

**1. INTRODUCTION**

- 1.1. This brochure on inspection, handling and installation recommendations is essential to maintaining maximum corrosion resistance and long-term tank life with minimal maintenance.
- 1.2. This information is a guideline and by no means relieves the purchaser of the full responsibility for proper inspection, safe handling and installation of the tank. Situations or conditions that may arise not covered in the brochure are the responsibility of the purchaser. The purchaser also accepts all liabilities for loss or damage to the tank or contents resulting from improper handling or installation.
- 1.3. Unloading of the tank will be the responsibility of the purchaser. Even if a Containment Solutions employee or representative is present at time of unloading and/or installation, this does not relieve the purchaser of any of his responsibility for proper handling and installation of the tank.

**1.4. Safety**

- 1.4.1. These instruction should not be interpreted in any way to put one's health at risk, or to harm property and/or the environment.
- 1.4.2. The following definitions will serve as a guide when reading this supplement:

**⚠WARNING**

Indicates a potentially hazardous situation, which if not avoided could result in death or serious injury.

**⚠CAUTION**

Indicates a potentially hazardous situation, which if not avoided may result in minor or moderate injury.

**CAUTION**

Indicates a potentially hazardous situation, which if not avoided may result in property damage.

**1.5. Prior to Shipping**

- 1.5.1. Containment Solutions thoroughly inspects all tanks before and after loading at our plant. When shipping via common carrier, the tank is packaged in accordance with carrier's rules and regulations.
- 1.5.2. Large tanks are shipped on Containment Solutions custom-designed fiberglass trailers with padded saddles. No skids or shipping cradles are needed due to the design of the trailer.
- 1.5.3. Should the purchaser desire, wood cradles and skids are available for an up charge.
- 1.5.4. The customer is responsible to provide clear access between public entrance road and tank site. Access clearance in width and height is defined by the load size plus maneuvering room for turns and truck trailer positioning. Large tanks may require the customer to coordinate utility company disconnect of overhead transmission lines and/or fence removal. Delayed delivery due to non-access may result in additional charges and rescheduled delivery.

**1.6. Inspection**

- 1.6.1. It is important that the tank be inspected by a responsible person or inspector prior to unloading. FRP tanks are susceptible to both internal and external damage as a result of excessive physical shock occasionally encountered in transit. A thorough inspection upon receipt will preclude any later question about the tank condition at time of delivery.

- 1.6.1.1. Areas where banding and support cradles come in contact with the tank should be checked both externally and internally.
- 1.6.1.2. The extreme top, bottom and sidewalls of the tanks should be checked.
- 1.6.1.3. Any external scratches or damaged areas should be inspected internally.
- 1.6.1.4. Areas where chipping cradles and side or end blocking make contact with the tank should be checked for signs that it has shifted or rotated in shipment resulting in crazing or cracks at the contact points.
- 1.6.2. If damage has occurred, specifically note all damage on the carrier's Bill of Lading. To determine repair procedure, notify Containment Solutions immediately. If damage has occurred, it must be repaired by Containment Solutions prior to the tank being put into service. Repairs by others relieves Containment Solutions from any future liability associated with the damage and the purchaser accepts all future liability resulting from any such damage or repairs.

**2. HANDLING & STORAGE**

**⚠WARNING**

Do not stand on or under tank while tank is being lifted. This could result in personal injury or death.

**⚠WARNING**

Do not enter tank unless following OSHA guidelines for confined space entry. Failure to follow OSHA guidelines could result in death or serious injury.



ASPHYXIATION



FIRE



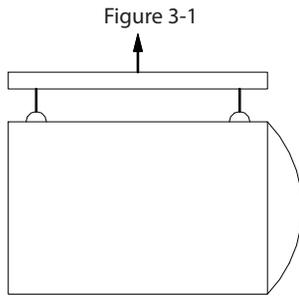
EXPLOSION

- 2.1. The following precautions should be followed to prevent damage to FRP tanks.
  - 2.1.1. Proper rigging procedures must be observed at all times. Tanks should not be allowed to swing out of control. Use guidelines to control swinging.
  - 2.1.2. Nozzles and other attachments are not intended for lifting or moving the tank. Use lifting lugs. If lifting lugs are not provided, use woven fabric slings.
  - 2.1.3. Never slide or roll the tank on its side - always lift.
  - 2.1.4. Do not allow the tank to drop or fall or impact other objects.
  - 2.1.5. Do not allow hooks, spreader bars, cables or chains to contact the tank.
  - 2.1.6. Under no conditions should cables or chains be put around the tank.
  - 2.1.7. When working around tanks, care must be taken to prevent tools from striking or being dropped inside the tank.
  - 2.1.8. Soft-soled shoes must be worn by workers when entering a tank.
  - 2.1.9. Any ladder used inside or outside the tank must have rubber protection where it touches the tank. Do not permit ladder to scratch tank surface.

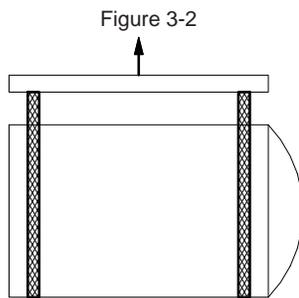
2.1.10. When storing a tank prior to installation, place on padded shipping cradles (if provided) or on firm level surface, which is free of stones and other small hard objects. When stored outdoors, tanks should be secured to prevent movement due to wind or other acts of nature.

### 3. UNLOADING RECOMMENDATIONS

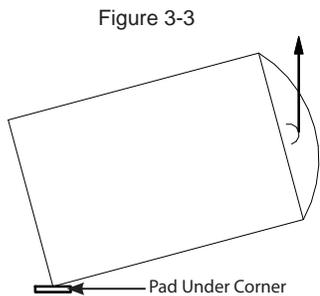
3.1. When unloading tanks from flat bed trailer or one of our custom-designed trailers, use a spreader bar attached to the appropriate lifting lugs, as shown in Figure 3-1.



3.2. When lifting lugs are not provided, equipment should be lifted with straps or nylon slings. If available, a spreader bar may be used as shown in Figure 3-2.

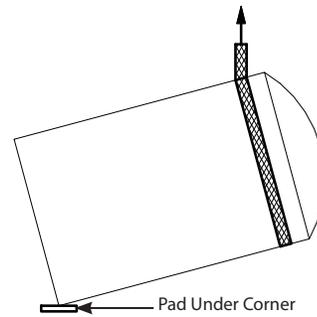


- 3.3. Guidelines must be attached to the tank so that workers can prevent it from swinging out of control and to insure that the tank is guided gently into position.
- 3.4. When up righting large tanks, place a suitable protective padding under the bottom pivot point. Care must be taken to prevent the tank from swinging out of control and to insure it is guided gently into position. Use top lifting lugs, as shown in Figure 3-3.



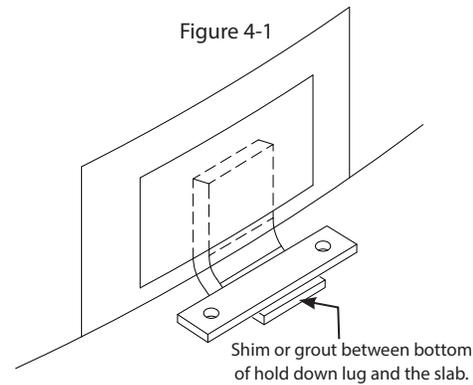
3.5. As an alternate, when lifting lugs are not provided, a non-slip sling can be used as shown in Figure 3-4.

Figure 3-4



### 4. STANDARD HOLD DOWN LUGS

4.1. Due to the difficulty in maintaining exact locations of anchor bolts, foundation holes must be drilled after the tank is set. If anchor studs must be set when foundation is poured, use two studs 7" apart on each side of the anchor lug. Then place a hold down plate across the top of the hold down lug as illustrated in Figure 4-1.



- 4.2. Shims or grouting is required under hold down lugs. Do not shim excessively. The tank load must be carried by the tank bottom, not the lugs. Do not grout, shim or tighten anchor bolts until the tank is filled.
- 4.3. Engineered hold down lugs are available for seismic ratings and wind load requirements as specified.

### 5. DISH BOTTOM & CONE BOTTOM TANKS

- 5.1. Install dished bottom and cone bottom tanks so that their weight is supported uniformly by all provided legs or mounting lugs. Use shims or grouting as necessary.
- 5.2. Skirted tanks shall be set onto a ring of grout, which will fill any irregularities between the skirt and the base structure.

### 6. CLEANING

6.1. Tanks should be thoroughly cleaned prior to putting into service. For intended food or similar service, it is the purchaser's responsibility to suitably sterilize and sanitize the tank.

### 7. FREEZING

7.1. Tank contents should never be allowed to freeze.

### 8. INTENDED CONTENT

8.1. This tank has been built for a particular fluid storage application and environment. With this in mind, please consult Containment Solutions prior to changing the application and/or environment.

## 9. AIR LOADING

### CAUTION

When air pressure is used to unload from another vessel into fiberglass tanks, extreme caution must be taken to adequately vent the tank to avoid tank damage.

- 9.1. Tanks must have a top manway or thief hatch that is open during pressure unloading. This type of filling creates a considerably greater venting requirement than normal venting when the unloading vessel is emptied.

## 10. VACUUM PRESSURE

### WARNING

Do not pressurize or vacuum tank. This could result in property damage or personal injury.

- 10.1. Unless specifically noted, tanks are designed for atmospheric service only. No vacuum or pressure should be applied to a tank.
- 10.2. When tanks are designed for vacuum / pressure applications, refer to name plate for allowed operating conditions.

## 11. VENTING / OVERFILLING

### CAUTION

Tanks must have adequate venting. Do not restrict or modify vent system. Inadequate venting may result in excessive pressure and/or vacuum conditions, which will cause structural damage and/or failure to the tank.

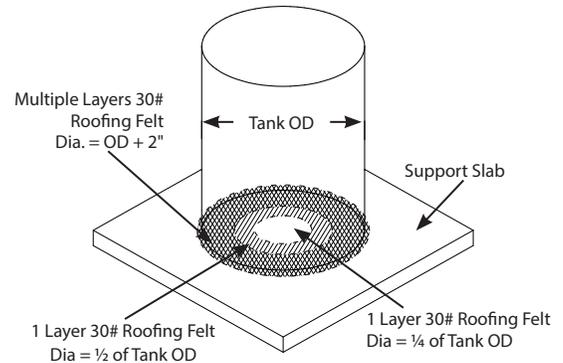
### CAUTION

Structural damage and/or tank failure may occur if tanks are filled above the tank's straight sidewall height.

## 12. CONCRETE PAD INSTALLATION OF FLAT & SLOPED BOTTOM TANKS

- 12.1. The support base for flat-bottomed vertical tanks should provide full and uniform support over the entire bottom area. The support base should be properly designed to prevent settling or deflection under maximum design loads.
- 12.2. The support base surface should be nonporous and free of cracks, depressions and vertical projections. Reinforced concrete, trowel finished to American Concrete Institute Specifications (ACI301-72, Section 11.7.3, "Trowel Finish") is often used as a support base.
- 12.3. Vertical tanks having a cone or dished bottom will have an alternate type of mounting arrangement such as FRP skirt or FRP or steel legs. These must be considered as special cases and each will have its own load distribution which requires a custom support design for each individual installation.
- 12.4. Each flat bottom unit should be set on a cushioning pad to minimize stresses caused by seams, shrinkage distortion, and/or support base irregularities. Where irregularities are less than  $\frac{1}{2}$ " (12.7mm) from flat, several layers of 30 lb. roofing felt equal in diameter to the outside diameter of the tank plus 2" (O.D. + 2"), should be laid directly on the surface of the support base. The center of the pad should also be built up with the addition of two layers of the same material with one equal in diameter to  $\frac{1}{2}$  the tank diameter and the other equal in diameter to  $\frac{1}{4}$  the tank diameter. See Figure 12-1

Figure 12-1



- 12.5. A suitable elastomeric sheet material of proper environmental resistance may be substituted for the roofing felt.
- 12.6. Where irregularities in the surface of the support base are greater than  $\frac{1}{2}$ " (12.7mm) from flat, an asphalt type of paving mastic can be troweled into these areas and pressed or tamped to provide a reasonably hard, flat and level surface. Time should be allowed for the mastic to harden (4 hours minimum) before any roofing felt is applied.
- 12.7. When a vessel has a full bottom drain, provision should be made in the base pad with clearance so that contact will not occur between the pad and the nozzle or nozzle flange.
- 12.8. Where a trench in the base pad is required to accommodate bottom discharge piping, a structural trench cover should be installed flush with the top of the base pad to minimize the unsupported area of the equipment bottom.
- 12.9. All flat bottom tanks should be secured in place by bolting to the base pad through hold down lugs. This precaution will minimize the chance of tank damage at nozzle locations and areas of other attachments due to movement of the unit. Do not grout, shim or tighten hold down lugs until tank is filled.
- 12.10. All vessel nozzles below the liquid level should be attached to any piping using a flexible connection or piping should be supported externally from the tank to avoid the transfer of loads from the piping to the nozzle.
- 12.11. Valves and associated piping that are attached to tank nozzles must be independently supported so that closing and opening of the valve does not transmit the total torque and bending loads directly to the nozzle.
- 12.12. Flanged nozzles have standard ANSI 150# flange bolt hole arrangement and are always flat faced. Full-face gaskets must be used.
- 12.13. Use metal washers under all bolt heads and nuts, which would otherwise be in contact with the FRP flanges. Nut and bolt threads should be lubricated before tightening. Bolting take-up torque should be applied uniformly alternating  $180^\circ$  and rotating as near  $90^\circ$  as possible. A bolt torque of 30 ft/lbs will normally be sufficient to affect a seal.

## 13. GRAVEL / BASE INSTALLATION OF FLAT BOTTOM TANKS

### CAUTION

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

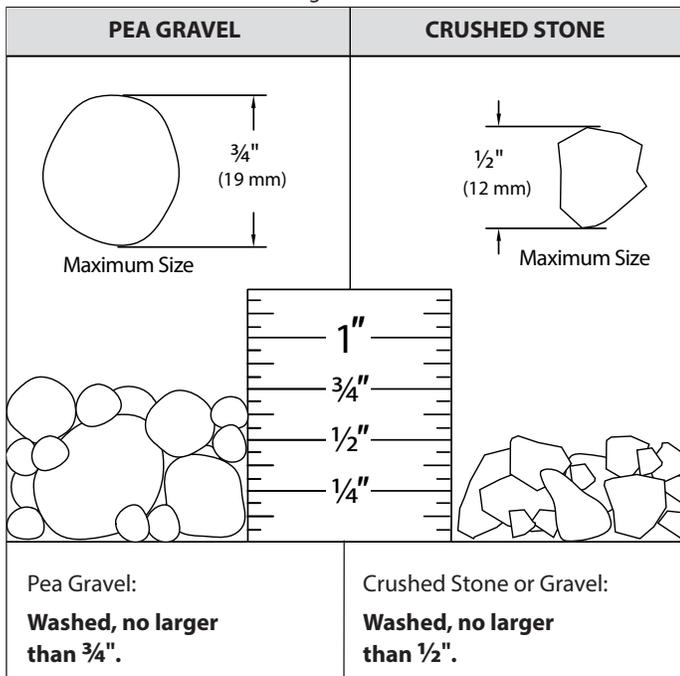
### CAUTION

When setting the tank onto this new base, use caution not to disturb bedding. Disturbance of the bedding when setting the tank may create voids beneath the tank. The bedding must fully support the entirety of the tank bottom.

#### 13.1. Required Components

- 13.1.1. Retain ring, typically a fiberglass hoop, equal in diameter to the tank bottom diameter plus 6". Hoop length should be minimum of 7" to accommodate 5" depth of gravel backfill plus 2" of ring burial depth. Installation on a sloped area will require additional hoop length by the amount of elevation difference between high and low sides of the slope.
- 13.1.2. Do not mix approved base with sand or native soil.
- 13.1.3. Do not install base with sand or native soil.
- Keep base dry and free of ice in freezing conditions.
  - Use only approved pea gravel or crushed stone (see Figure 13-1):

Figure 13-1



- 13.1.4. If material which meets these specifications is not available, contact Tank Technical Support for information on approved alternate materials and installation instructions. Using other backfill without Containment Solutions' prior written approval will void the tank warranty and may result in tank failure.

#### 13.1.5. Installation steps

- 13.1.5.1. Select installation site and mark the tank perimeter plus 6" with spray paint or other visible reference marker. Remove any rocks, debris, vegetation, roots or other objects from this defined tank base area. Level the native soil within the base area and tamp down for compaction.
- 13.1.5.2. Set the retainer ring on the prepared tank site location and mark the perimeter with a shovel. Remove retainer ring and dig a trench for embedding the retainer ring into the native soil. Minimum embedment depth is to be 2" to prevent erosion of foundation material. If installation is on a slope, the 2" minimum embedment should be provided at the lowest point of the slope. Set the ring within the embedment trench and level in all directions. Backfill native soil into the trench, against the inside and outside of the ring. Tamp and compact the soil around the ring perimeter and inside circumference to "seat" the ring in place.
- 13.1.5.3. Fill the retainer ring with gravel or crushed stone to the top edge of the ring and level flush with the ring edge in all directions.