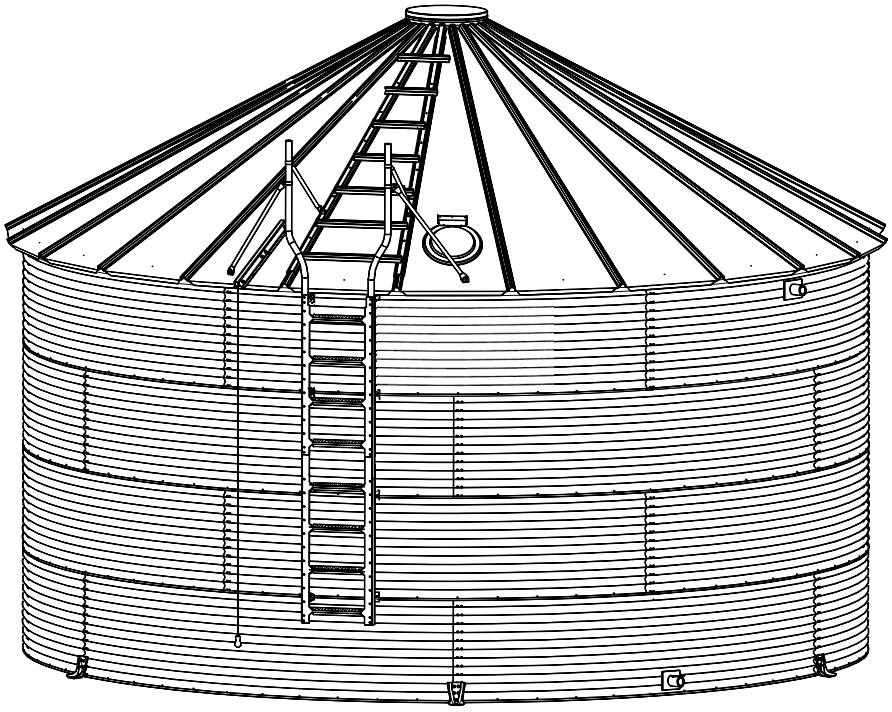
AGI WESTEEL

Special (2–tier)

Water Tank
Installation and Storage Instructions



***This image is representative only**

Read this manual before using product. Failure to follow instructions and safety precautions can result in serious injury, death, or property damage. Keep manual for future reference.

Part Number: 199800 R2
Revised: September 2020
Original Instructions

New in this Manual

The following changes have been made in this revision of the manual:

Description	Section
Updated bin design specifications as follows: Maximum horizontal wind pressure based on 94 mph (151 km/h) as per NBCC 2015 and 105 mph (169 km/h) as per ASCE 7-16.	Section 3.1 – Tank Design and Capacity on page 10
Updated hardware usage.	Section 6.2 – Hardware Usage on page 39

CONTENTS

1. Introduction

Before assembling, please read this manual. Familiarize yourself with the process and the necessary precautions for efficient and safe assembly of this Westeel Special (2–tier).

Everyone present at the assembly site is required to be familiar with all safety precautions.

Keep this manual available for frequent reference and review it with new personnel. Call your local distributor or dealer if you need assistance or additional information.

2. Safety

2.1. Safety Alert Symbol and Signal Words

This safety alert symbol indicates important safety messages in this manual. When you see this symbol, be alert to the possibility of injury or death, carefully read the message that follows, and inform others.

Signal Words: Note the use of the signal words **DANGER**, **WARNING**, **CAUTION**, and **NOTICE** with the safety messages. The appropriate signal word for each message has been selected using the definitions below as a guideline.

DANGER Indicates an imminently hazardous situation that, if not avoided, will result in serious injury or death.

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

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

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

2.2. General Safety

Read and understand all safety instructions, safety decals, and manuals and follow them when assembling the equipment.

- Only experienced personnel who are familiar with this type of assembly and installation should perform this work. Untrained assemblers/installers expose themselves and bystanders to possible serious injury or death.
- Do not modify the water tank in any way or deviate from the instructions in this manual without written permission from the manufacturer. Unauthorized modification or methods may impair the function and/or safety. Any unauthorized modification will void the warranty.
- Follow a health and safety program for your worksite. Contact your local occupational health and safety organization for information.
- Contact your local representative or Westeel if you need assistance or additional information.
- Always follow applicable local codes and regulations.

2.3. Personal Protective Equipment

The following Personal Protective Equipment (PPE) should be worn when installing the equipment.

Safety Glasses

- Wear safety glasses at all times to protect eyes from debris.

Coveralls

- Wear coveralls to protect skin.

Hard Hat

- Wear a hard hat to help protect your head.

Steel-Toe Boots

- Wear steel-toe boots to protect feet from falling debris.

Work Gloves

- Wear work gloves to protect your hands from sharp and rough edges.

2.4. Safety Decals

- Keep safety decals clean and legible at all times.
- Replace safety decals that are missing or have become illegible. See decal location figures that follow.
- Replaced parts must display the same decal(s) as the original part.
- Replacement safety decals are available **free of charge** from your distributor, dealer, or factory as applicable.

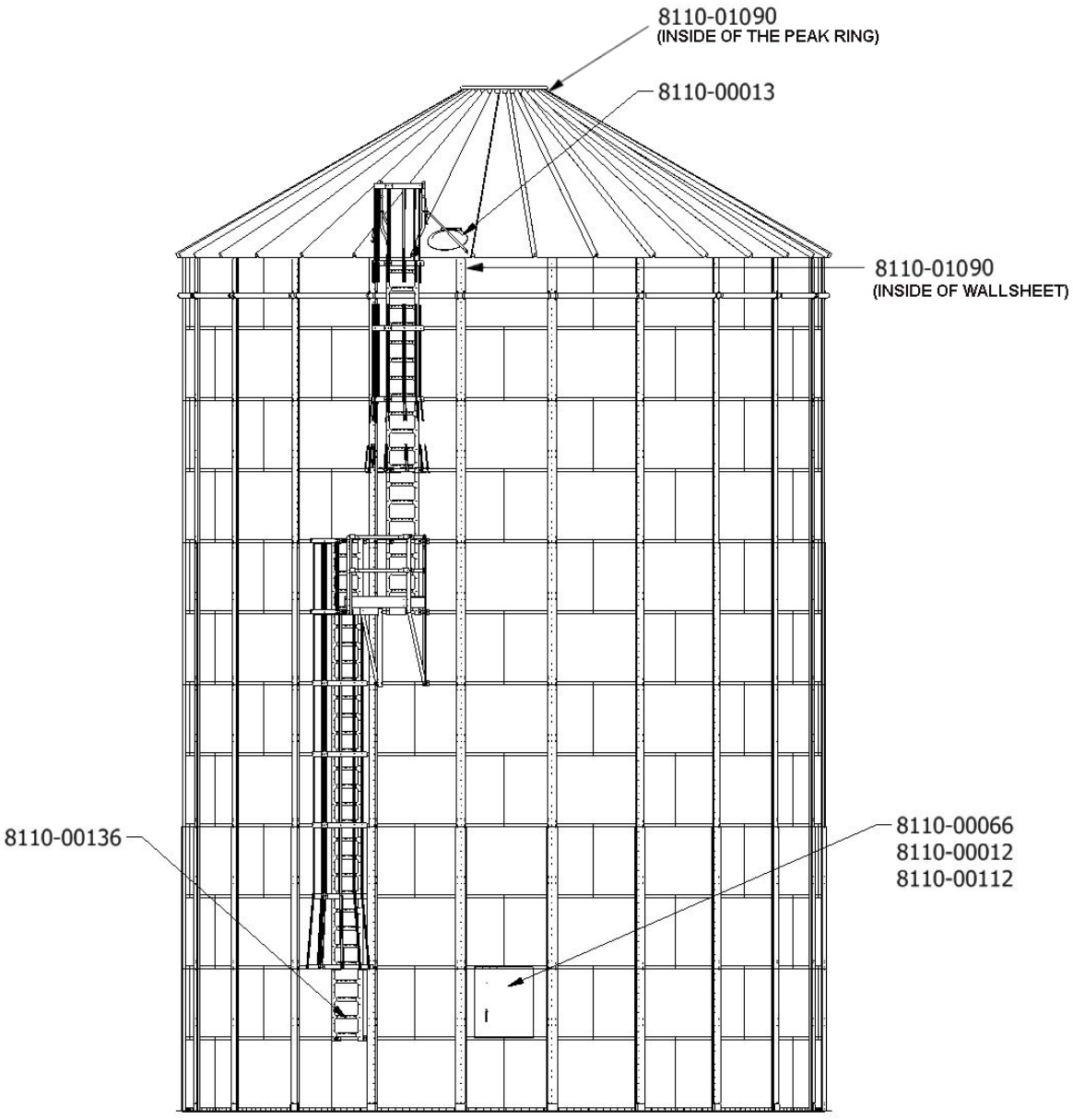
2.5. Decal Installation/Replacement

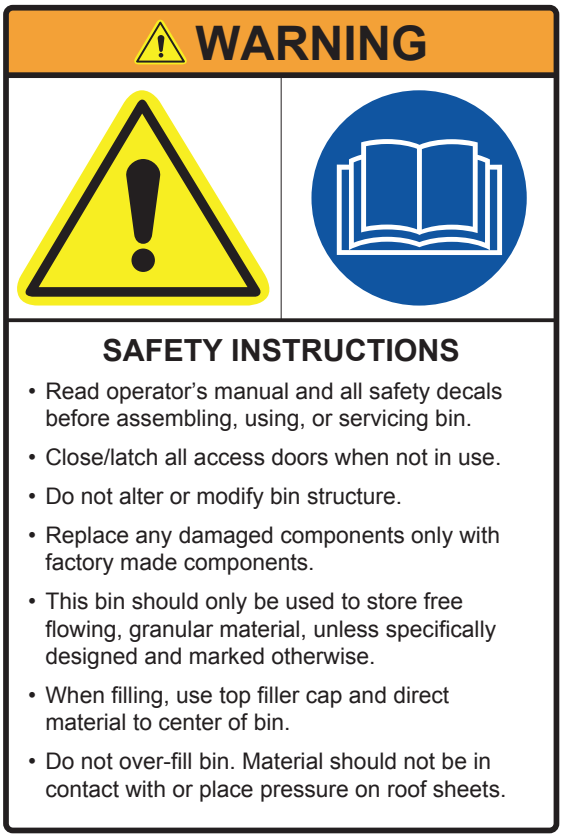
1. Decal area must be clean and dry, with a temperature above 50°F (10°C).
2. Decide on the exact position before you remove the backing paper.
3. Align the decal over the specified area and carefully press the small portion with the exposed sticky backing in place.
4. Slowly peel back the remaining paper and carefully smooth the remaining portion of the decal in place.
5. Small air pockets can be pierced with a pin and smoothed out using the decal backing paper.

2.6. Safety Decal Locations and Details

Replicas of the safety decals that are attached to the water tank and their messages are shown in the figure(s) that follow. Safe operation and use of the water tank requires that you familiarize yourself with the various safety decals and the areas or particular functions that the decals apply to, as well as the safety precautions that must be taken to avoid serious injury, death, or damage.

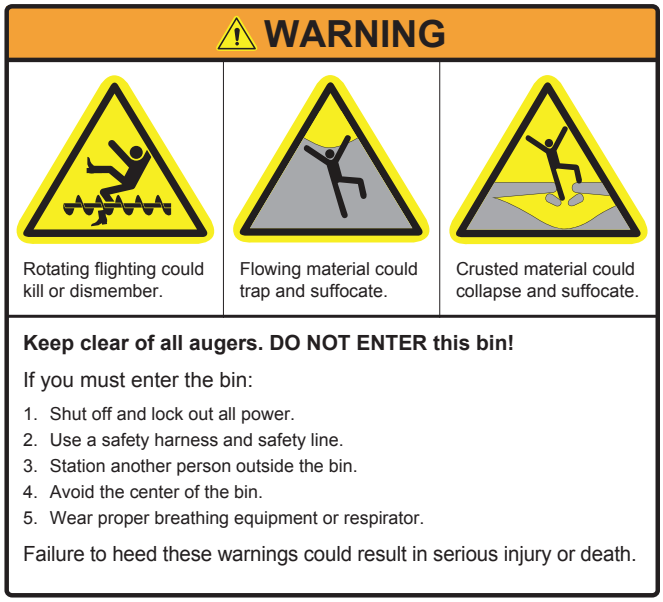
Figure 1. Safety Decals





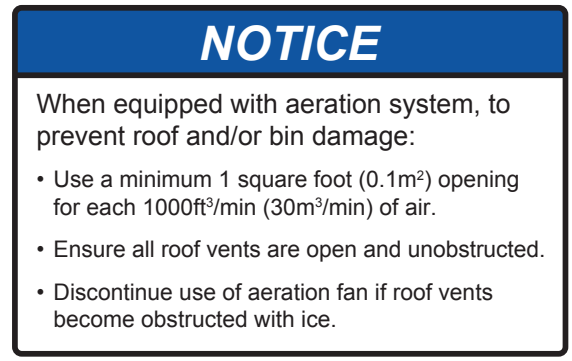
Part Number: 8110–00012

Part Number: 8110–00013



Part Number: 8110–00112

Part Number: 8110–00136



Part Number: 8110–00066

Part Number: 8110–01090

3. Before You Begin

3.1. Tank Design and Capacity

Standard Westeel open top Water Tanks—Special are designed for:

1. Containment of liquids with a specific gravity of less than or equal to 1.0.
2. Maximum horizontal wind pressure based on 94 mph (151 km/h) as per NBCC 2015 and 105 mph (169 km/h) as per ASCE 7-16 if used with an appropriate flat/low profile roof.
3. Zero seismic activity.

Note

Seismic resistance in water tanks varies with height and diameter. Many standard designs have significant seismic capabilities. Designs can be reviewed and/or modified to reflect local seismic requirements.

3.2. Site and Assembly

Unless otherwise specifically provided in writing, Westeel does not take responsibility for any defects or damages to any property, or injury to any persons, arising from or related to any site or assembly considerations, including but not limited to:

- Tank location and tank siting
- Soil conditions and corresponding foundation requirements (note that the examples provided in manuals are for specifically stated soil conditions)
- Tank assembly (Westeel recommends the use of qualified installers; contact Westeel for information on installers in your area)
- Field modifications or equipment additions that affect the tank structure
- Interconnections with neighboring structures
- Compliance with all applicable safety standards, including but not limited to fall restraint systems (ladders or other systems). Local safety authorities should be contacted as standards vary between jurisdictions.

3.3. Methods of Installation

Recommendations for installing Westeel Water Tanks should be closely followed to achieve the full strength of the tank, and to achieve adequate weather sealing. Warranty is void if the recommendations are not followed including but not limited to:

1. Wall sheets that are not specified for a given tier, are used.
2. Foundations are found to be inadequate or out-of-level.
3. Anchor bolts (cast-in-place, drill-in, chemical type or other) are found to be inadequate.

If using bin jacks, choose a hoist with a suitable capacity for the expected empty tank deadload. Make sure the rated capacity of the hoist is not exceeded.

3.4. Critical Assembly Requirements

To ensure a successful, safe and reliable outcome you must comply with the following assembly techniques and practices:

1. Comply with all local code and jurisdictional requirements applicable to your water tank installation.
2. Design and build foundations with the necessary strength for the loads they must support, and for local soil conditions. Westeel foundation guidelines are based on specific stated conditions and may not be applicable to local conditions.
3. Your foundation must provide uniform and level support to the structure being supported. Surface imperfections causing gapping must be remedied. This may involve, but not be limited to a) grouting under the bottom ring of a non-stiffened bin or tank, and b) shimming under the uprights of a stiffened bin or tank, or under the legs of a hopper.
4. Make sure that the proper hardware is utilized for all bolted connections. If a shortage occurs, do not substitute. Take the necessary steps to obtain the proper hardware. Make sure nuts are tightened to the required torque values as specified in the appropriate assembly manual.
5. Comply with all assembly instructions provided in the appropriate assembly manual to make sure your whole water tank is constructed safely. **Important: Do not deviate from the wall sheet and upright layouts provided.**
6. Before anchoring your structure to its foundation, make sure the structure is round. The maximum variation from perfect roundness is 3/4" on the radius. Locate anchor bolts toward the outside of the anchor bolt holes (away from the circle) to permit the incremental expansion that can occur with the initial filling.

3.5. Product Storage

Rust on Galvanized Parts

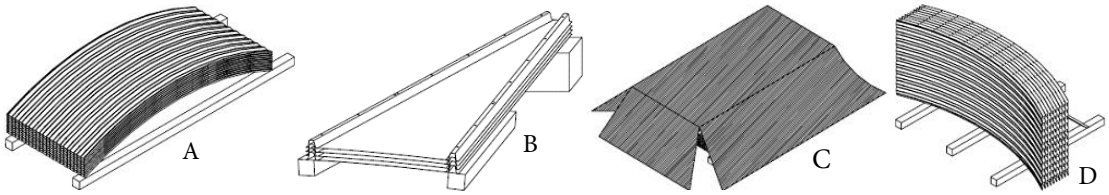
1. White rust forms when moisture is allowed to collect on galvanized surfaces that have yet to develop the durable zinc oxide layer. This zinc oxide layer naturally occurs as the surface interacts with carbon dioxide, and is characterized over time by the dull grey appearance that weathered galvanized surfaces get.
2. Parts that are not well ventilated or well drained can collect water between surfaces and develop white rust.
3. White rust is not a structural concern if its development is stopped in the early stages. A light film or powdery residue can occur after a period of heavy rainfall or a short time of improper storage. If white rust has started to develop, separate parts and wipe off any moisture. Next, using a clean cloth, apply a thin layer of petroleum jelly or food-grade oil to the entire part.
4. If moisture is left on parts, this white rust can become more aggressive and turn into red rust. Red rust can cause degradation in the material and become a structural concern. Any parts that have red rust should be replaced immediately.

Storage Guidelines

- Keep all bundles dry before assembly of the bin.
- Start assembly as soon as possible.
- Do not lay bundles on the bare ground; raise all bundles 6” – 8” off the ground on wood blocks or timbers. (See Figure 2 on page 12 Detail A)
- Store curved wall sheets ‘hump-up’. (See Figure 2 on page 12 Detail A).
- All other bundles material should be placed so that they are well sloped to promote good drainage. (See Figure 2 on page 12 Detail B).

- Roof sheets must be elevated at least 12” at the small end of the sheet.s (See Figure 2 on page 12 Detail B).
- Temporary storage can be provided by erecting a simple framework supporting a waterproof tarp. (See Figure 2 on page 12 Detail C)
- All hardware boxes should be stored inside. These are not waterproof, and will deteriorate in normal weather conditions, allowing moisture to contact the parts inside.

Figure 2. Product Storage



If Parts Become Wet

1. If goods become submerged or wet, the bundles should be opened as soon as possible, sheets or material separated and dried. Keep separated until assembly.

   Brace goods properly so as to avoid damage or injury from material falling when in storage. (See Figure 2 on page 12 Detail D).
2. Any boxed goods that become wet should be dried and stored in a new box that is free of moisture.
3. In addition to wiping down wall sheets, a food-grade oil can also be applied with a clean, lint-free cloth. This will assist in preventing any further moisture from contacting the galvanizing on the steel. Due to safety concerns with installation and use, Westeel does not recommend the use of oil on other parts such as roof sheets and safety ladders.

3.6. Important Notes

1. In order to maintain your wall sheets in good condition separate sheets and allow air circulation between them. Store sheets in a dry place. Do not store sheets with ends pointing upwards.
2. Contact local power officials for minimum power line clearance.
3. See the Tank Design and Capacity section of this manual for information about materials that can be stored in these vessels.
4. Tighten all bolts to the recommended torque setting (see Recommended Bolt Torques in the related installation layout document).

Note

Consistent with Westeel’s policy of continued research and development of our products, we reserve the right to modify or change information contained in this publication without notice.

3.7. Planning and Timing

Before construction begins, even before the product is unpacked, some pre-planning is recommended. Consider the following:

Water tanks are generally constructed from the top down. The top tier of wall sheets and the roof are installed first. Then the tank is raised and other tiers are sequentially added. The best time to install components and accessories are when the tank is readily accessible and before the tank is raised such that the installation

location is out of reach. It is advisable to construct a diagram of accessories and their relative location before construction so as not to forget these details during construction.

Some things to consider:

- The stencil wall sheet is usually facing the road or the yard. Consult the owner as to preferred location.
- Consideration should also be given to the orientation of the inspection hatch sheet, which is usually located on one side or other of the roof ladder.
- The sidewall ladder is usually lined up with the roof ladder. However lining up the ladder with the inspection hatch is another alternative. Similarly, platforms are normally installed beside the ladder and can likewise be positioned at the inspection hatch or roof ladder.
- If equipped with sidewall stairs, the location of the top platform must be given similar consideration. The spiral stairs can be installed to spiral down in a clockwise or counter-clockwise direction so this must also be considered.
- The locations of water level gauges, pipe penetrations and other accessories, relative to the other components and external features, must also be considered. Any penetrations through the wall sheets must **not** be made on a vertical bolt seam. Rather the penetrations should preferably be located towards the center of a wall sheet such that the hole and collars do not interfere with any structural bolt hole locations. It might also be necessary to support any equipment that is attached to the tank if it is excessively heavy and cannot support itself.

Some things to remember during the assembly of the tank include:

- Positioning the geotextile bag and liner in the center of the tank before it is completely closed-in is suggested.
- Roof and eve ladders, platforms, cages, stairs, etc should be installed when the first wall sheet tier and roof are completed and before the liner is attached. Any penetrations in the top tier should also be made at this time.
- Water gauges and other roof-mounted accessories should also be installed at this time.
- As the tank is being raised, remember to continue assembling the ladder and cages, or spiral stairs as you go.

4. Preparation

4.1. Check Shipment

Unload the parts at the assembly site and compare the packing slip to the shipment. Ensure that all items have arrived and that none are damaged.

Report damaged parts or shortages immediately to your dealer. Your dealer will order replacement parts immediately to ensure that assembly will not be held up by missing parts. All parts will be charged for and credit will be issued by party at fault. No credit will be issued if freight bills are signed as received in good condition.

4.2. List of Tools and Equipment

Use quality tools and equipment. Use them safely, and correctly, for their intended use. Tools for this application should include:

Tools

- Electric or pneumatic (air) impact tools
- Power drill and drill bits
- Sockets (multiple 9/16" and 1/2" sockets recommended)
- Large-pocket carpenter pouch
- 8" (20 cm) metal punches (for aligning bolt holes)
- Step and extension ladders, construction grade
- 6-point wrenches (Imperial, box end)
- Metal-cutting saw suitable for cutting roof rings and wind rings
- Scaffolding
- Centre-post bin stand
- Crane and/or bin jacks

Minimum Recommended Safety Equipment

- A properly-stocked first-aid kit
- Eye, foot, head, and hand protection (safety glasses, steel-toed boots, hard hat, work gloves)
- Cable, chain, or rope to tie-off bin or jacks in case of wind
- Body harness and lifeline (for use where falling hazard exists)
- Ground fault interrupt protected electrical hook-ups

4.3. Order Optional Equipment

Optional equipment such as unloading augers, aeration equipment, anchor bolts, foundation sealant, external ladders, safety cage and platforms, etc., should all be on site and checked before assembly starts. Plan your installation in advance. For details, see assembly instruction supplied with optional equipment.

5. Assembly

Before continuing, ensure you have completely read and understood this manual's Safety section, in addition to the safety information in the section(s) below.

5.1. Assembly Safety

WARNING

- Do not take chances with safety. The components can be large, heavy, and hard to handle. Always use the proper tools, rated lifting equipment, and lifting points for the job.
- Carry out assembly in a large open area with a level surface.
- Always have two or more people assembling the water tank.
- Make sure you have sufficient lighting for the work area.
- Tighten all fasteners according to their specifications. Do not replace or substitute bolts, nuts, or other hardware that is of lesser quality than the hardware supplied by the manufacturer.
- Stay away from overhead power lines and other obstructions during assembly. Contact with power lines can cause electrocution.
- Do not work in high winds.
- The equipment shall be installed in accordance with applicable local codes and regulations.

5.2. Top Tier Installation

The following is a step-by-step procedure for assembling a non-structural roof system.

Preparation

1. Inspect the concrete foundation to insure that the foundation meets all the requirements of the installation.
2. Plan the assembly:
   a. Determine the desired tank orientation.
   b. Determine the locations of tank features and accessories (Westeel logo, unloading devices, outside ladder, spiral stairs).

   These considerations affect the location of the inspection hatch roof panel and the placement of the roof ladder or roof stairs.
3. Lay out the tank circumference (for the bottom tier of wall sheets) on the foundation:
   a. Anchor a string to the exact center of the concrete foundation.
   b. Determine the required string length using Table 1 on page 16.

      Note

      The radius values given in the chart are 3/4” smaller than the wall sheet radius at the bottom. This ensures that the scribed circle can be seen during assembly. A perfectly placed ring of sheets should be 3/4” on the outside of this scribed circle.

   c. Scribe the tank circumference onto the foundation.

      Important

      Follow these steps carefully. It is imperative that the tank be as round as possible.

Table 1. Scribe Radius and Peak Ring Height (1 and 2 tier)

Nominal Tank Dia.	Scribe Radius	
(ft)	(ft in)	(m)
6	2'5-11/16"	0.754
9	4'8-1/2"	1.435
12	5'11-3/8"	1.814
15	7'4 -3/4"	2.255
18	8'10-11/16"	2.710
21	10'4-9/16"	3.164
24	11'10-1/2"	3.619
27	13'4-3/8"	4.074
30	14'10-5/16"	4.529
33	16'4-3/16"	4.984
36	17'10-1/8"	5.438
39	19'4"	5.893
42	20'9-15/16"	6.348
45	22'3-13/16"	6.803
48	23'9-3/4"	7.258

Assemble the First Tier of Wall Sheets

1. Assemble a single tier of wall sheets.

2. Refer to the Appendix for information on proper hardware usage.
3. After the first ring of wall sheets has been assembled, check the position and roundness of the ring:
   a. Verify that the tank is round, with no more than 3/4" variation on the radius, when measured from the center of the tank.
   b. Verify that the wall sheets form a smooth circle with no flat spots or cauliflower shaped curves.
   c. Before anchoring the tank to the foundation, re-check to ensure that the tank is round and within tolerance.

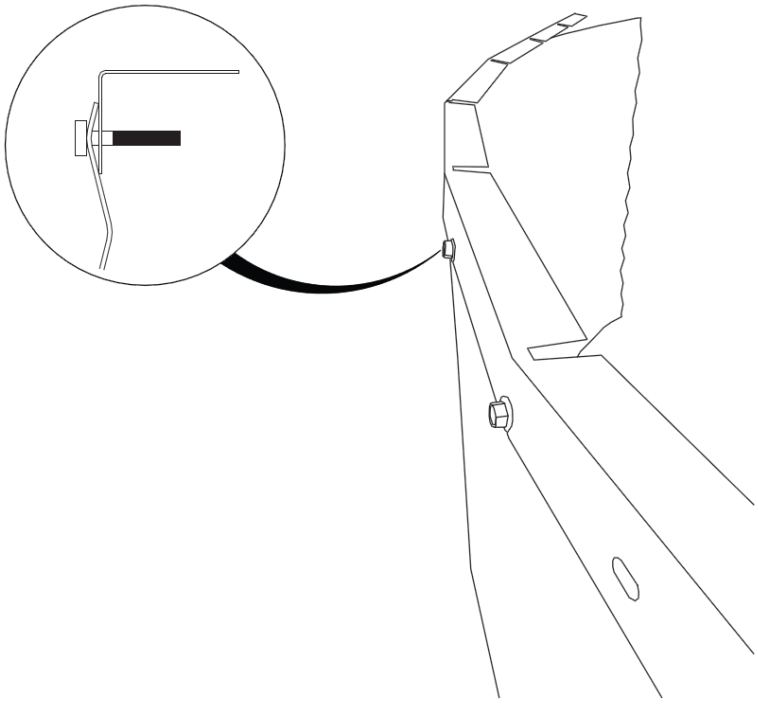
      Note

      Correcting for roundness becomes much more difficult the longer you wait.
4. Locate anchor bolts towards the outside of the anchor bolt slots (away from tank) to permit the incremental expansion that can occur with the initial filling of the tank.
5. When setting jacks, make sure they are also set round and that they are anchored to the concrete.
6. Attach the top ring angle to the inside top of the wall sheets:
   a. Bolt the center hole of the angle first and work towards the ends.
   b. The angle curves as it is bolted to the sheet.
   c. Use provided flat washers to join ends of the angle where required.

      Note

      Do not align the top ring angle joints with wall sheet joints.

Figure 3. Installing the Top Ring Angle



7. Install flat or low profile roof as per the roof manual (WESTEEL or third party).

   Important

   The water tank must have a roof installed for wind rating.

5.3. Water Tank Wall Sheet Matrix

Table 2. Wall Sheet Part Number Table

Specification					Hole Pattern	Wall Sheet		Stencil Sheet	
Thickness nom (min)	Gauge	Label Colour	Weight lbs	Length (overall) (hole-to-hole)		Flat	Finished	Flat	Finished
.040 (.036)	20	Yellow	58.3	116.5” (112.5”)	D	194679	199200	194623	199224
					S	194679	199257	194623	199263
					D	194680	199201	194624	199225
.050 (.045)	18	Orange	72.8		D	194681	199202	-	-
.057 (.052)	17	Red	83.0		D	194682	199203	-	-
.066 (.061)	15	Pink	97.7						
.076 (.070)	14	Lime	112.2		D	194683	199204	194625	199226
					D	194684	199205	-	-
.096 (.088)	13	Green	141.7	117.0” (112.5”)	T	194604	199212	-	-
.116 (.107)	12	Blue	172.1		T	194605	199213	-	-
			171.4	116.5” (112.5”)	D	194685	199206	-	-
.126 (.117)	11	Purple	191.0	118.25” (112.5”)	Q	194616	199214	-	-
			189.0	117.0” (112.5”)	T	194606	199209	-	-
.139 (.130)	10	Black	209.4		T	194607	199210	-	-
			211.6	118.25” (112.5”)	Q	194617	199215	-	-
.168 (.159)	8	Tan	252.1	117.0” (112.5”)	T	194608	199211	-	-
NOTE: Hole patterns are shown as double (D), staggered (S), triple (T), and quadruple (Q)									

5.4. Tank Roundness

1. Make sure the tank is assembled as perfectly round as possible.
2. Use a string anchored and centered on the concrete foundation to scribe a circle.
3. Refer to Table 1 on page 16 for the appropriate calculated scribe radius for the tank.

   Note

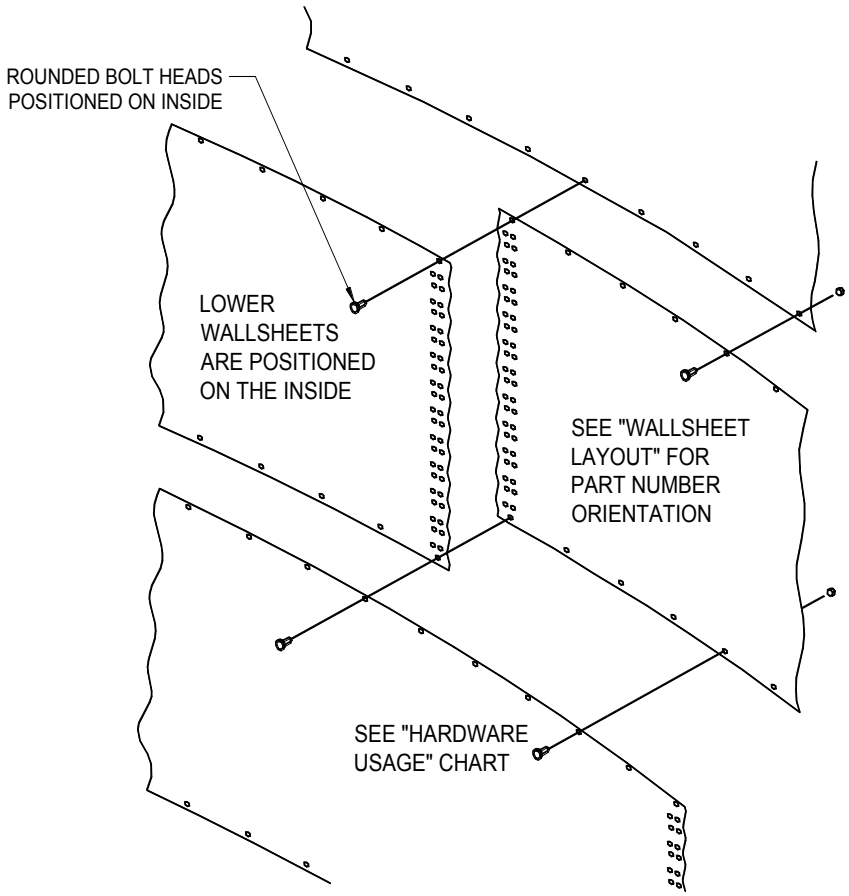
   These radiuses are 3/4" smaller than the wall sheet radius at the bottom, so that the scribed circle can be seen during assembly. A perfectly placed ring of sheets should be 3/4" on the outside of this line all the way around. This should be the first step in assembling a tank. The maximum amount that a tank can be out of round is 3/4" on the radius, when measured from the center of the tank. In addition the wall sheets must form a smooth circle with no flat or elongated portions.

4. Before anchoring the tank to the foundation, ensure again that the tank is round, within tolerance.
5. Locate anchor bolts towards the outside of the anchor bolt holes (away from tank) to permit the incremental expansion that can occur with the initial filling.

5.5. Wall Sheet Assembly Detail

1. Tighten nuts and bolts before lifting the tank for the next wall sheet tier.
2. When assembling wall sheets, one sheet can be left out of each tier to permit ease of access for installers.
3. As the tank is lifted, add in wall sheet while the space is still accessible.
4. If workers must access a suspended tank, then the bottom access point must be protected by blocking, or some other adequate means of supporting the tank should the lifting mechanism fail.

Figure 4. Wall Sheet Assembly Detail



5.6. Assembling Wall Sheets on Small Diameter Tanks

The assembly of small diameter tanks is very sensitive to bolt hole locations on mating sheets. Very slight differences in diameter due to gauge thickness, or the spacing between mating sheets quickly becomes evident in misaligned horizontal wall sheet seam holes. On tanks with larger diameters, this tendency becomes less prevalent.

This hole misalignment can also be minimized with proper assembly techniques. The following is a recommended procedure.

Recommended Procedure

1. Assemble the top wall sheet tier, the roof panels, and the first tier and roof accessories as described in other sections of this manual.

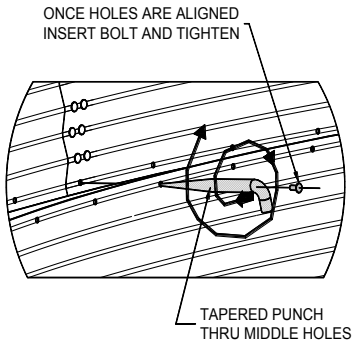
   On 6 and 9 foot tanks, leave the bolts in the bottom half of the vertical wall sheet seams loose until the lower tier is attached.

2. Lift the tank high enough to allow the next tier of wall sheets to be positioned and assembled on the inside of the upper tier.

3. Adjust tank height so that the hole alignment of the already-assembled tier is level with, or slightly elevated with respect to, the top holes in the tier to be added.

   A level foundation will aid in the overall assembly.

Figure 5. Aligning bolt holes



4. The preferred assembly method is to stagger the vertical seams, tier to tier. Position the top center hole of the first wall sheet to be added relative to the mating hole on the previously assembled tier.

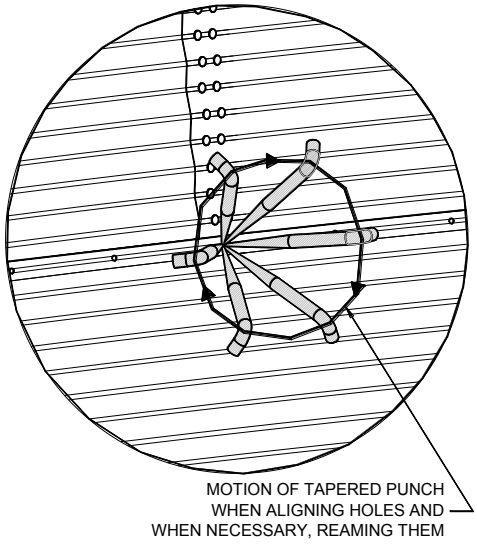
   By definition, the upper hole will be one that is located on the vertical seam of the elevated wall sheets.

5. Capture and hold the wall sheets relative to each other by inserting tapered punches through the middle hole on the lower sheet and the mating vertical seam hole on the upper sheet. (See Figure 5 on page 20.)

6. Angle and rotate the punch to align and ream the holes in the three mating sheets. (Figure 6 on page 21)

   At least one other punch should be inserted into an adjacent hole in order to assist in maintaining alignment.

Figure 6. Reaming and aligning holes

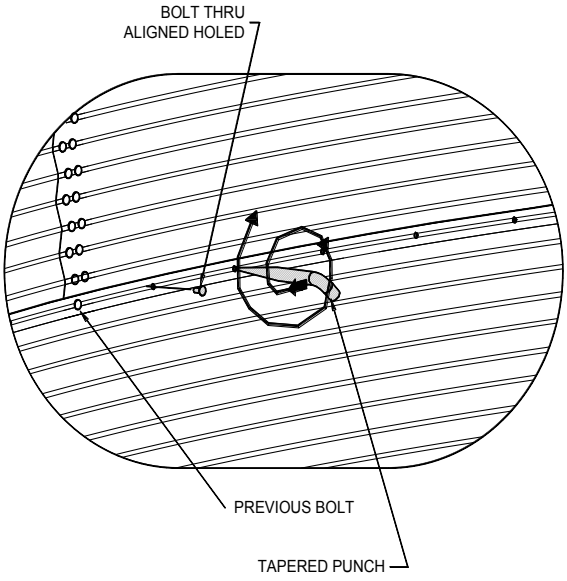


7. Insert the first bolt, apply a nut and tighten immediately.
8. Starting at this center hole, successively work outwards towards either end.

   Each hole on the inner wall sheet will tend to grow slightly larger relative to the holes on the outer sheet. Resist this tendency by inserting a punch into the adjacent hole that is being bolted and prying the inner wall sheet back and in to create a tight spacing between mating sheets.
9. Insert a bolt, apply a nut, and tighten immediately.
10. Repeat the process on each consecutive hole. (See Figure 7 on page 21)

    This should enable you to freely insert bolts as you work toward the outside holes on the wall sheet being assembled. The tightness of fit will increase slightly as you go. This can be countered by using the punch to ream holes slightly, or to use a second cordless impact driver on the inside of the tank to “spin in” bolts once they are started.

Figure 7. Aligning consecutive holes



11. Leave the last vertical seam hole on either end of the wall sheet being installed and repeat the procedure on each of the following wall sheets.

    Note

    When it comes time to make the connection on the vertical seams of the lower tier, it should still be possible to first insert a punch to align the three mating sheets. This can be aided by first utilizing a second punch in the next lower hole in the vertical seam of the lower wall sheets. If necessary, the holes can again be reamed slightly to facilitate the insertion of the bolt. Again, the bolt can be spun in with the nut runner. If necessary, the mating hole can be drilled out, but this should be avoided unless absolutely necessary. If it is necessary to drill out the mating holes, bolts should first be installed in the rest of the vertical seam being mated.

12. Once the horizontal seam is complete, tighten the remaining bolts in the vertical seams of the upper wall sheet that were previously left loose.
13. Continue to work down the vertical seams in the lower wall sheet tier.

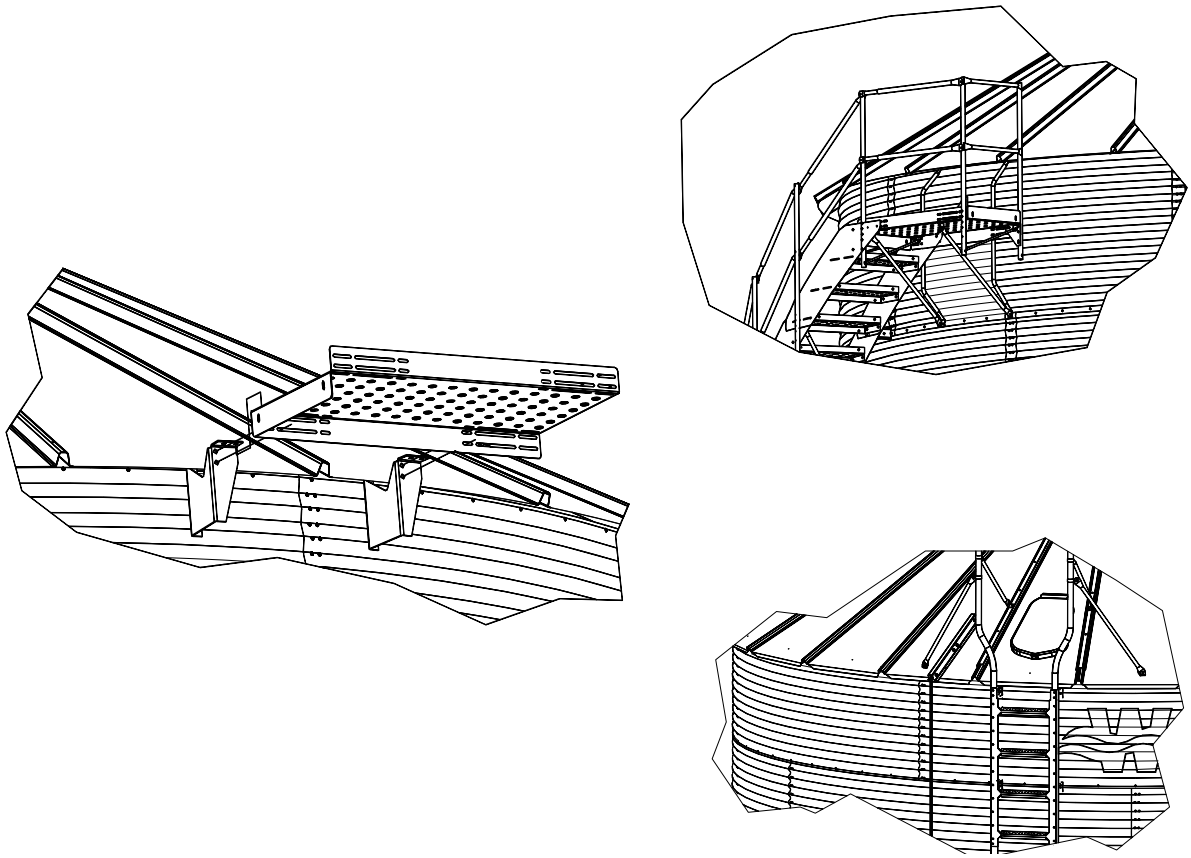
    All holes should be filled before tightening. Again, leave the holes in the bottom half of the wall sheet loose to aid in the assembly of the next tier.

5.7. Prior to Installing Liner and/or Lifting the Tank for the First Time

Before installing the liner, precautions must be taken to protect yourself and prevent puncturing the liner.

1. Tighten all roof hardware and sheets before lifting the tank and beginning installation of the second tier or other assembly activities.
2. Make sure that all the sheet-to-sheet connecting bolts have the round heads to the inside. Nothing should project inwards that might damage the liner.
3. All wall penetrations for the top tier of wall sheets should be cut or drilled before installing the liner. A saw blade or drill tip could easily puncture the liner fabric. Perform any pre-drilling that can be done.
4. Any ladders, stairs or other accessories should be attached to the top tier prior to liner installation. (See Figure 8 on page 23) Locations for hole placement and assembly instructions are found in their appropriate manuals.

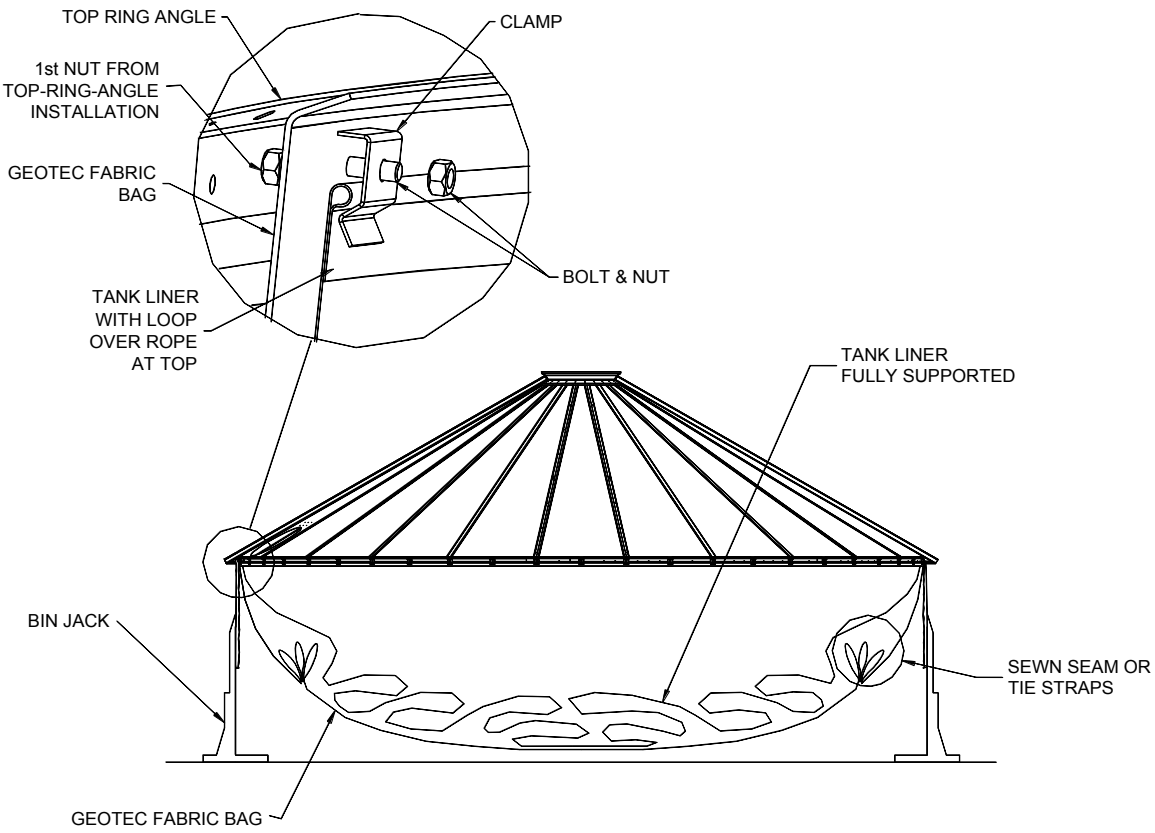
Figure 8. Ladders, Stairs and Accessories



5. Install the water level indicator or any other options or accessories that are components of the roof or installed on the first tier wall sheet.
6. Move the liner and textile onto the pad (center of tank) prior to installation of the walls.
7. As the tank is lifted, ensure some form of blocks are placed under the tank to ensure safe entry and exit of the tank.

5.8. Tank Liner Installation

Figure 9. Tank Liner and Top Ring Detail



Note

Roof is representative only. Top angle provided to be used with low profile or flat roof only.

Step #1

1. After the first wall sheet ring and roof is assembled and tightened, and while the top of the wall can still be accessed from the ground, begin to attach the geotec bag and liner.
2. Unfold the geotec bag and find the top edge with holes cut approximately every 12".
3. Hang the geotec bag off of the inward protruding 5/16” x 2" bolts around the top of the wall sheets at the top ring angle location (or where the roof panels meet the wall sheets for 6’ and 9’ diameter tanks).
4. Place a liner clamp over the bag with the “V” facing the wall as shown in Figure 9 on page 24.
5. Use a second nut to hold it in place.
6. Leave the nut loose enough so that the top of the liner can be slid under the “V” later, once the geotec bag has been completely installed.
7. Work around the tank installing the geotec bag as you go. Any leftover geotec material can be folded and left as a wrinkle.
8. Unfold the liner and locate the top edge with the rope welded into it.
9. Insert the top edge under the liner clamp such that the rope is completely pushed up past the “V” in the bracket.

10. Snug up the nut to secure in place but do not completely tighten.
11. Proceed installing the liner around the tank by inserting under the clamps and finger tightening the nuts.

    Do not pull the liner tight between the liner clamps. Leave a slight and consistent excess in between.
12. Periodically check the remaining liner against the remaining wall distance to determine if more or less wrinkle should be left between the liner clamps.
13. Once the liner is installed and evenly spaced between the clamps, tighten the nuts so that the clamps securely capture the liner against the wall, and cannot be pulled free.

Note

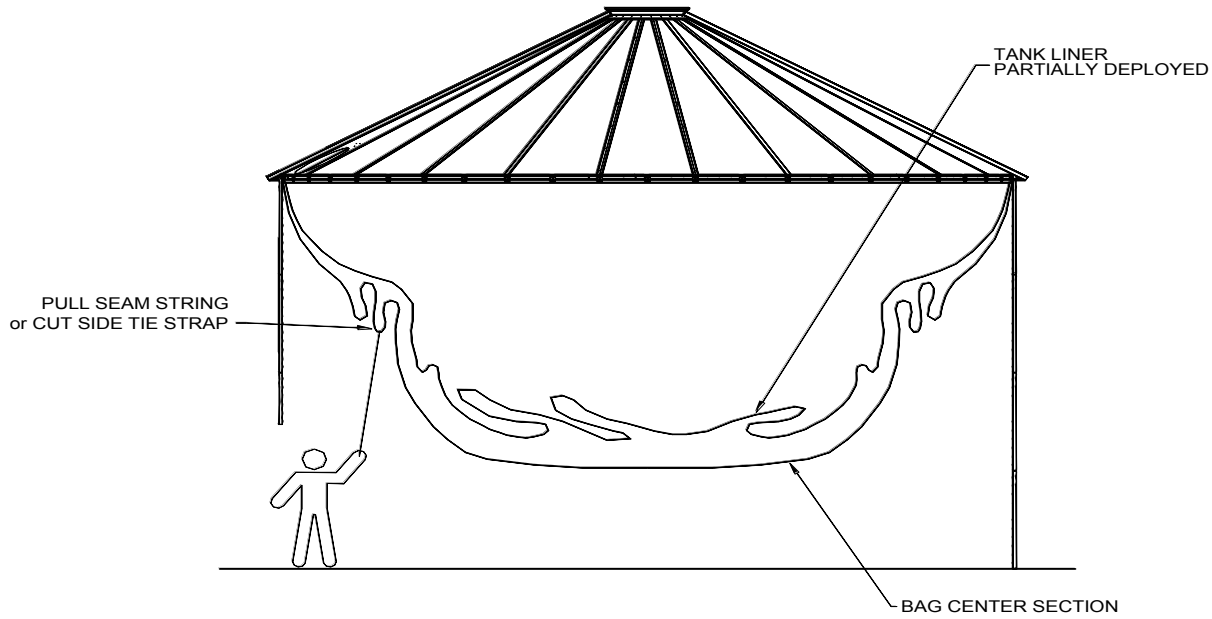
The geotec bag provided keeps the liner up high and in the center of the tank, out of harms way, during the assembly of the remainder of the tank. It also insures that the perimeter is freely available for installers to work during wall sheet assembly.

Step #2

1. After the tank is erected to full height, enter tank through last unattached wall sheet section and pull hanging seam string or cut side tie straps (located every few feet) on the goetec bag. (See Figure 10 on page 25.)

   This will detach the bottom of the geotec bag from the folded walls, and allow the bag and liner to fall into its proper final position. The geotec bag remains intact and creates a buffer between the liner and the tank sidewalls and floor.

Figure 10. Release the tank liner



Note

Roof is representative only. Top angle provided to be used with low profile or flat roof only.

Step #3

1. After the geotec bag and liner have fallen, walk the perimeter in between the bag and the tank wall and pull the textile and liner close to the bottom inside corners.
2. Ensure that the liner is left a couple feet from the wall so that the tank can be lowered safely without pinching and damaging the liner.

3. Install the final wall sheet.

   It is recommended that the tank be lifted high enough for a person to enter under the wall for these final steps.

4. Some form of blockage should be placed under each sheet to shore the tank for this phase.

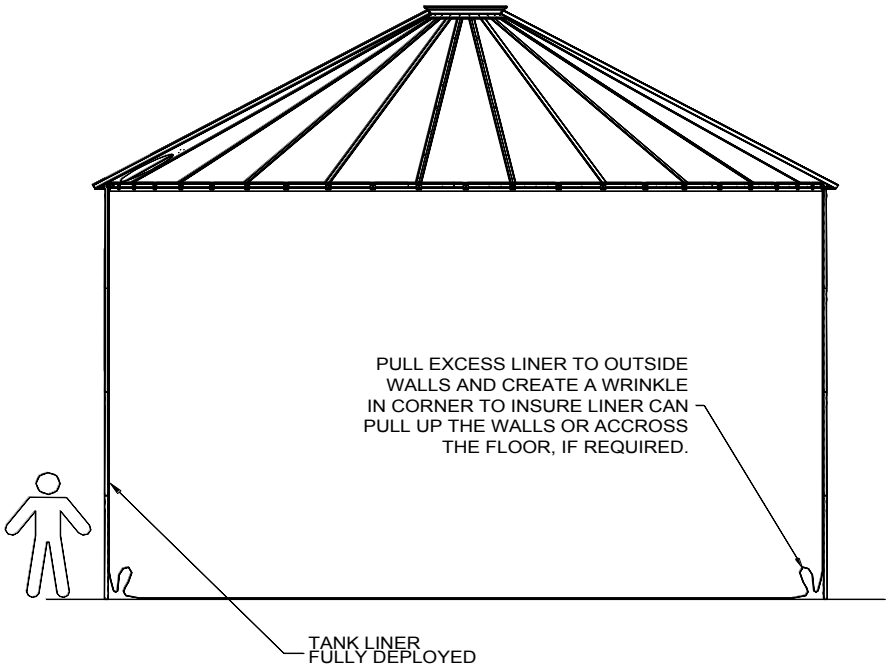
5. Lower the tank into place and secure.

   Note

   Once the tank is secured, it may be necessary to enter the tank to make final liner adjustments, install inlets and outlets, etc. A ladder with protected feet can be lowered through the inspection hatch. Be sure to wear footwear that will not damage the liner.

6. Push the excess liner to the wall and create a wrinkle in the corner, as shown in Figure 11 on page 26.

Figure 11. Pull the liner to the wall



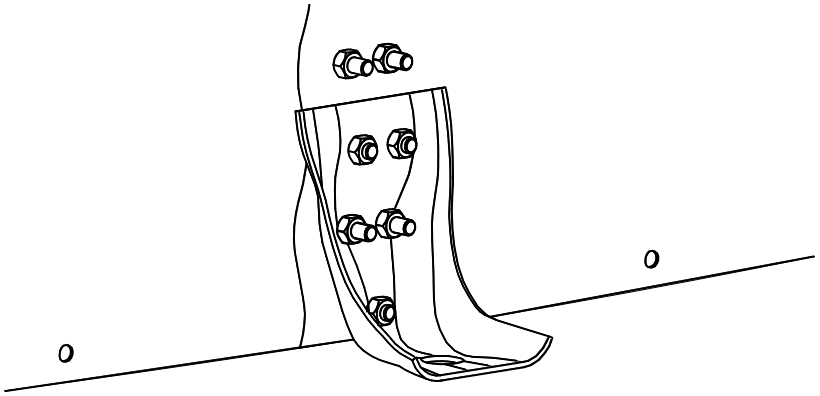
Note

Roof is representative only. Top angle provided to be used with low profile or flat roof only.

5.9. Tank Anchoring

Anchoring is achieved by use of a bracket attached at the bottom wall sheet (shown in Figure 12 on page 27 at a vertical seam). Attachment to a pad or to the ground is by customer supplied hardware. Anchoring must be sufficient to secure tanks against the environmental loading conditions which are available from WESTEEL for different geographical locations. Anchor brackets may need to be installed at locations other than vertical wall seams depending on tank diameter and punched hole pattern of the bottom tier wall patterns.

Figure 12. Anchor Bracket



Install the Anchor Bracket

1. Place the anchor against the wall sheet at the desired location and mark hole locations.
2. Drill holes and install anchor brackets utilizing wall sheet hardware.

Note

If bottom tier wall sheets have a double hole pattern, anchor brackets may be placed at the vertical seam location in order to take advantage of existing holes.

Note

Rules for placing anchor brackets:

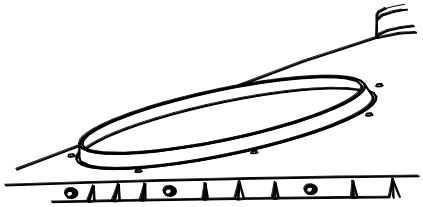
- For 6' diameter tanks — use four (4) anchor brackets at 1/2 sheet locations
- For 9' diameter tanks — use six (6) anchor brackets at 1/2 sheet locations
- For 12' diameter tanks — use eight (8) anchor brackets at 1/2 sheet locations
- For 15' diameter and larger tanks— use one (1) per wall sheet

5.10. Options

24” Diameter Inspection Hatch Assembly

This option is a collar and lid assembly that can be installed on a flat or low profile roof sheet. It comes with its own instructional manual.

Figure 13. 24” Diameter Inspection Hatch



Corrugated Reinforcement Plate

This is an option that will be supplied as requested. It comes in sizes 2", 4", 6", 8", 10" and 12". A hole must be cut in the tank wall and bolt holes drilled by installer. (See Section 5.11 – Fitting Plate Installation on page 29.)

Figure 14. Corrugated Reinforcement Plate

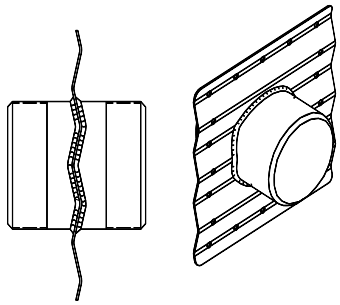


Table 3. Reinforcement Plates Kits List (comes with hardware and caulking tape)

Size (inches)	Part Number
2”	199570
4”	199571
6”	199572
8”	199573
10”	199574
12”	199575

Anti Vortex Assembly

This is an option that will be supplied as requested. It comes in sizes 4", 6", 8" and 10". The assembly includes the corresponding corrugated reinforcement plate, hardware, and caulking tape.

Figure 15. Anti Vortex Assembly

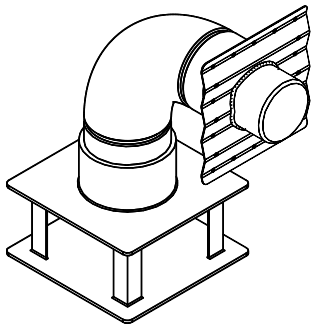


Table 4. Anti Vortex Assembly Kits

Size (inches)	Part Number
4”	199441
6”	199234
8”	199189
10”	199530

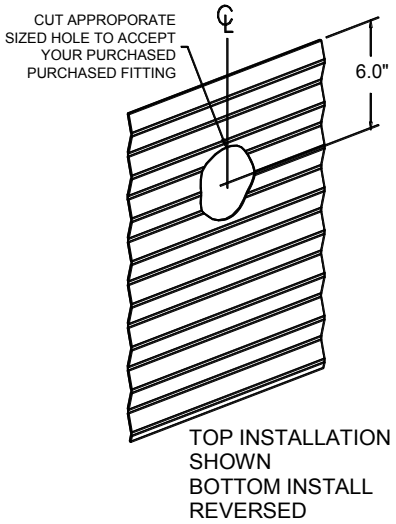
5.11. Fitting Plate Installation

This corrugated reinforcing plate with attached nipple assembly can be provided for overflow or inlet at the top of the tank and for water discharge near the bottom of the tank. The following steps must be followed to create a strong, safe and water tight assembly.

1. Cut an opening, appropriate to your discharge assembly size, in a top or bottom tier wall sheet.

   The hole should be centered on the width of the sheet and be approximately 6" from the top (for overflow). The bottom location (for discharge) is dependent on the complexity of the discharge assembly used (anti vortex, etc). For that reason, the bottom location can be the same as the top, if the same discharge plate is used, or larger if a special inside apparatus is used.

Figure 16. Cutting an opening



Note

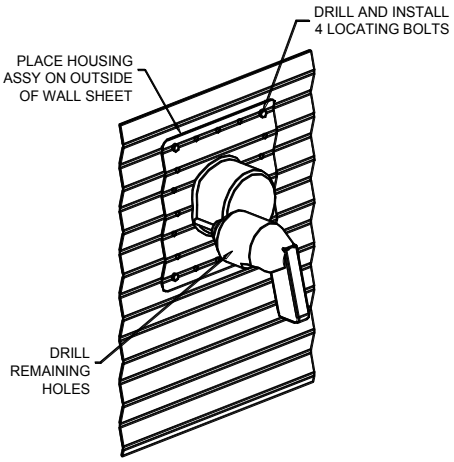
Any variation in hole location adversely affects the stated capacity. In order for the plate to fit the corrugations of the wall sheet, the hole in the wall sheet must be centered on either a corrugation hill or valley. This operation is easiest to perform at the first or last tier stage, when all elements can be accessed from the ground.

Note

If the liner and textile bag are already hung, take care that the liner is not cut or damaged.

2. Place the plate assembly on the outside of the tank and use it as a template to drill the bolt holes as follows: (See Figure 17 on page 30.)
   a. Drill four 3/8" locater holes.
   b. Bolt in place and tighten.
   c. Drill the remaining holes

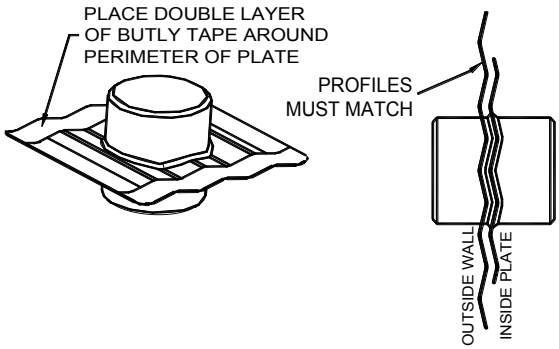
Figure 17. Use the plate assembly as a template to drill holes



If the liner and textile bag are already hung, take care that the liner is not cut or damaged. Having a spotter on the inside is advised.

3. Remove the plate assembly from the wall.
4. Add two layers of Westeel butyl tape around the entire perimeter of plate, on the side that will be facing outward.

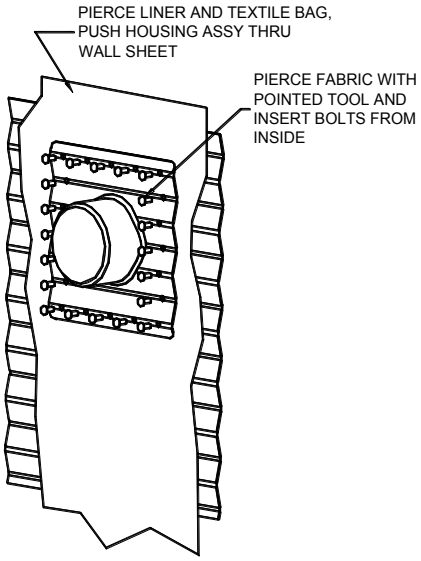
Figure 18. Adding butyl tape to the plate



5. Be careful to consider that the corrugation of the reinforcing plate and the outside wall sheet must fit together.
6. Enter the tank, inside the attached liner.
7. Carefully make a cut in the liner/textile bag for discharge plate nipple to push through. (See Figure 19 on page 31.)

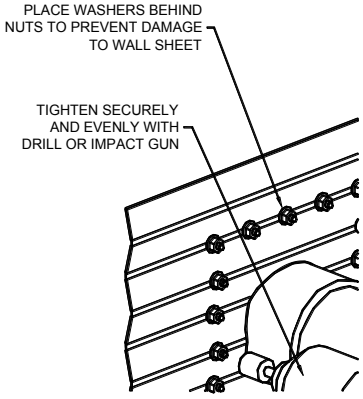
   Use a pointed tool to poke through the bolt holes.
8. Insert 5/16" x 1.5" bolts through to the outside of the tank.

Figure 19. Mounting the discharge plate from the inside



9. Insert washers and nuts over the bolts on the outside of the tank.
10. Tighten securely and evenly until butyl tape starts to squeeze out on the inside and washers start to deform on the outside.

Figure 20. Tightening nuts to seal the discharge plate



5.12. Wall Sheet Layouts

Figure 21. Model 0601 WTR to 0606 WTR

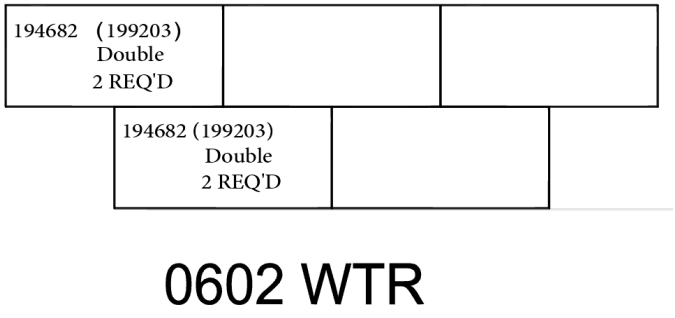


Figure 22. Model 0901 WTR to 0906 WTR

Figure 23. Model 1201 WTR to 1206 WTR

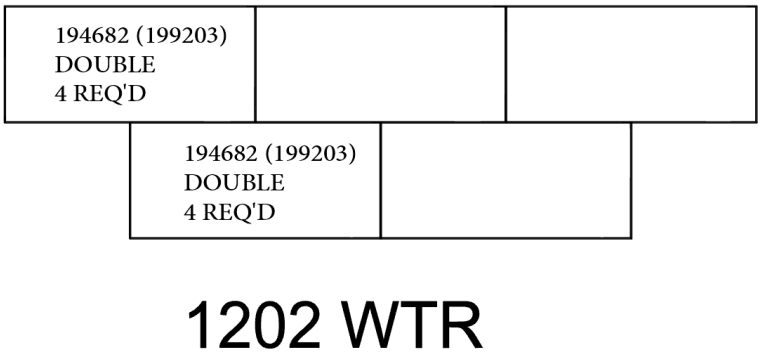
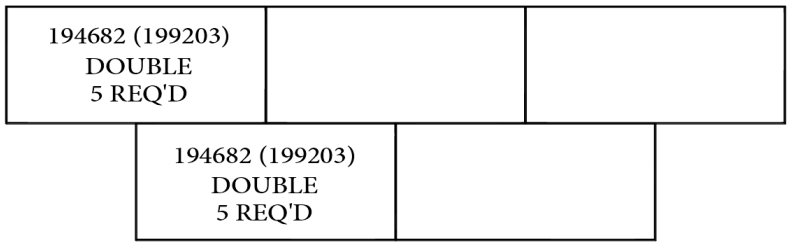
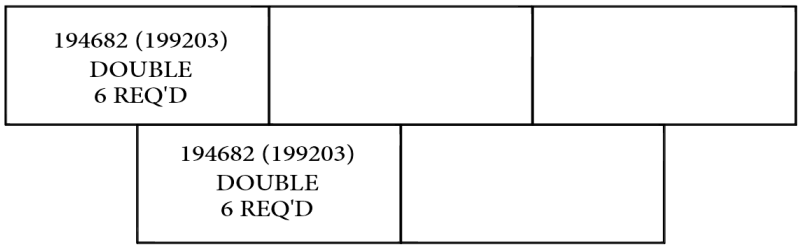


Figure 24. Model 1501 WTR to 1506 WTR



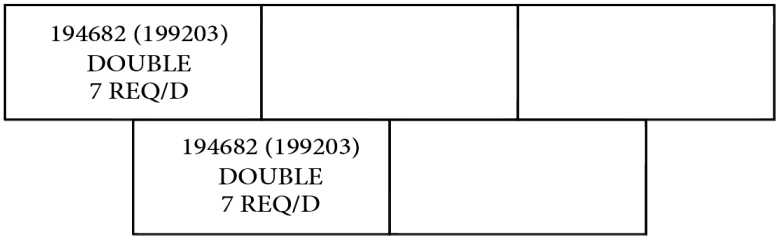
1502 WTR

Figure 25. Model 1507 WTR to 1804 WTR



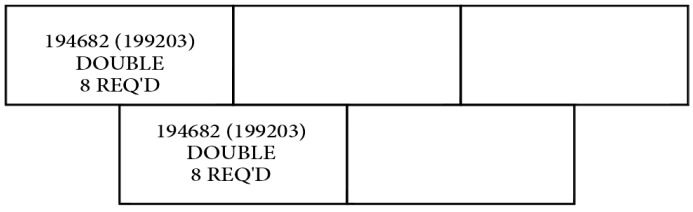
1802 WTR

Figure 26. Model 2101 WTR to 2106 WTR



2102 WTR

Figure 27. Model 2107 WTR to 2404 WTR



2402 WTR

Figure 28. Model 2701 WTR to 2706 WTR

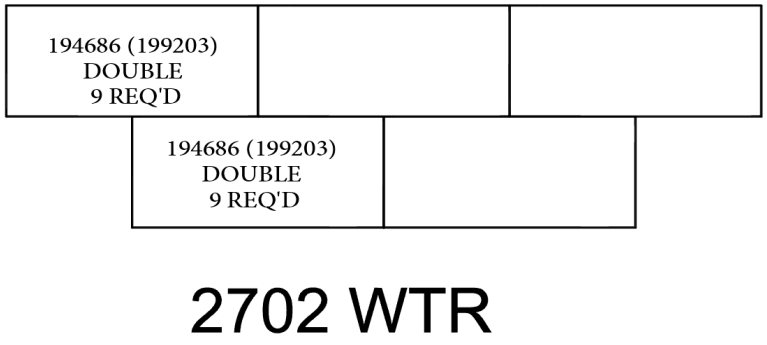


Figure 29. Model 3001 WTR to 3006 WTR

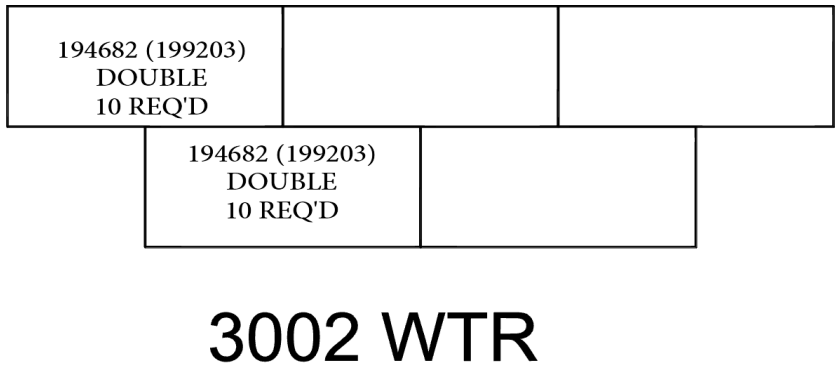


Figure 30. Model 3301 WTR to 3306 WTR

Figure 31. Model 3601 WTR to 3606 WTR

Figure 32. Model 3901 WTR to 3906 WTR

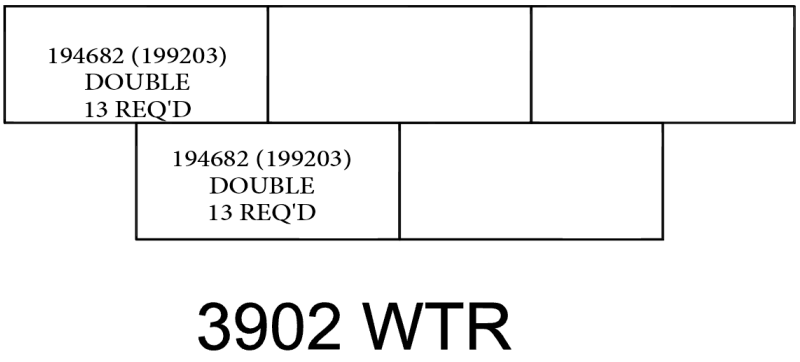


Figure 33. Model 4201 WTR to 4206 WTR

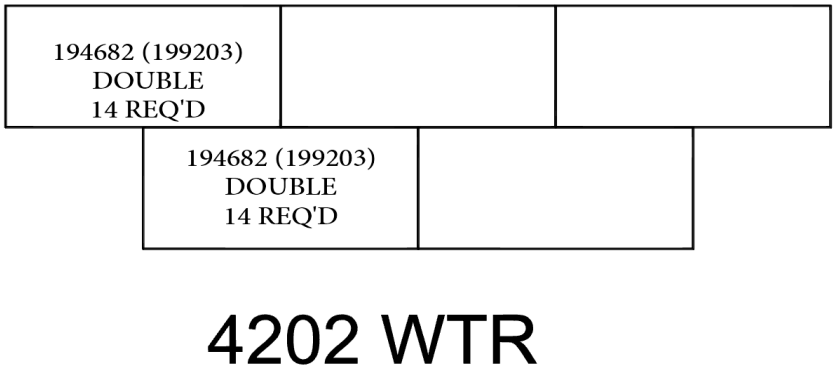


Figure 34. Model 4501 WTR to 4506 WTR

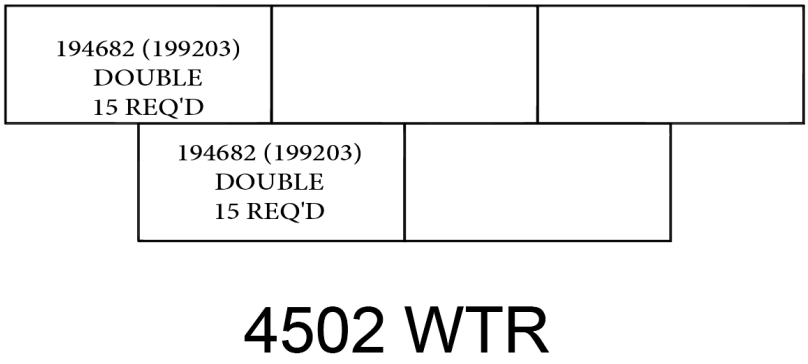
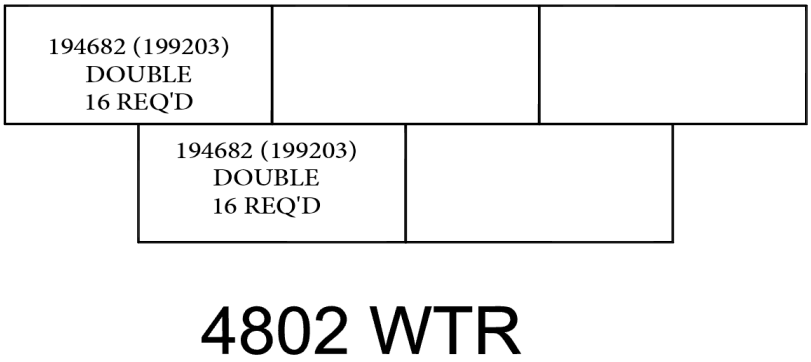


Figure 35. Model 4801 WTR to 4806 WTR



5.13. Water Tank Sign Installation Detail

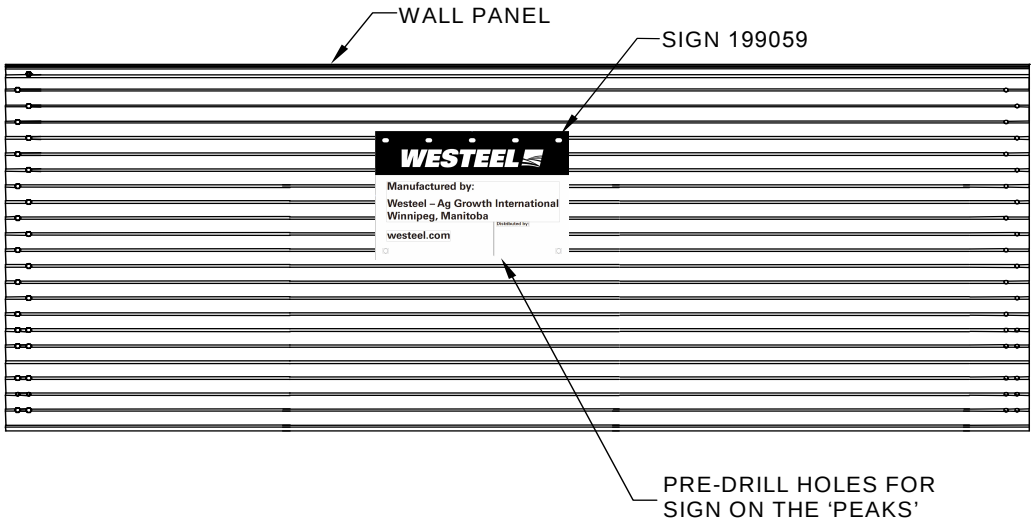
1. Locate the sign in a high visibility area.
2. Wipe wall panel to remove oil.
3. Mark holes on the panel on the ‘peaks’.

   Hole spacing on the sign is designed so the bolts on the horizontal seam may be utilized if desired.
4. Pre-drill holes.
5. Depending on the wall sheet gauge / punch pattern, use one of the following bolts sizes to attach the sign to the wall panel:
   - 3/8” x 1”
   - 7/16” x 1.5”
   - 7/16” x 1.75”

   Note

   Put the bolt heads with the sealing washers on the inside.

Figure 36. Water Tank Sign Installation Detail

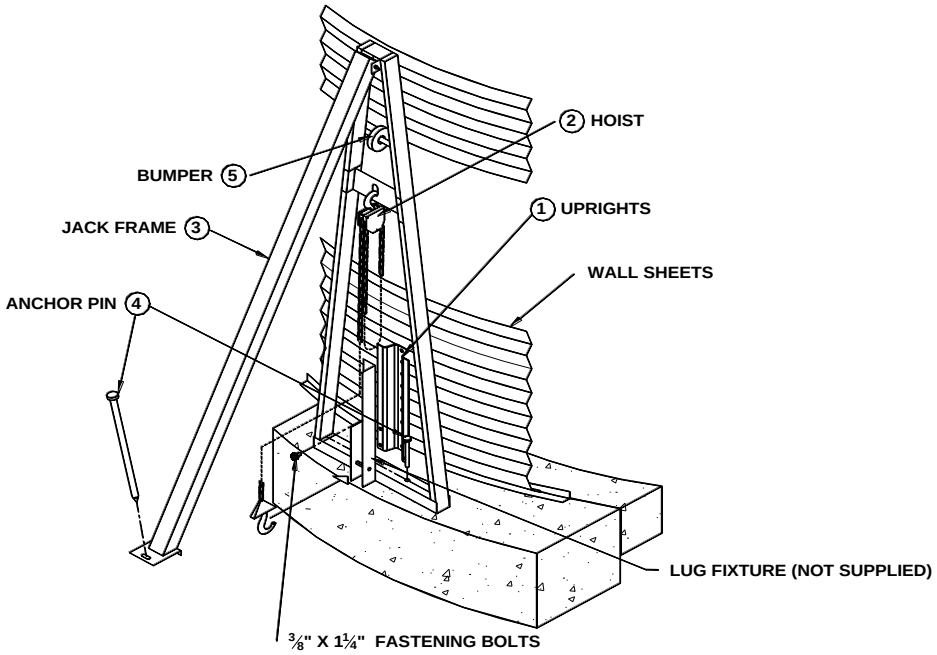


Note

The sign must be installed to identify the product and validate the warranty.

5.14. Tank Jack

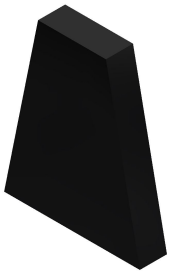
Figure 37. Tank Jack Detail



1. Choose a hoist with a suitable capacity for the expected load. Make sure the rated capacity of the hoist is not exceeded.
2. Fabricate custom lifting lugs to suit the assembly equipment. Each lug should have a capacity 5 times the expected load.
3. Have jacks evenly spaced around the tank. Use one jack per wall sheet.
4. Anchor the jack securely. Use a guy wire if necessary to ensure stability.
5. Use a minimum of four 3/8” x 1¼” bolts (Grade 8) (not supplied) to fasten lug, if one jack per wall sheet is used

6. Appendix

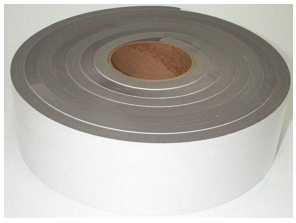
6.1. Roof Parts Box Identification



212231 – Foam Roof Rib Closure

212230 – Bird Stop

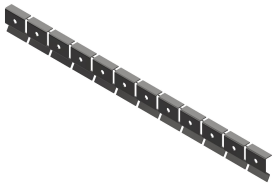
195149 – Peak Ring Bulb Gasket (105")
195150 – Peak Ring Bulb Gasket (168")



195030 – Foam Closure for Peak Ring

235882 – Inspection Hatch Gasket (21’ - 48’)

194784 – Anchor Bracket



199046 – Liner Clamp

6.2. Hardware Usage

Table 5. Roof Hardware

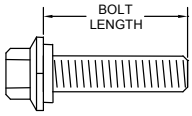
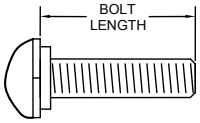
	5/16" x 1" Flanged Hex Bolt (Washer)	5/16" x 1-1/4" Flanged Hex Bolt (Washer)	5/16" Flanged Lock Nut	5/16" STL/NEO Sealing Washer	3/8" Flat Washer
	235914 (250) 235915 (50)	235916 (80) 235917 (50)	235923 (250) 235925 (50)	235973 (25)	235956 (200) 235957 (75)
TOP RING ANGLE to WALL SHEET		●	●		
TOP RING ANGLE JOINTS to WALL SHEET		●	●		●
ROOF VENT to ROOF SHEET VENT CUTOUT	●		●		
INSPECTION HATCH LID ASSEMBLY to ROOF SHEET HATCH CUTOUT	●		●		
INSPECTION HATCH LATCH to ROOF SHEET	●		●	●	

Table 6. Tank Hardware

	**3/8" x 1" Round Head Bolt c/w Slot**	**3/8" Hex Nut**	**7/16" x 1-1/2" Flanged Hex Bolt (Washer)**	**7/16" x 1-3/4" Flanged Hex Bolt (Washer)**	**7/16" Hex Nut**
	235960 (700) 235959 (300)	**235960 (700) 235950 (300)**	**232855 (400)**	**232856 (300)**	**232855 (400) 232856 (300)**
WALL SHEET to WALL SHEET	●	●			
WALL SHEET to WALL SHEET (LAM)			●		●
WALL SHEET to WALL SHEET (0.336" LAM)				●	●
WALL SHEET to ANCHOR BRACKET	●	●			
WALL SHEET (LAM) to ANCHOR BRACKET			●		●
WALL SHEET (0.336" LAM) to ANCHOR BRACKET				●	●

6.3. Recommended Bolt Assembly

When tightening bolts, tighten the nut on the bolt until a “snug-tightened condition” has been achieved. A “snug-tightened condition” is defined in *Specification for Structural Joints Using ASTM A325 or A490 Bolts* (Research Council on Structural Connections: June 2004), which states:

“*The snug-tightened condition is the tightness that is attained with a few impacts of an impact wrench or the full effort of an ironworker using an ordinary spud wrench to bring the connected plies into* ***firm contact****.*”

A properly tightened bolt will compress the sealing washer noticeably. All assembly crew members must be made aware of this requirement, and must know how to achieve a snug-tightened condition using common bin-building tools.

It is important that the bolts in the vertical wall sheet seams are tightened enough to squeeze the caulking and bring the wall sheet surfaces into firm contact with each other. This is especially important to monitor when installing bolts in temperatures approaching -10°C (14°F).

The following table shows the minimum impact gun torque capacity necessary to achieve a snug-tightened condition for bolts used in the assembly process.

Table 7. Recommended Impact Gun Torque Values Capacity to Achieve Snug-Tightened Bolts

Bolt Diameter	Bolt Grade	Grade Mark	Recommended Torque Capacity		
			in-lb	ft-lb	N-m
1/4”	Grade 8.2		75	6	8
5/16"	Grade 8.2		215	18	24
3/8"	Grade 8.2		370	31	42
7/16"	Grade 8.2		600	50	68
1/2”	Grade 8.2		960	80	108
5/8”	Grade 8.2		1800	150	203
3/4”	Grade 5		3230	269	365

For proper sealing, do not overtighten the wall seam connections. Sealing is not critical on upright splice connections; these connections should be tightened securely to prevent loosening.

Hold the bolt head securely when tightening the nut to prevent damage to the sealing washer.

Important

ALWAYS TIGHTEN THE NUT, NOT THE BOLT.

Avoid bin assembly at temperatures below -10°C (14°F) if possible. Erection in low temperatures does not ensure strong, well sealed connections. Do not substitute bolts in place of those supplied by Westeel.

7. Limited Warranty: Westeel Water Tank Containment Systems

Westeel – Ag Growth International (“Westeel”) warrants products for Water Tank Containment Systems that it has manufactured and/or that are branded with its name (the “goods”) subject to the following terms and limitations, (the “warranty”):

Duration of Warranty

The duration of the warranty is limited as follows:

- 10 years

The duration of the warranty will run from the date of purchase from a dealer or distributor authorized by Westeel (the "warranty period").

Exclusive Remedy — Replacement

Within the warranty period, Westeel will replace the goods and/or original manufactured components thereof which are found, to Westeel's satisfaction, to be defective. Westeel is not responsible for direct, indirect, special, consequential, or any other damages of any kind, including personal injury to any individual, howsoever caused, including caused by transportation of the goods for repair or replacement.

Procedure for Obtaining Service

In the event of a warranty claim, the purchaser must complete any and all information required by Westeel in order to properly assess or investigate the claim. Westeel will not be responsible for the removal of any of the goods found to be defective, or transportation charges to and from Westeel's authorized dealer or distributor, or for installation of any replacement goods and/or parts furnished under the warranty.

Limitations as to Scope of Warranty

The warranty does not extend to defects or damage caused, in whole or in part, by:

1. use of a kind and/or to a degree not reasonably expected to be made of the goods;
2. improper storage of the goods both prior to and after purchase;
3. damage caused by, or in the course of, installation or assembly;
4. any use of the goods which is not an intended use as specified in Westeel's published product literature, or otherwise specified by Westeel in writing;
5. any equipment attached to or used in conjunction with the goods that are not of Westeel's manufacture nor supplied by Westeel;
6. any field modifications or substitutions to original Water Tank Containment System components;
7. acidic environmental conditions affecting the structural integrity of the goods;
8. any other circumstance not in keeping with proper maintenance and/or use of the goods;

9. cosmetic changes such as white rust and scratches
10. Acts of God, accident, neglect or abuse of the goods by the purchaser and/or any other individual or entity; or
11. Any use or installation inconsistent with Westeel's Standard Disclaimers.

Limitations as to Manufacturer

The warranty does not cover products sold by Westeel that are not manufactured by Westeel. In those circumstances, the purchaser is referred to the manufacturer of those products.

Limitation of Implied Warranties and Other Remedies

To the extent allowed by law, neither Westeel nor its dealers, nor any company affiliated with Westeel makes any warranties, representations, or promises as to the quality, performance, or freedom from defect of any Product covered by this Warranty.

WESTEEL HEREBY DISCLAIMS, TO THE EXTENT APPLICABLE, ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. A PURCHASER'S ONLY REMEDIES IN CONNECTION WITH THIS WARRANTY ARE THOSE SET FORTH IN THIS WARRANTY. IN NO EVENT WILL WESTEEL, ITS DEALERS, OR ANY COMPANY AFFILIATED WITH WESTEEL BE LIABLE FOR INCIDENTIAL, CONSEQUENTIAL OR PUNITIVE DAMAGES.

Some jurisdictions do not allow waivers of certain warranties, so the above waivers may not apply to you. In that event, any implied warranties are limited in duration to ninety (90) days from delivery of the products. You may also have other rights which vary from jurisdiction to jurisdiction.

Exclusive Warranty

This warranty is the only warranty provided by Westeel and all other warranties and/or commitments, whether express or implied and no matter by whom made, statutory or otherwise, are subsumed and replaced by it and are of no legal effect. If any provision of the warranty is held by a court of competent jurisdiction to be void or unenforceable, in whole or in part, such provision shall be deemed severable and will not affect or impair the legal validity of any other provision of the warranty.

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Please include the part number listed on the cover page in your message.