to backfilling to grade.
- If the tank must be filled with fluid while placing the backfill, the fluid level inside the tank must not exceed the level of the surrounding backfill material by more than 24 inches.

**The use of approved backfill material is critical to long term tank performance.**

- Do not mix approved backfill with sand or native soil.
- Do not backfill tank with sand or native soil
- Require yours backfill supplier to certify, with a sieve analysis, that the backfill meets this specification.
• Sieve analysis must be attached to the tank installation checklist.
• Keep backfill dry and free of ice in freezing conditions.

Use only approved pea gravel or crushed stone

5.0 EXCAVATION PARAMETERS
• Slope home sides as required by OH&S/ OSHA & other local, provincial, state and federal regulations.
• FRP Tanks shall be installed between 2’ and 7’ of cover depth including pavement or concrete slab thickness. Contact GFI Composites Ltd. For a cover depth exceeding 7’.

5.1 Tank Spacing

Stable Soil Condition
Holes must be large enough to allow for the minimum required distance between tank at ribs, and the minimum required distance from the ends and side of the tank to the walls as specific in Provincial/ State requirements. Under no circumstances should the distance between the tank and the hole walls be less than 18 inches.

5.1.1 Unanchored Tanks
Minimum clearance between tanks and tank hole side is 18”.

5.1.2 Anchored Tanks
Minimum clearance between anchored tanks is 24” or two times the width of one concrete Deadman and the greater of 18” or Deadman width or tank hole clearance.
5.2 Tank Location – Nearby Structures

- The tank owner is responsible for determining the proper location of a tank elevation. GFI Composites Ltd. Recommends contacting a local foundation professional engineer for technical guidance and recommendations for tanks located close to buildings or other structures.
- When selecting a tank site, care must be taken to avoid undermining the foundations of new or existing structures.
- Contact a qualified structural engineer if tanks must be located close to buildings or other structures than could transmit soil stress to a buried GFI tank.

6.0 GEOTEXTILE FABRIC

Geotextile fabric allows the passage of water but helps prevent the migration of approved backfill into the native soil and vice versa. Migration may compromise the backfill support of the tank. Do not use plastic sheeting, or any other material that may tear or degrade over time, as a replacement for geotextile fabric. A geotextile fabric must permit the follow of water while maintaining segregation of the backfill from native soil.

6.1 Geotextile Fabrics are Required for any of the Following Installations

- Areas subjected to frequently changing ground water levels.
- Water conditions with silty soil
- Muck, bog, peat, swamp, landfill type areas or any other situations where the soil is inherently unstable.

6.2 Geotextile Fabric Installation

- Line the side and bottom of the excavation with geotextile fabric.
- Overlap adjoining geotextile panels a minimum 12”.
- Place backfill on top of the geotextile fabric to hold it in place.
- In wet hole conditions, backfill on tip of the geotextile fabric is necessary to sink and hold it in place.
7.0 PLACING TANK IN HOLE

- Carefully lower end of tank into the excavation by using lifting straps and/ or a spreader bar as required.
- DO NOT use chains or wire slings around the tank.
- Use guy ropes to guide the tank to prevent tank from rotating.
- DO NOT roll the tank to move it.
- Always take extra care when handling a tank with a bottom fitting or sump to prevent damage to the fitting.

8.0 COVER

8.1 Minimum Cover – No Traffic

- Two (2) feet of approved backfill materials is the minimum cover required if there will be no vehicle load over the tank at any time and if the tank is properly anchored.

8.2 Minimum Cover – Traffic Loads (Light)

- Three (3) feet of backfill material on top of the tank with reinforced concrete surface pad at least eight (8) inches thick. No traffic loads permitted without concrete traffic pad.
- The concrete pad must extend horizontally at least one (1) foot beyond the tank in all directions. Asphalt pavement is not a substitute for concrete pads.
- Concrete pas should be designed by a qualified and licensed structural engineer.
9.0 INSTALLATION – DRY HOLE

- Excavate the site to allow for two (2) feet of clearance around the outside of the tank.
  - **NOTE:** A seven (7) feet burial tank must not have any more than (7) feet of specified backfill material measuring from the top of the tank to ground level.

9.1 Backfill Bed

- Ensure hole is deep enough to provide a 12-inch minimum backfill of approved backfill material over the hole bottom or concrete slab.
- **DO NOT** place the tank(s) directly on concrete slab
- **DO NOT** use timber, beams, or cradles to support tank(s)
  - **Warning:** Use only specified backfill material for bedding.

9.2 Side/ End of Tank

- After placing the first 12” lift of approved backfill, use a long probe from the edge of the hole to push the backfill in place. (A 4x4 post works well) Ensure that all voids between ribs and under the tank are completely filled to ensure the tank is fully supported.
- Take extra care when probing the backfill not to strike tank since tank damage may result.
- Continue backfilling the tank with same backfill material. Backfill in uniform layers no greater than 12 inches thick.
- The quality of backfill material around the tank between the 4 and 8 o’clock positions (see illustration below) is critical to ensure quality tank performance.
- Rounded smooth pea gravel is free flowing and will normally flow easily around the tank haunches. Crushed stone often requires some manual placement and effort to ensure that the haunches are uniformly supported.
9.3 Top of Tank
- Continue backfilling with the same backfill material above the top of the tank in maximum lifts of 12 inches to finished grade or to level of bottom of concrete traffic slab.
- **DO NOT** permit vehicle traffic or other types of heavy loads on the tank; this will void the warranty!

10.0 INSTALLATION – WET

**Hole Water Level Pumping, Bed**
Install well point or pump out wells
- Excavate the corners of excavation. Pump until water is bellow tank bottom.
• Install a 12-inch bed of specified backfill material and position the tank on the bed.
• If extremely difficult water conditions at the site are expected, such as underground streams, surface run-off locations, shorelines or wide fluctuations in water level, increase the bed thickness to 10-inches and clearances between the tank and hole walls to a minimum of 24-inches.

10.1 Ballasting

• If the ground water level is expected to exceed the tank bottom level at any stage during the placement of the backfill, ballasting is required until the tank is anchored and completely backfilled to grade.
• The tank must not float or move after starting the backfill placement.

![Diagram of ballasting process]

• Maintain water ballasting level in the tank to a maximum of 24-inches above the water level in the hole.
• A lifting cable may be used to guide tank as it sinks. **DO NOT** permit the guide cable to become too tight to prevent overloading of the lifting lugs.

10.2 Backfill Placement

• Ensure that the minimum required clearances are maintained before starting backfill placement. See Section 4.
• Proceed with the backfill placement as per the Dry Hole Installation in Section 9 using specified backfill material.
• To prevent the tank from flowing during spring thaw or high-water table condition, leave the tank approximately 1/3 full during the winter months. This weight will keep the tank
in place. Freezing of sewage of water when the tank is 1/3 full will not affect the tank as ice will have room to expand beyond the 1/3 level. **DO NOT** permit liquid to freeze beyond the 1/3 full level.

### 11.0 INSTALLATION – FREEZING WEATHER

- Ensure that aggregate is free flowing without the use of calcium chloride
- **DO NOT** use frozen flumps of backfill material (*Caution: Steaming may cause subsequent refreezing of fill material*)
- Ensure that the bottom and sides are free of snow and/ or ice.

### 12.0 ANCHORING

The decision whether or not to anchor the tank and the selection of the anchoring method is the sole responsibility of the owner.

#### 12.1 General

- Minimum depth of cover (with anchors) is 2 feet. Minimum depth of cover (without anchors) is 5.5 feet, including an 8” structural concrete slab, or 6’ 2” Without slab.
- In high groundwater conditions use minimum cover of 4’ with anchors.

#### 12.2 Use of Deadman

- Deadman are typically reinforced concrete beams. Deadman sections must contain at least two anchor points.
- Lay the Deadman in the excavated hole parallel to the tank outside of the tank “shadow”.
- Bottom of the Deadman shall sit on floor of excavated hole.
- Ensure that the Deadman are outside of the tank “shadow”
12.3 Use of Anchor Pad

- An anchor slab is typically a reinforced concrete base.
- Anchor pads shall be designed by a licensed structural engineer.
- The total length of the slab must extend at least 12-inches beyond the tank in all directions.
- The thickness of the reinforced slab should be a minimum of eight (8) inches.
- Provide a separate anchor point for each hold down strap.
- Allow for sufficient depth in the excavation for 12 inches of approved bedding material between the base of the tank and the other slab.

![Anchor Pad Diagram]

12.4 Hold Down Straps

- Only a GFI Composites Ltd. Tie down kit may be used when anchoring a GFI tank.
- Place the fiberglass reinforced plastic (FRP) straps at the top of the structural ribs only at the designated ribs. If FRP straps are ordered at time of tank order, there are anchor guides on the designated anchor ribs. These guides assist in properly placing the straps over the ribs.

![Hold Down Straps Diagram]

- Place hook end of FRP strap onto anchor point of Deadman/Concrete pad.
• Place the turnbuckle between the D-ring end of the FRP strap and the anchor point of the concrete Deadman/ pad.
• Hand tighten the turnbuckle to a snug position and then tool tighten using the same number of turns on each turnbuckle to maintain a consistent tension on each FRP strap.
• Evenly distribute loads by tightening all hold-down straps uniformly until they are snug without causing deflections in the tank.
• **DO NOT** overtighten to preclude excessive tank deflection.
• Included in the tie-down kit are two (2) ½” diameter by 10’ long cables. If this is required:
  o Using the steel cable, loop through the turnbuckle and around the Deadman or concrete pads, steel tie-down rods.
  o Use six (6) cable clamps and clamp the cable together.
  o The saddle of the clamp must go over the live portion of the cable (as shown in figure 11-3)
  o **DO NOT** permit steel cables to contact the tank shell wall.

12.5 Tie down kit content – 8’ Diameter
  o 1- Fiberglass Reinforced Plastic (FRP) Strap (3/16” thick x 2” wide x 181” L)
  o 2- Galvanized Aircraft Cables (1/2” Diameter x 10 feet long)
  o 12 Galvanized ½ “Cable Clamps
  o Galvanized Turnbuckles 3/4” x 9” (5200 pounds working strength)