

# PETROLEUM

& OIL/WATER SEPARATORS

## FIBERGLASS TANK INSTALLATION



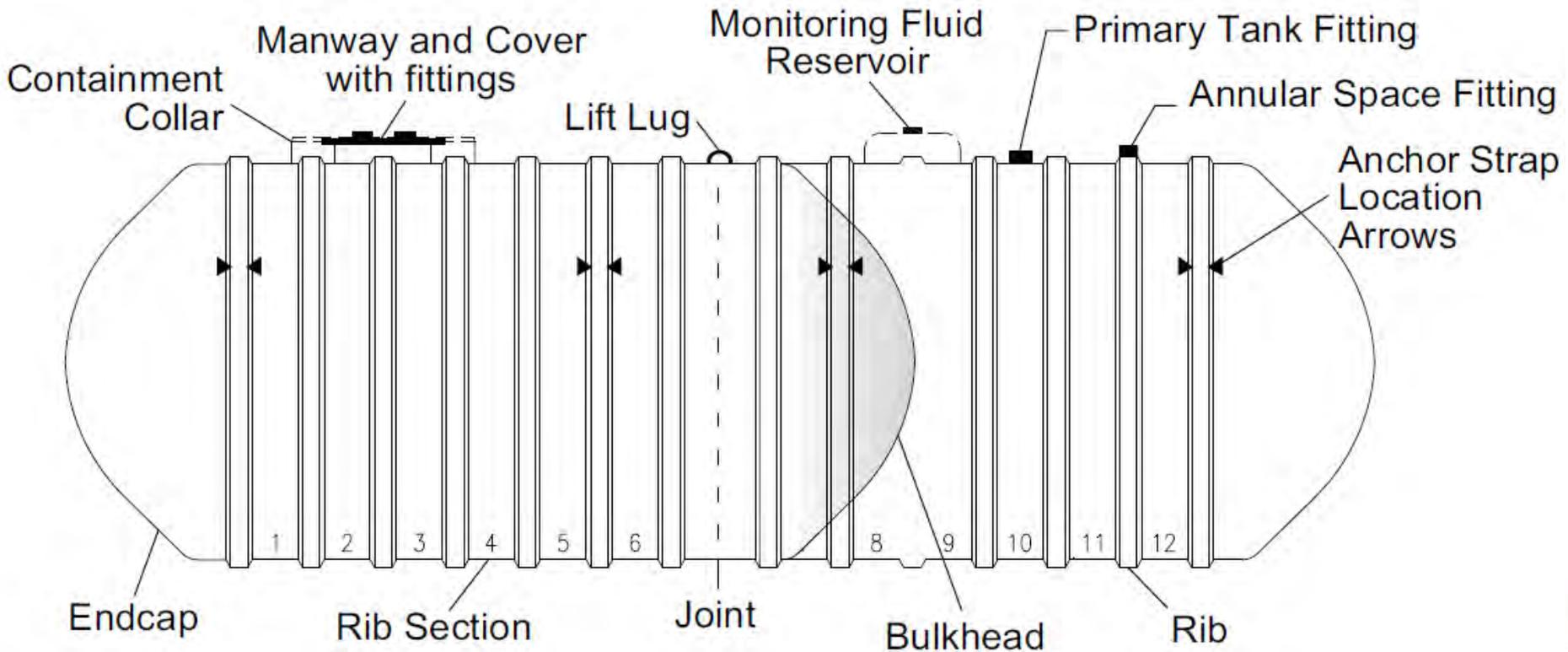
***Version 11.1.11***

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- **Introductions**
- **Review Key Installation Procedures (PPT)**
- **Written Exam**
- **Contractor Documentation**
- **Submit signed Attachment E  
as a record of training**
- **Review Missed Questions**
- **2-Year Renewal**

# Generally Used Terms





# PRE INSTALLATION PREPARATION

## Section A

# Safety Reminders

## **⚠ 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.

- Pay close attention to the important safety comments throughout the Installation Instructions
- Remember to follow all OSHA, EPA and local regulations which apply

- Remember to barricade tank area
- Complete installation checklist
- Review shipping packet contents

## IMPORTANT PAPERS ENCLOSED

For All Underground Fiberglass Reinforced Plastic (FRP) Tanks  
For Field Services, Contact CONTAINMENT SOLUTIONS SERVICES  
800-822-1997

### WARRANTY INFORMATION

Please contact Containment Solutions at (800) 537-4730 or visit our website at [www.containmentsolutions.com](http://www.containmentsolutions.com) for a copy of your warranty.

### INSTALLATION INSTRUCTIONS

These must be given to your installation contractor to read before he starts digging the hole. Incorrect installation may result in tank failure and potential environmental harm. The owner should consult with and follow all local and federal regulations before work commences.

### INSTALLATION CHECKLIST

This checklist should be filled out by the contractor and endorsed by the owner's representative. A completed copy of the checklist should be retained by the owner. A complete checklist will be required by CONTAINMENT SOLUTIONS for any future warranty claims. This must be given to your installation contractor to read before he starts digging the hole. Incorrect installation may result in tank failure and potential environmental harm.

### DEADMAN ANCHOR INSTALLATION INSTRUCTIONS AND LAYOUT

Carefully follow off loading instructions when installing CSI pre-fabricated deadman anchors. Make sure proper lifting equipment is used and all safety procedures are followed. Insure all lifting points are properly secured prior to offloading. Properly position deadman in excavation hole and follow tank installation instructions.

### CALIBRATION CHART

Accurate inventory control is required by law. If manual gauging is to be used as the inventory method, this chart will provide information on how to properly measure the level of the petroleum and how to convert that measurement to gallons.

### BILL OF LADING

Note any damage or shortages on the Bill of Lading and keep your copy. Any transit damage or shortage claim must be reported within 48 hours of delivery. Call 800-537-4730 day or night. If the tank has been damaged after delivery, call Containment Solutions Services 800-822-1997.

## IMPORTANT WARNING

### Improper Installation May Result In Tank Failure

Tank Installation Information (For installation questions, call Tank Technical Support (800) 537-4730).

1. **Bed and Backfill Material:** Use either clean naturally rounded aggregate with a mix of particle sizes not less than 1/8" or more than 3/4" diameter or washed crushed stone or crushed gravel with angular particle size not less than 1/8" or more than 1/2" diameter. Backfill must also meet ASTM C-33. No more than 5% of the backfill shall pass through a #6 sieve. The dry gravel density must be a minimum of 95 pcf.

*Caution: Do Not Use Sand or Dirt for Backfill.*

2. **Bed:** Provide a minimum 12" level backfill bed over hole bottom or concrete slab. *Caution: Do Not Place Fiberglass Tanks Directly on Concrete Slab or Grout Tanks in Wet Concrete. Do Not Place Tanks on Concrete Slab, Timbers, Beams, Cradles, or Large Stones.*

3. **Backfilling:** Work backfill material completely beneath tank bottom, between ribs and under end caps to provide necessary support for tank.

4. **Anchoring:** Tanks must be anchored where high water tables exist, surface water flows through hole, or other water conditions may exist now or in the future.

5. **Filling Tanks:** Do not fill tanks until backfill is to top of tank.



## Handling/Preparation:

- All tanks must be mechanically unloaded
- Carefully unload all accessories to prevent damage

## For temporary job site storage:

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

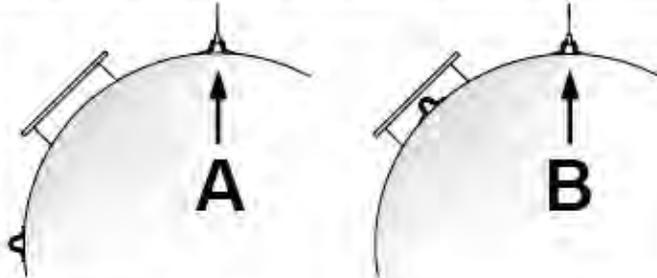
**When tanks arrive at the job site, they should always be mechanically unloaded**



# Handling / Preparation - Tanks

Figure A-1

**1. Lifting from Truck with Tank Rotated**

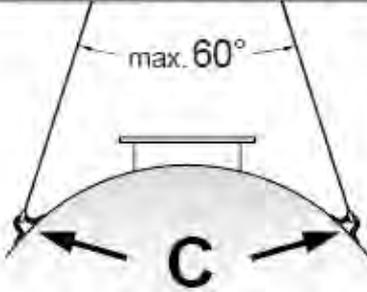


Use all lugs on top center line to lift tank from truck.  
Rotate tank after unloading to upright position for lifting into excavation.

- There are different tank orientations for unloading or lifting into the excavation.
- Identify the tank lift lug orientation and use the appropriate method to lift the tank.

Figure A-2

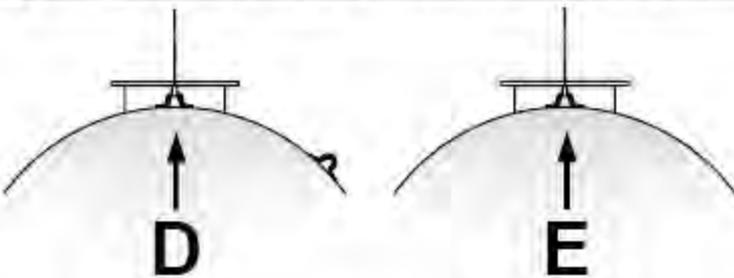
**2. Lifting from Truck or Ground with Tank Upright**



Use the number of lugs identified on the label to lift tank.

Figure A-3

**3. Lifting from Truck or Ground with Tank Upright**



Use the number of lugs identified on the label to lift tank.

# BED & BACKFILL

## Section B

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

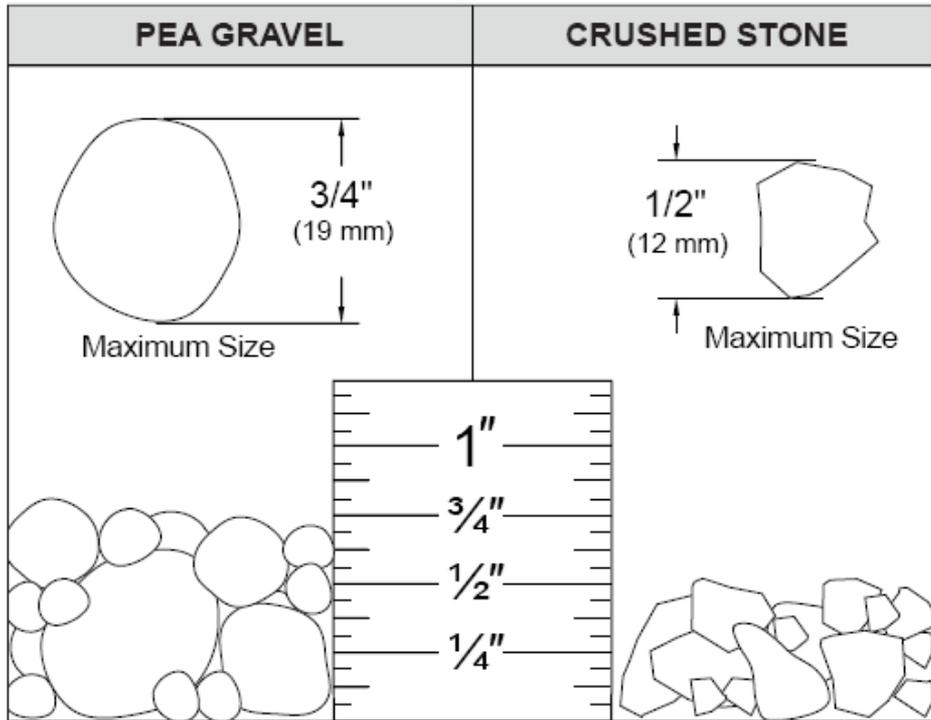


## Bed & Backfill



# Bed & Backfill

Figure B-1



- Clean and washed backfill material only.
- Crushed Stone no larger than 1/2"
- Rounded Pea Gravel no larger than 3/4"
- No more than 5% passing #8 sieve

If backfill materials that meet CSI's requirements are not available, alternative materials can **ONLY** be used if written permission is obtained from CSI prior to installation.

## Bed & Backfill



# TANK TESTING PROCEDURES

## Section C

# Testing All Fiberglass Tanks

## **⚠ WARNING**

Do not pressurize 4', 6', 8' and 10' diameter tanks over 5 psig (35 kPa). Do not pressurize 12' diameter tanks over 3 psig (21 kPa). Tank damage or physical injury may result.

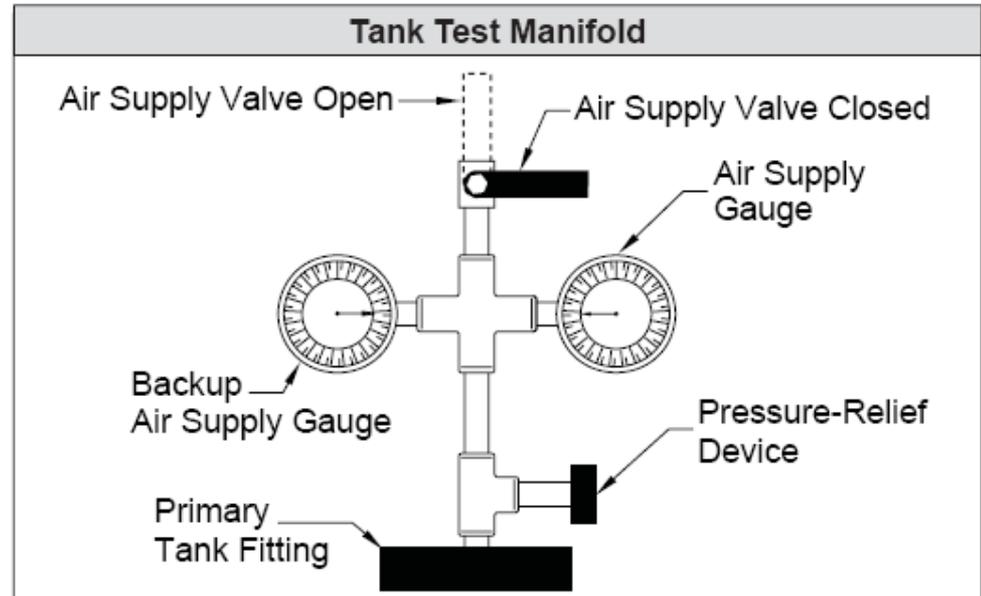
### **Important Warning For all Tests**

Never pressurize tank over 5 psig or 3 psig for 12' diameter tanks

# Testing All Fiberglass Tanks

- Connect a “Tank Test Manifold” to a primary fitting
- Use pressure gauge of 15 psig or less (max ¼ psig increments)
- Use pressure relief device to ensure tank pressure does not exceed 5psig (3 psig for 12’ tanks)

Figure C-1

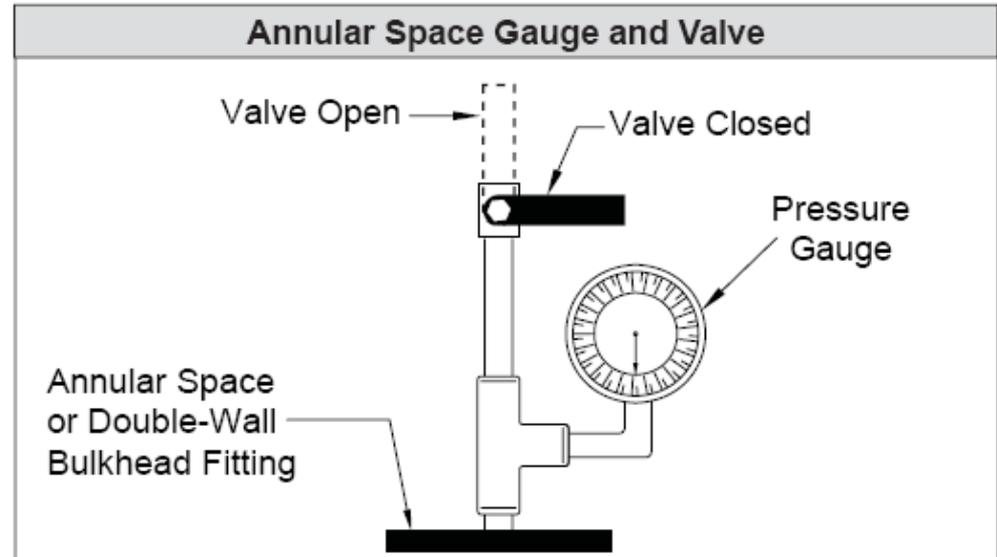


Tank Test Manifold  
(Contractor Supplied)

# Testing All Fiberglass Tanks

- For any tank model with a dry interstitial space (including a double-wall bulkhead) connect an “Annular Space Gauge and Valve” to an annular space fitting

Figure C-2



**Annular Space Gauge and Valve**  
(Contractor Supplied)

# Testing All Fiberglass Tanks

- **Single-Wall Tank Tests are only in Sections D1, D2 or D3**
- **Double-Wall Tank Tests are only in Sections D4 – D9**
- **Determine which section is appropriate**
- **Follow each step of the instructions provided in the Tank Installation Instructions**
- **Only 3 of the possible 9 testing procedures are discussed in this presentation and only the critical steps are highlighted. You are responsible for all the steps in any of the 9 possibilities when installing CSI tanks.**

# SINGLE-WALL TANK TESTING PROCEDURES

## Section D

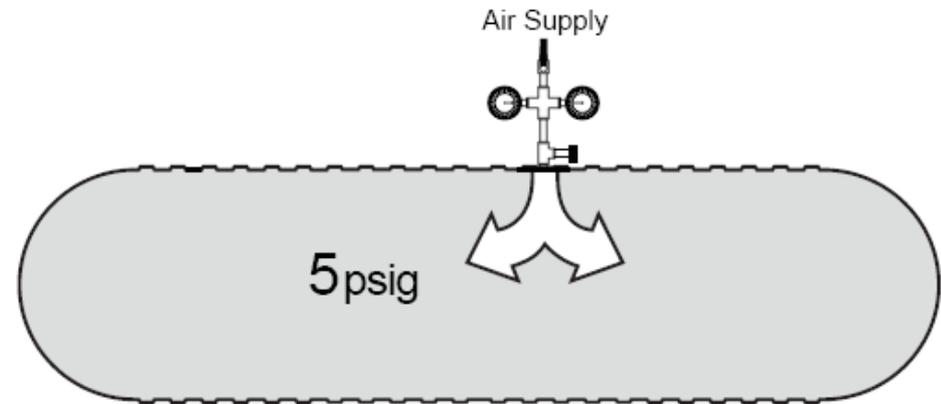
# Section D1 - Testing Single-Wall Tanks

Steps 1-3: follow Installation Instructic

- 4. Pressurize tank to 5 psig maximum (3 psig for 12' tanks).**
- 5. Monitor the pressure readings for 30 minutes for any loss in pressure from the initial reading which may indicate a leak.**
- 6. While under pressure, cover tank outer surface including fittings and manways, with soap solution and inspect.**

Steps 7-10 : follow Installation Instructions

Figure D1-1



# Testing All Fiberglass Tanks

- Soap entire tank and inspect for air bubbles
- Soap all fittings and manways
- Contact CSI Field service immediately in the unlikely event a leak is discovered



# DOUBLE-WALL TANK TESTING PROCEDURES TANKS WITH DRY ANNULAR SPACE

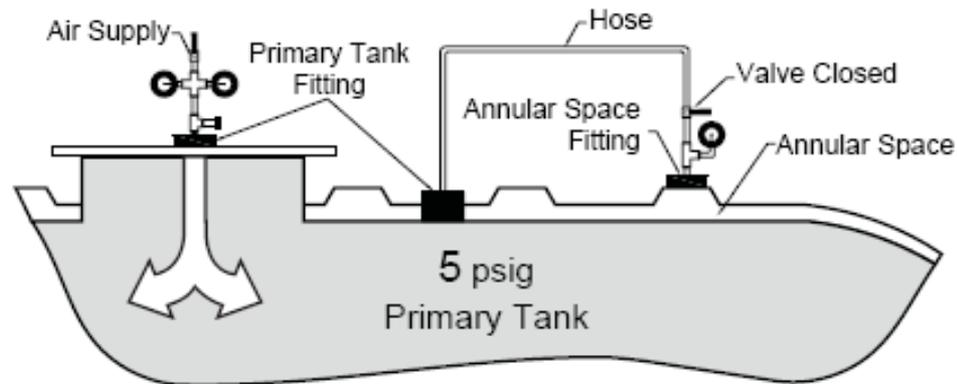
## Section D

# Section D4 - Testing Double-Wall Tanks with Dry Annular Space

Steps 1-5: follow Installation Instructions

**6. Pressurize tank to 5 psig maximum  
(3 psig for 12' tanks).**

Figure D4-1



**CAUTION**

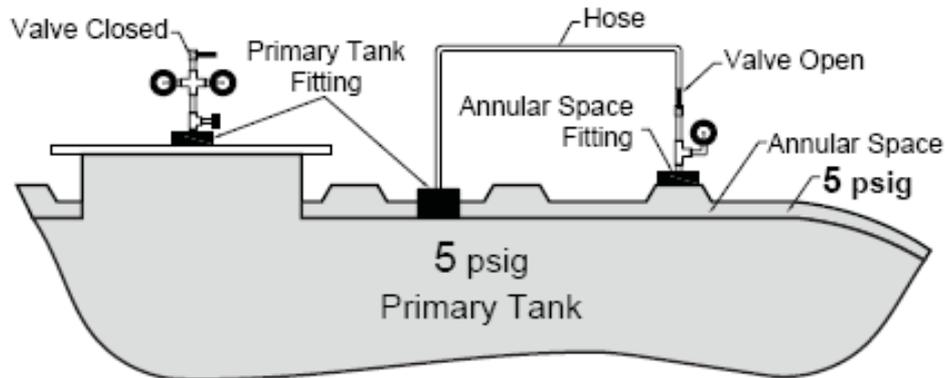
Do not connect the air supply directly to the annular space monitoring fitting or tank damage will result.

## Section D4 - Testing Double-Wall Tanks with Dry Annular Space

Steps 7-8: follow Installation Instructions

- 9. Open valve between primary tank and annular space in order to pressurize the annular space using the existing pressure in the primary tank (pressure in the primary tank may drop slightly)**

Figure D4-2



- 10. While under pressure, cover fittings and manway(s) with soap solution and inspect**

## Section D4 - Testing Double-Wall Tanks with Dry Annular Space

Steps 11-12: follow Installation Instructions

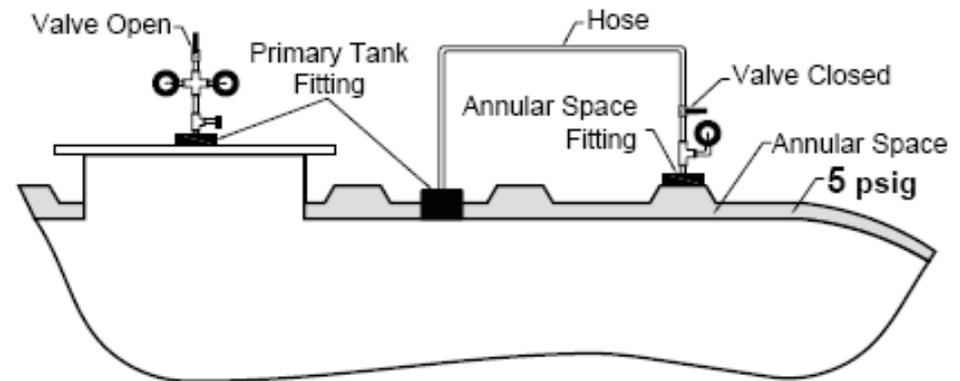
**13.** Maintain pressure on the annular space (see Figure D4-3)

**14.** Observe and monitor the gauge on the annular space for 30 minutes for any loss of pressure which may indicate a leak.

**15.** While under pressure, cover tank outer surface, including fittings and manway(s), with soap solution and inspect.

Steps 16-19: follow Installation Instructions

Figure D4-3



# DOUBLE-WALL TANK TESTING PROCEDURES TANKS WITH HYDROSTATICALLY MONITORED SPACE

## Section D

# Section D7 - Testing Double-Wall Tanks w/ Hydrostatically Monitored Space

Step 1: follow Installation Instructions

**2.** Closely inspect outer wall for any trace of green monitoring fluid.

Steps 3-6: follow Installation Instructions

**7.** With a light, look inside for any monitoring fluid.

**8.** Replace and tighten fitting plug(s).



# Section D7 - Testing Double-Wall Tanks w/ Hydrostatically Monitored Space



9. Connect “Tank Test Manifold” to a primary tank fitting.
10. Connect the pressure source to the “Tank Test Manifold.”

## **CAUTION**

Never pressurize a wet annular space. Doing so may damage the primary tank or cause tank failure.

# Section D7 - Testing Double-Wall Tanks w/ Hydrostatically Monitored Space

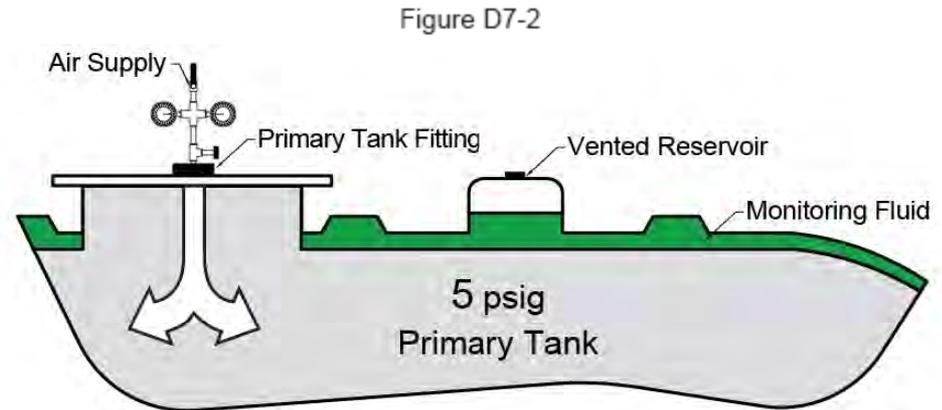
**11.** Pressurize primary tank to 5 psig maximum (3 psig for 12' tanks) (see Figure D7-2).

**12.** Close valve on “Tank Test Manifold.” Disconnect the air supply line.

**13.** Monitor the pressure for 30 minutes for any loss in pressure from the initial reading which may indicate a leak.

**14.** While under pressure, cover tank fittings and manway(s), with soap solution and inspect.

Steps 15-18: follow Installation Instructions



# EXCAVATION

## Section E

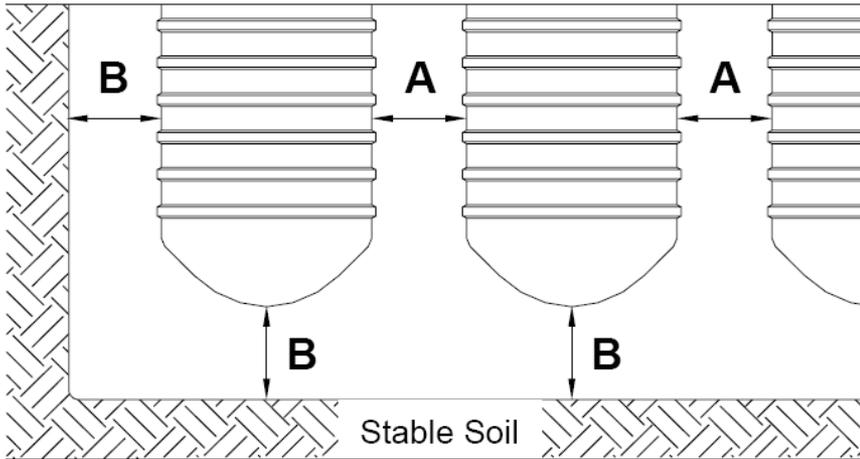
## Excavation Size

- **Minimum spacing between tanks is 18” when no mechanical anchoring is required**
- **Tank spacing depends on soil in the excavation as well as the choice of anchoring systems**



# Excavation Size – Stable

Figure E-1



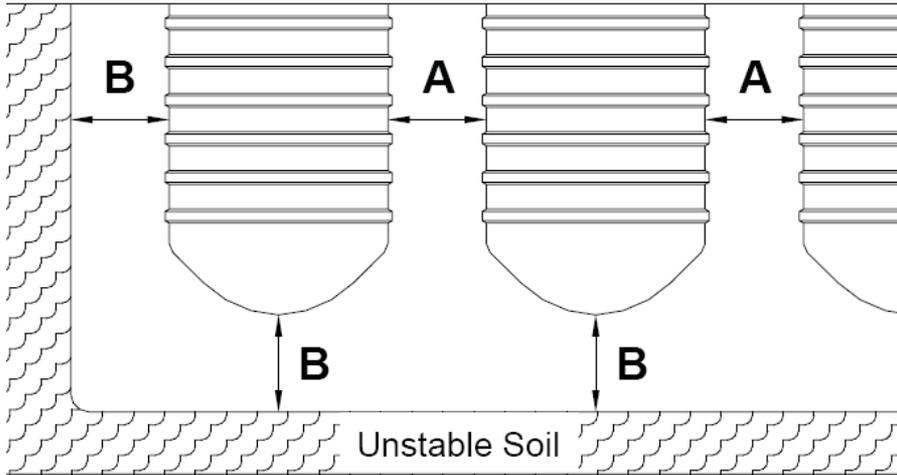
- **Minimum spacing between tanks and excavation walls, in stable soils**
- Example: with no mechanical anchoring, a 10' diameter tank will need a minimum 18" spacing between tanks and 24" spacing between the tank and the excavation walls

TABLE E-2

4', 6', 8' Diameter Tanks		
	Minimum	w/ 12" x 12" CSI Deadmen
A	18" (457mm)	24" (610mm)
B	18" (457mm)	24" (610mm)
10' Diameter Tanks		
	Minimum	w/ 18" x 8" CSI Deadmen
A	18" (457mm)	36" (914mm)
B	24" (610mm)	24" (610mm)

# Excavation Size – Unstable

Figure E-3



- **Minimum spacing between tanks and excavation walls, in unstable soils**
- In unstable excavations the spacing between the excavation walls and the tank should always be a minimum of  $\frac{1}{2}$  the diameter of the tank

TABLE E-4

4', 6', 8' Diameter Tanks		
	Minimum	w/ 12" x 12" CSI Deadmen
A	18" (457mm)	24" (610mm)
B	$\frac{1}{2}$ Tank Dia.	$\frac{1}{2}$ Tank Dia.
10' Diameter Tanks		
	Minimum	w/ 18" x 8" CSI Deadmen
A	18" (457mm)	36" (914mm)
B	$\frac{1}{2}$ Tank Dia.	$\frac{1}{2}$ Tank Dia.



## Excavation Size

**When job site conditions require an oversized hole, fill the entire excavation with approved backfill.**



# GEOTEXTILE FABRIC

## Section F

# Geotextile Fabric (Filter Fabric)

Geotextile fabric is required between backfill and native soils for certain installations such as **unstable soils, swampy areas** and **landfills** to prevent backfill from migrating and thereby undermining support of the tank, piping or paving.

# Geotextile Fabric (Filter Fabric)

- Geotextile fabric should be used in tidal conditions, area of frequently changing ground water, and unstable soils
- Do not use plastic, or any other material that may tear or degrade, as a replacement for geotextile fabric

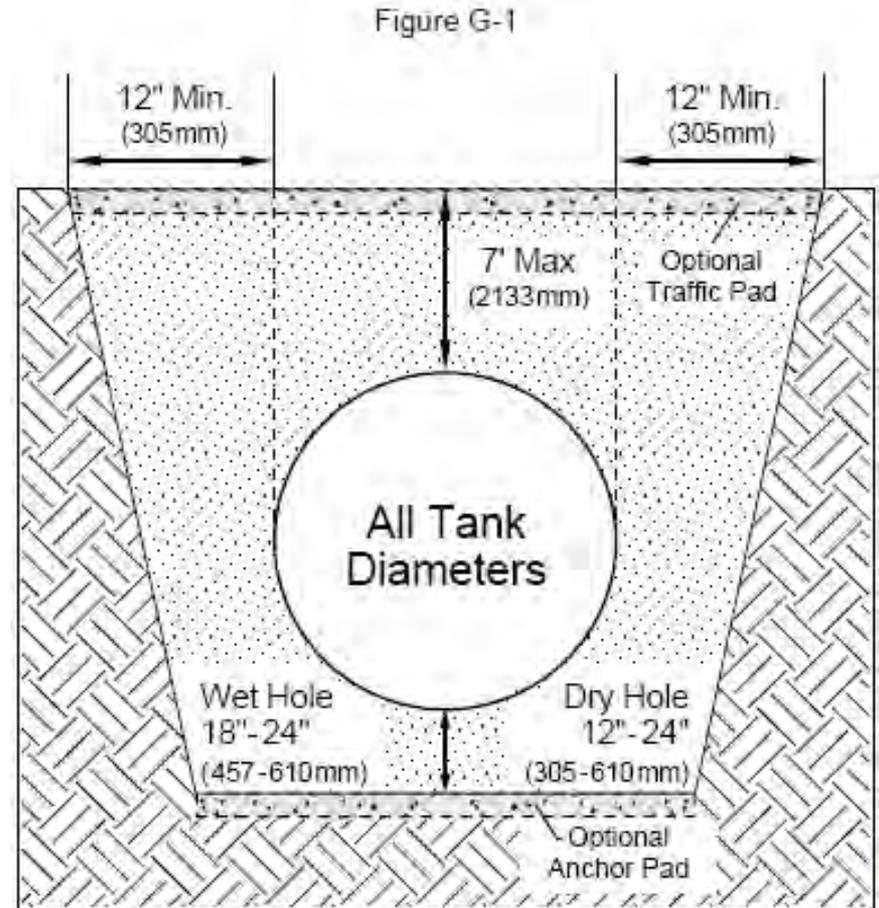


# BURIAL DEPTH

## Section G

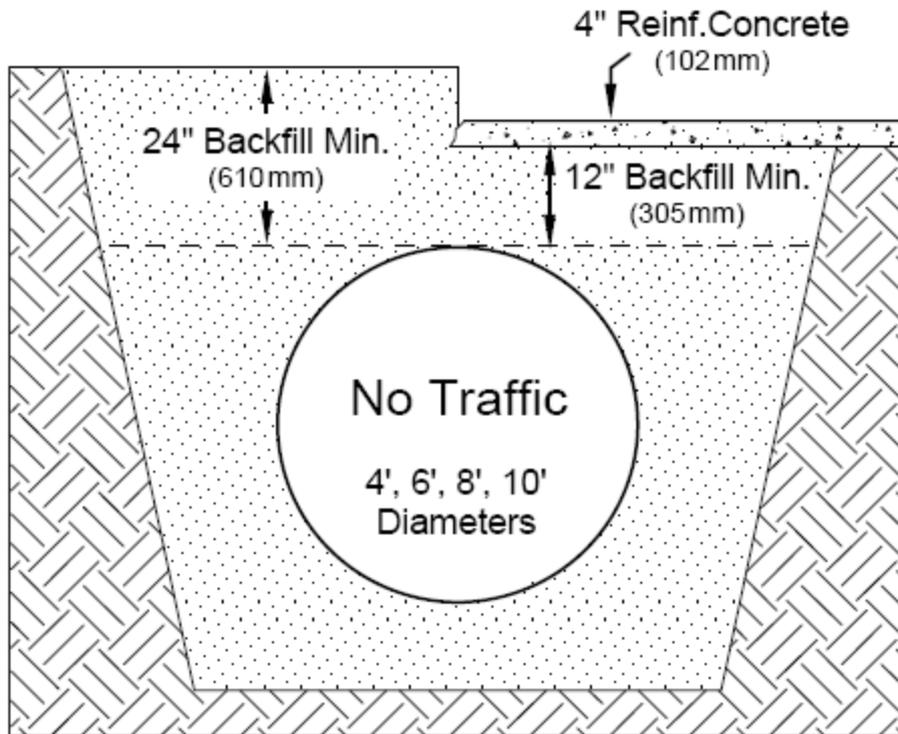
# Burial Depth and Cover

- **Minimum bedding under tank is 12" (18" in a wet hole) and a maximum of 24"**
- **Maximum standard burial depth is 7'**
- **Traffic pad must extend at least 12" beyond tank perimeter**
- **Minimum burial depth will vary according to job site conditions:**
  - Traffic load
  - Mechanical anchoring
  - Number of tank sumps/risers



# Burial Depth – No Traffic Load

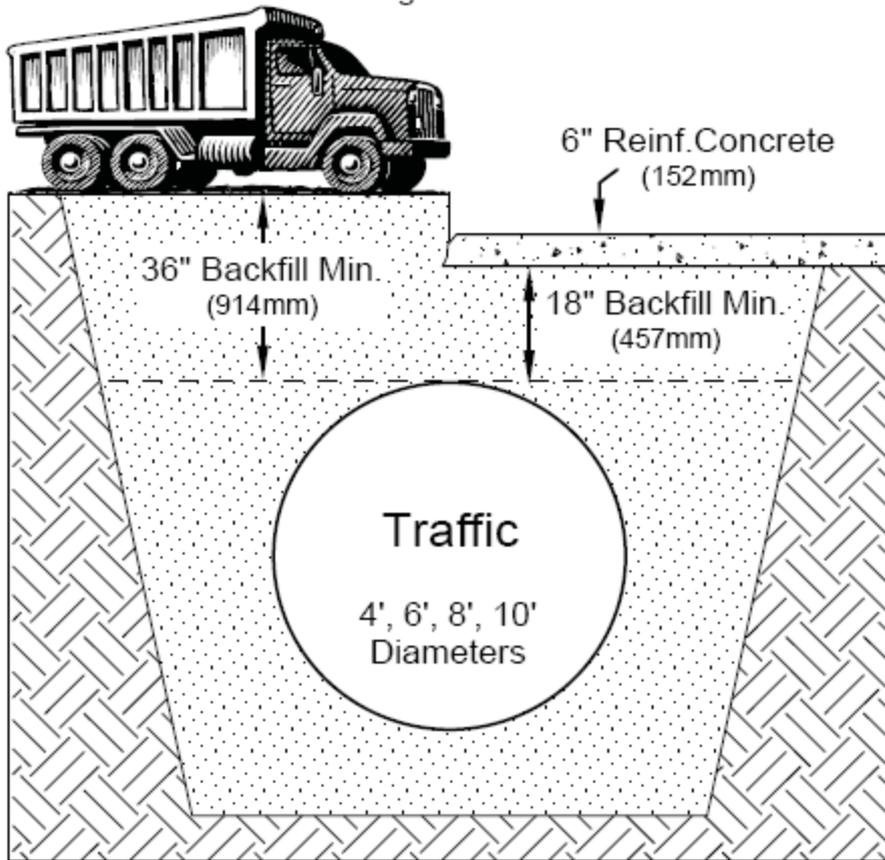
Figure G-2



- **For No Traffic Loads:**
  - 4'-10' tanks need a minimum of 24" backfill or 12" backfill and 4" reinforced concrete
  - 12' tanks need 42" backfill or 38" backfill and 4" reinforced concrete

# Burial Depth – Traffic Load

Figure G-3



- **For Traffic Loads:**
  - 4'-10' tanks need a minimum of 36" backfill or 18" backfill and 6" reinforced concrete
  - 12' tanks need 48" backfill or 36" backfill and 6" reinforced concrete

# TANK ANCHORING

Section H

The three common methods are:

1. Deadmen Anchors
2. Concrete Anchor Pad
3. Overburden (no mechanical anchoring)

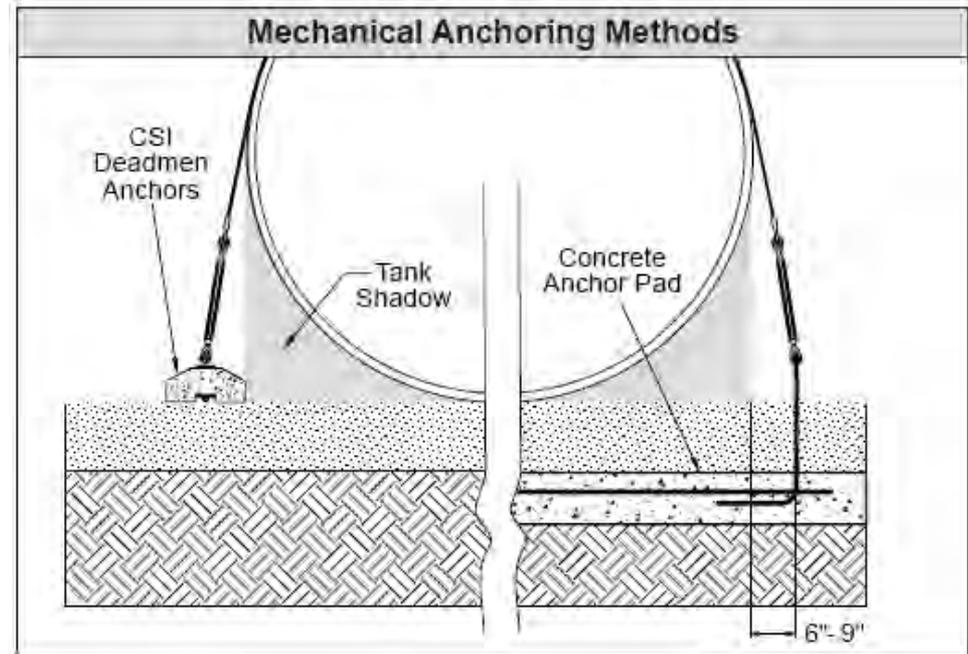
For minimum burial depths refer to the Anchoring Chart in Installation Instructions INST 6001 (Appendix A)

Appendix A - Anchor Chart (4', 6', 8' Diameter Tanks)			App. A					
<b>Anchor Chart</b>								
Minimum burial depth to achieve 1.2 safety factor against flotation assuming worst case conditions of water to grade and the tank empty. Assumes multiple tank installation.								
Tank Diameter & Nominal Capacity in Gallons. (Including all Compartments)	Space Between Tanks	# of Anchor Straps	# of Sumps or Risers (Backfill to Grade No Traffic / Backfill with 6" Concrete Traffic Pad)					
			0	1	2	3	4	
<b>Diameter Tanks</b>	up to 1,000 w/ 12"x12" DM	24"	2	24" / 24"	33" / 24"	-	-	-
	up to 1,000 w/ 8" Pad	24"	2	24" / 24"	33" / 24"	-	-	-
	up to 1,000 No Mech	18"	0	29" / 26"	58" / 53"	-	-	-
	1,100 - 1,500 w/ 12"x12" DM	24"	2	24" / 24"	33" / 24"	81" / 68"	-	-
	1,100 - 1,500 w/ 8" Pad	24"	2	24" / 24"	45" / 38"	81" / 68"	-	-
	1,100 - 1,500 No Mech	18"	0	29" / 26"	51" / 46"	74" / 68"	-	-

# Mechanical Tank Anchoring

- If water can enter the tank excavation, CSI recommends mechanical anchoring
- Use only CSI fiberglass anchor straps
- Deadmen or concrete anchor pads may be used

Figure H-1

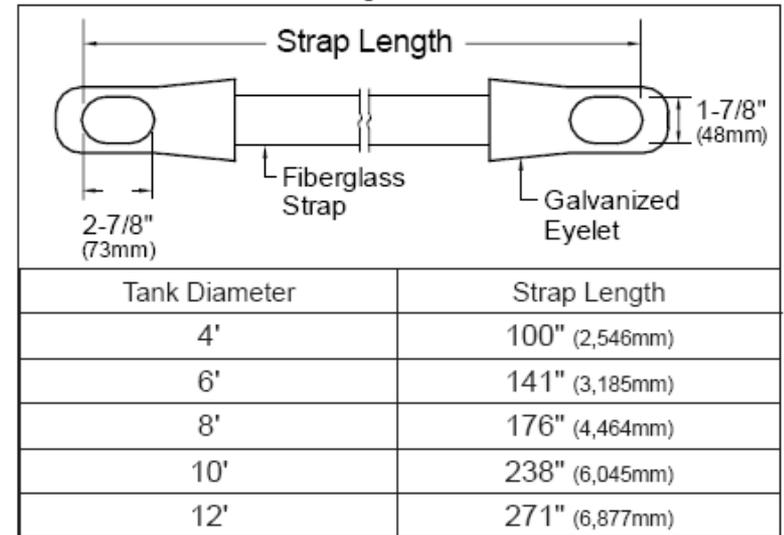


# Tank Anchoring – Anchor Straps

## For All Mechanical Anchoring:

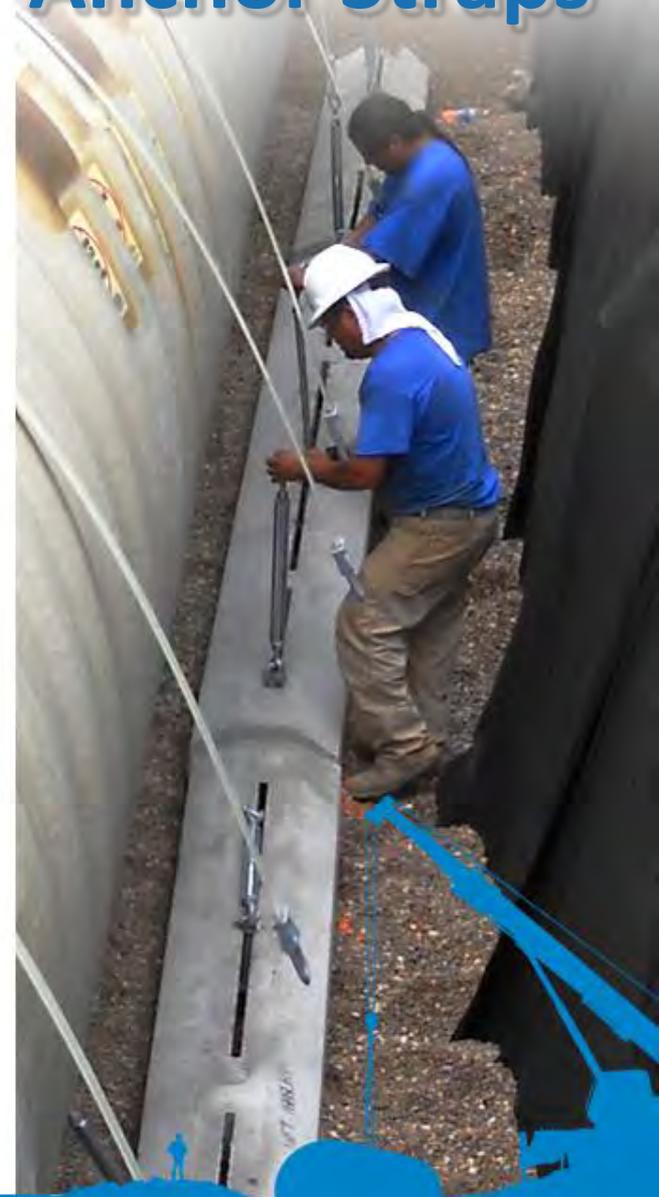
- Use correct length anchor straps for each diameter tank
- Anchor points must be aligned with designated anchor ribs  $\blacktriangleright \blacktriangleleft$  ( $\pm 1''$ ). Do not use straps between ribs except on 4' tanks
- Use one anchor point per strap end

Figure H-3



# Tank Anchoring – Anchor Straps

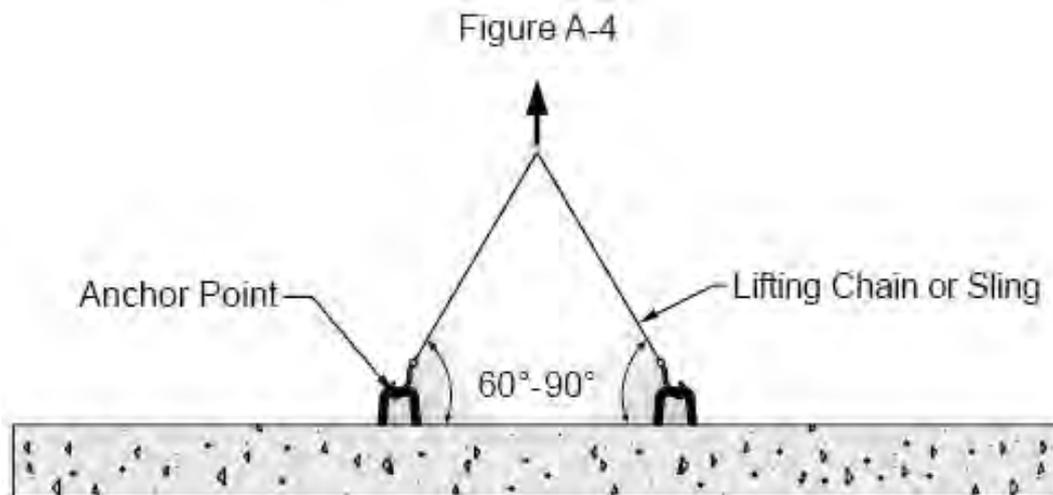
- **Anchor straps on fiberglass tanks:**
  - Must have anchor points at the bottom of the hole aligned within 1” of the designated rib
  - Should be tightened with turnbuckles (seen here) or come-alongs to give a “snug” fit
  - Are available in a convenient man-out-of-hole split strap option



# Tank Anchoring - Deadmen

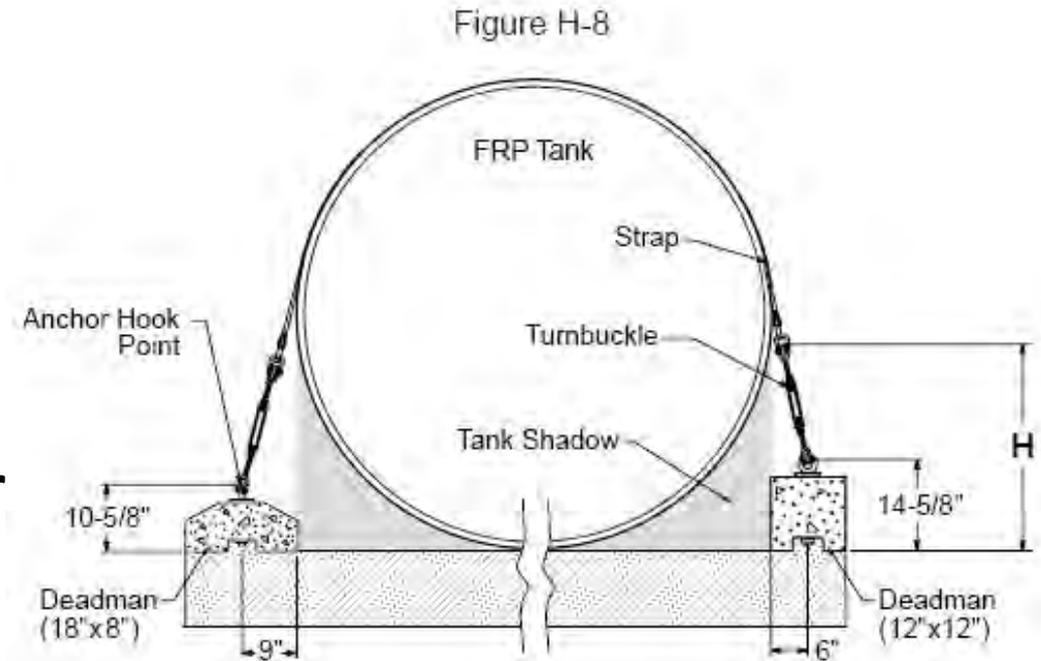
## Unloading Deadmen:

- Ensure lifting equipment is rated to handle the full load before lifting
- Use a minimum of 2 equally spaced anchor points



# Tank Anchoring - Deadmen

- Lay the deadmen in the excavation parallel to the tank and outside of the tank shadow
- Each tank requires its own deadman on both sides, or if one deadman is used between adjacent tanks, it must be doubled in width
- Place multiple deadmen, in contact, end to end

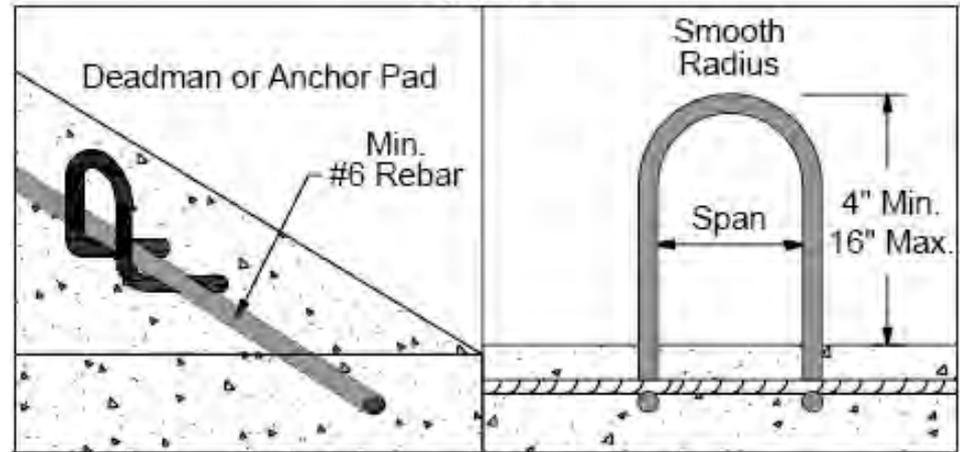


# Tank Anchoring – Anchor Pad

## Using Anchor Pad:

- As a minimum the anchor pad for stable excavations must be at least 8" thick, with #6 rebar on 12" centers each way
- When a concrete anchor pad is used the tank and pad must be separated by at least 12" of approved pea gravel or crushed stone backfill
- Embedded anchor points must be designed for the working loads in Section H of the Installation Instructions

Figure H-9



# VERTICAL DIAMETER MEASUREMENTS

## Section I

# Vertical Diameter Measurements

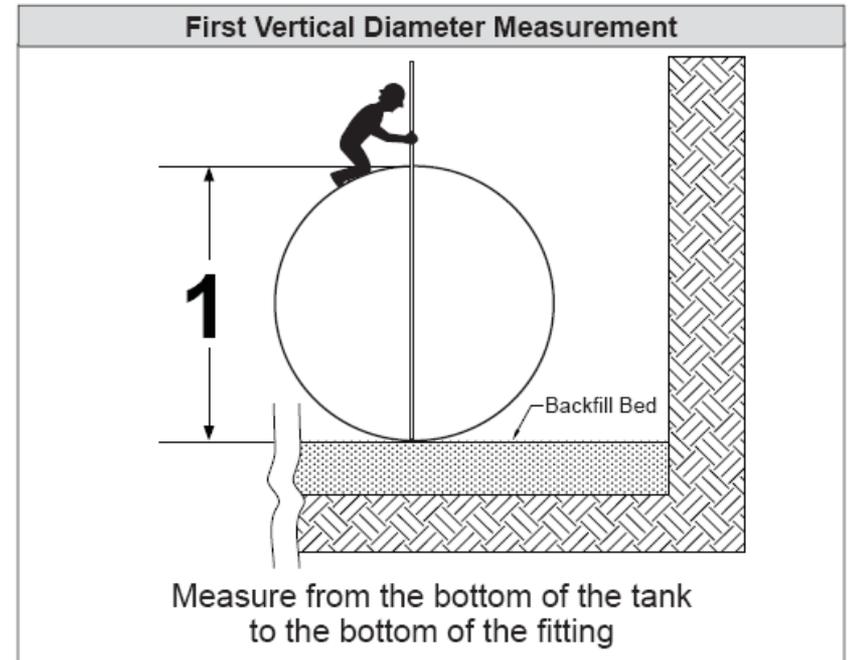
- Excessive Deflection (loss of vertical diameter) of any installed tank can create stress on the tank
- The major cause of deflection is the loss of tank support because of improper backfill material or installation method
- Compare all deflection measurements to the limits established by CSI on the Tank Installation Checklist
- There are **5** total vertical diameter measurements



# Vertical Diameter Measurements

- **“First Vertical Diameter Measurement”**
  - After placement of tank on backfill bed
- All measurements are recorded on the Tank Installation Checklist

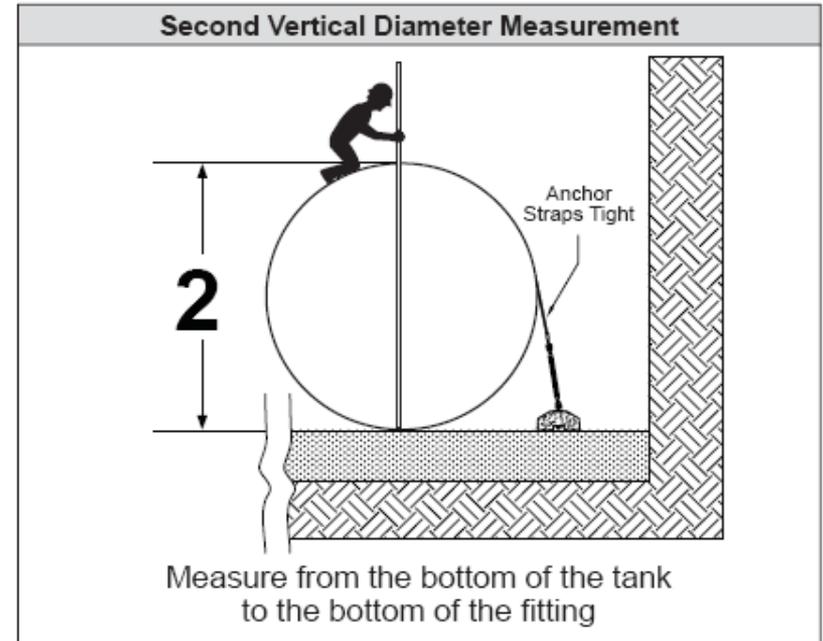
Figure I-2



# Vertical Diameter Measurements

- **“Second Vertical Diameter Measurement”**
  - When mechanical anchoring is completed
  - (only applicable if mechanical anchoring is used)
  
- All measurements are recorded on the Tank Installation Checklist

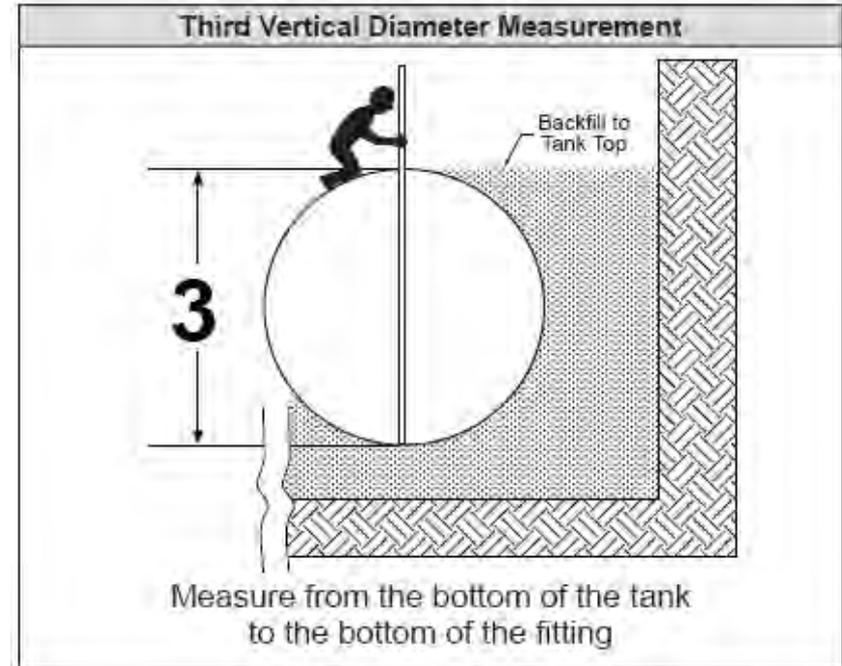
Figure I-3



# Vertical Diameter Measurements

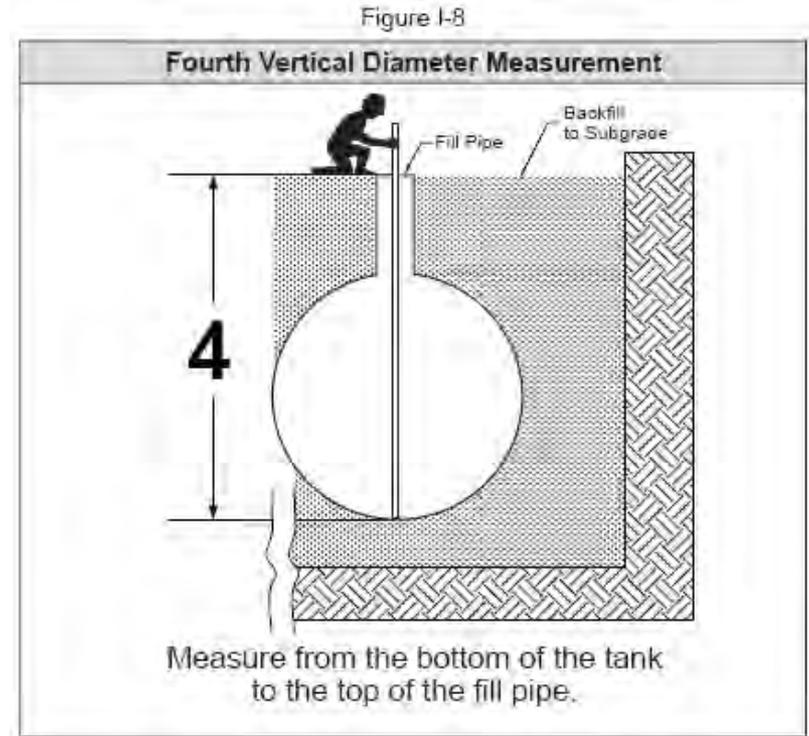
- **“Third Vertical Diameter Measurement”**
  - After backfill is to tank top
- All measurements are recorded on the Tank Installation Checklist

Figure I-7



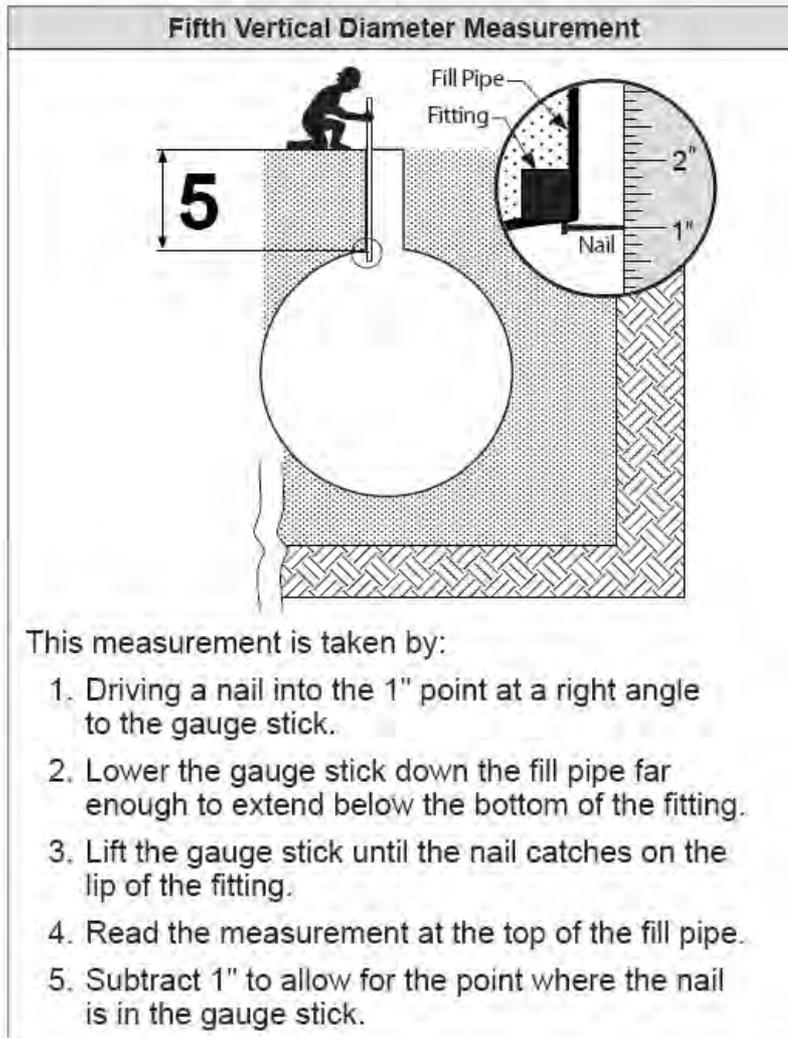
# Vertical Diameter Measurements

- “Fourth Vertical Diameter Measurement”
  - When backfill is to subgrade, but **BEFORE** the concrete pad
- All measurements are recorded on the Tank Installation Checklist



# Final Tank Deflection Measurement

Figure I-9



- “Fifth Vertical Diameter Measurement”
  - When backfill is to subgrade, but **BEFORE** the concrete pad
- Complete Tank Installation Checklist

# TANK INSTALLATION PROCEDURES

## Section I

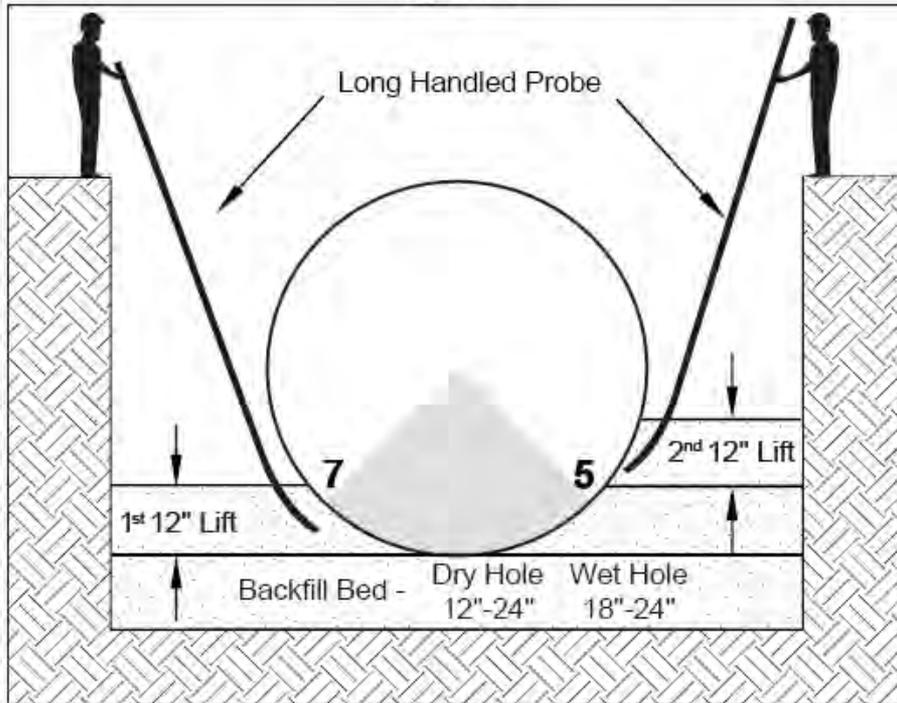
# Installation Procedures

## Basic Installation Steps Overview:

1. Review all instructions and make sure you are compliant with proper procedures
2. Add Backfill Bed
3. Place Tanks in excavation on Backfill bed
4. Take First Vertical Diameter Measurement
5. Complete Mechanical Anchoring
6. Take Second Vertical Diameter Measurement
7. Backfill Tank to tank top
8. Take Third Vertical Diameter Measurement
9. Backfill to subgrade
10. Take Fourth and Fifth Vertical Diameter Measurements

# Installation Procedure – DRY HOLE

Figure I-4

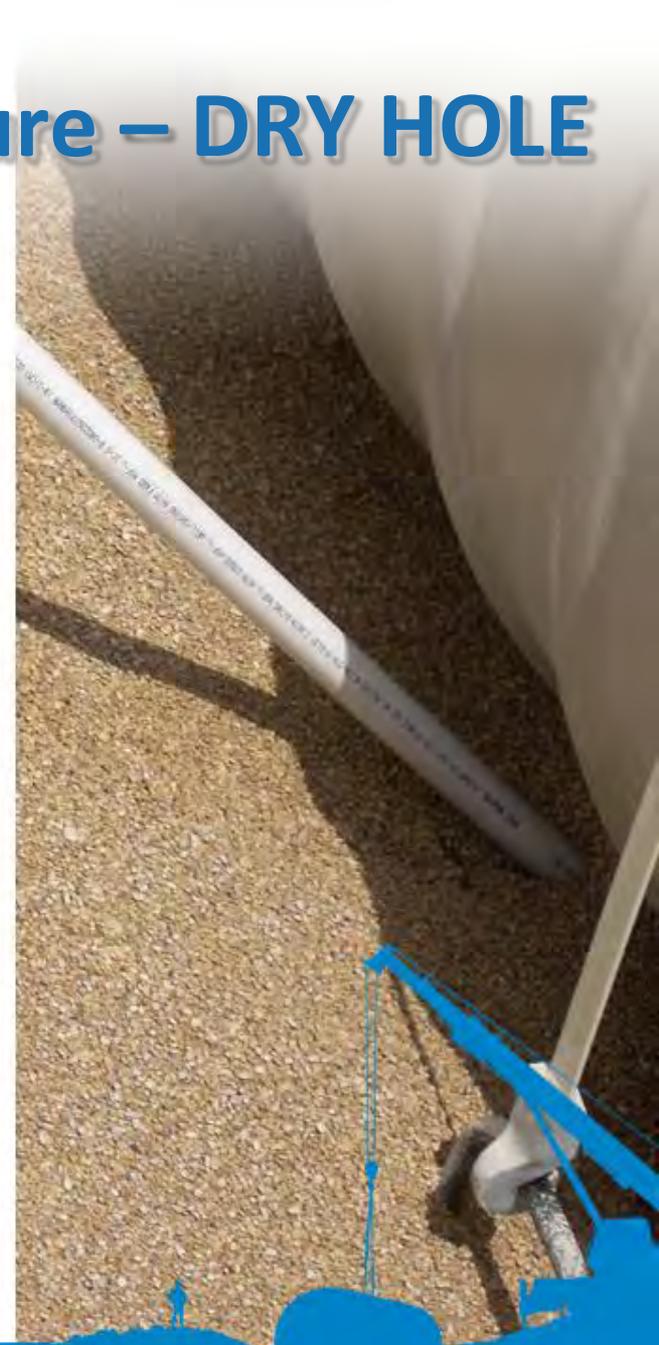
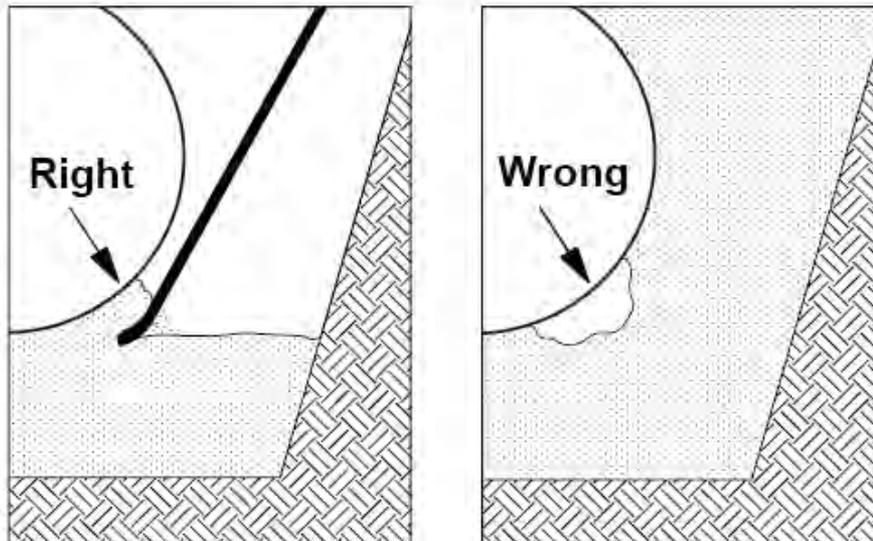


- **Minimum initial tank bed of 12" of approved backfill**
- **Probe first 12" lift under tank between 5 and 7 o'clock positions of tank**
- **Probe second 12" lift (most critical area)**

# Installation Procedure – DRY HOLE

- Probe first 12" lift under tank between the 5 and 7 o'clock position of tank
- The 5 and 7 o'clock position is the most critical area for support
- Probe second 12" lift

Figure I-5



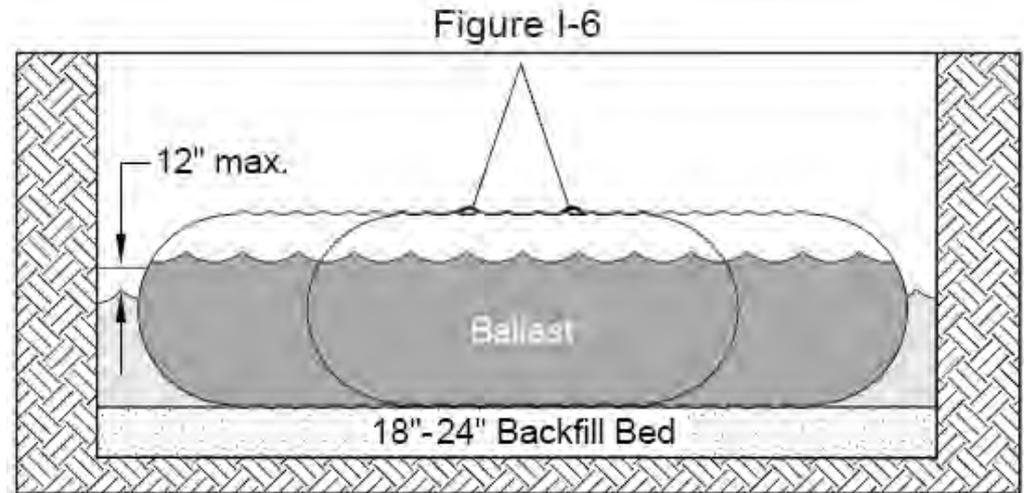
# Installation Procedure – DRY HOLE

- Ballast tank only  
**AFTER** backfill is to  
top of tank



# Installation Procedure – WET HOLE

- De-water hole as much as possible
- Place 18"- 24" backfill bed under tank
- Use only enough water ballast in tank to sink tank
- Keep tank vented to prevent pressurization
- Ballast level inside tank should not be more than 12" above ground water level outside of tank



# Installation Procedure – WET HOLE

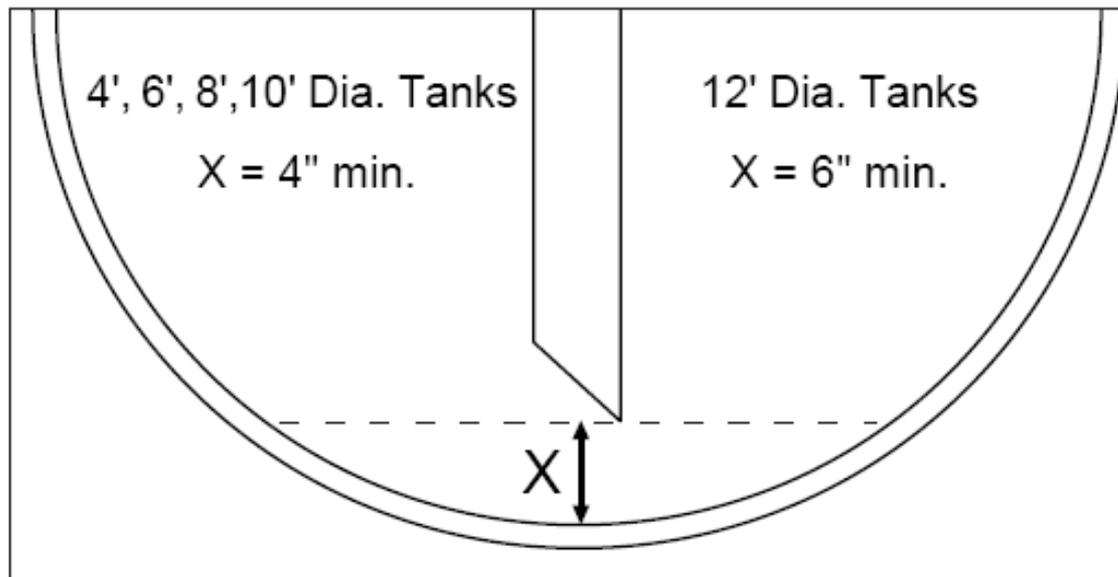
**Fiberglass tanks installed in unstable soils such as peat, swamp or landfill type must have a hole size big enough to allow a minimum space equal to **half the tank diameter** from the ends and sides of the tank to the excavation walls.**



# Internal Piping Clearances

- Internal piping should be a minimum 4" from bottom of tank (6" min. 12' tanks)

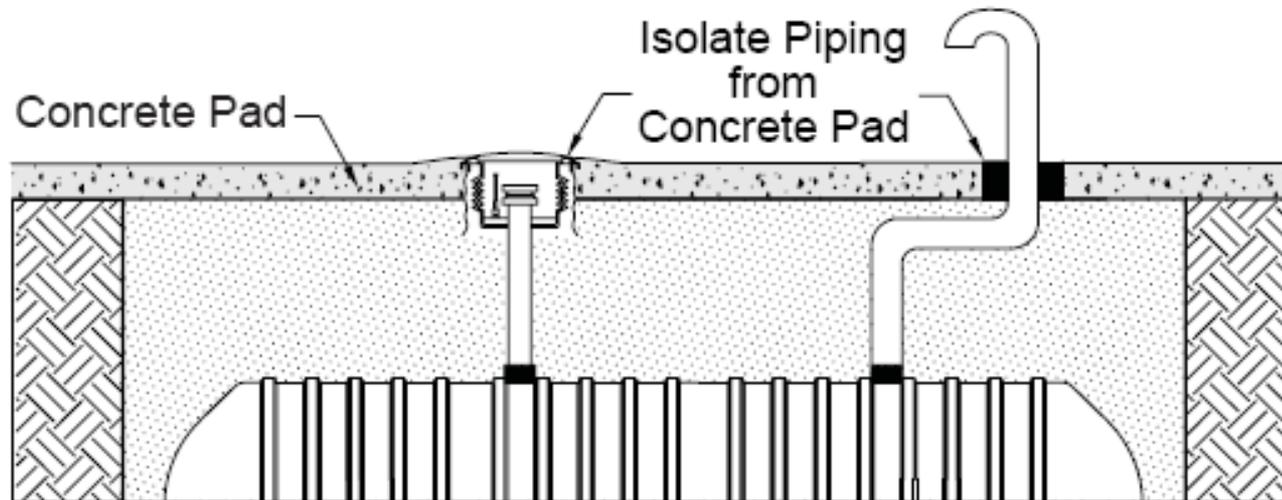
Figure K-2



# External Piping Clearances

- Isolate external piping from the concrete pad
- Attached piping must be free to move with tank

Figure K-1



- **Primary tank and annular space MUST be properly vented**
- **CSI recommends only gravity-filling of tanks**
- **Avoid pressure deliveries if possible**
  - If not, install overflow shut-off equipment that disengages pump
  - DO NOT over fill tank, or damage may occur, even if tank is vented

- **DO NOT enter tank!!**
- **DO NOT exceed 50 ft./lb. torque when tightening manway bolts**
- **The load bearing capacity for a standard 22” manway installed is 1,200 lbs. for single-wall tanks and 2,400 lbs. for double-wall tanks**

## **⚠ 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

# Critical Installation Steps Review

- 1. Air/Soap test the tank**
- 2. Use proper backfill material**
- 3. Provide a proper bed for the tank**
- 4. Evaluate if the tank will need to be anchored**
- 5. Properly place and probe the first two 12" lifts of backfill under the haunches of the tank**
- 6. DO NOT ballast the tank until backfill is to the top of the tank**
- 7. Measure and Record all Vertical Diameter Measurements**

# Tank Sump Installation Checklist

## Tank Sump Installation Checklist:

- Is included in the SW Sump Installation Instructions, found in the shipping packet
- **MUST** be properly filled out for each project
- **MUST** be signed by both the installing contractor and tank owner's representative
- **MUST** be retained by the tank owner and provided at a later time to CSI to validate any future warranty claim



**SUMP INSTALLATION CHECKLIST**  
 Inspection Procedure For Fiberglass Tank Sumps

Complete this checklist and keep it with copies of any written authorizations for variations and/or deviations received from CSI.

Site Owner \_\_\_\_\_ Date of Installation \_\_\_\_\_

Site Address \_\_\_\_\_  
Street City State Zip

Installing Contractor \_\_\_\_\_  
Company Street City State Zip

Single-Wall Tank Sump	Initial On Lines Below	
	Yes	NO
1. Did you follow the instructions described in the installation instructions?	_____	_____
2. Were all sump components inspected for damage prior to installation?	_____	_____
3. Did you prepare all joints per these instructions?	_____	_____
4. Were all joints cured hard a minimum of 24 hours without parts being disturbed or moved?	_____	_____
5. Will the sumps be exposed to high ground water?	_____	_____
6. Were the sump tops properly protected from traffic loads?	_____	_____
7. Was an approved backfill method used around and under the entire sump?	_____	_____
8. Were o-ring gaskets lubricated, clean, and undamaged?	_____	_____
9. Were all sumps tested for tightness? (check one below)	_____	_____
<input type="checkbox"/> Fill sump with water <input type="checkbox"/> Vacuum test sump with WTL Lid	_____	_____

---

Installation was in accordance with most recent CSI Installation Instructions Pub. No. INST 6030.

Owner Representative (Print Name)	Date	Contractor Representative (Print Name)	Date
Owner Representative (Signature)		Contractor Representative (Signature)	

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**For Additional Questions**

**Tank Technical Support**

**(800) 537-4730**

**(936) 756-7731**

**Field Service Department**

**(800) 822-1997**

**(814) 542-8520**