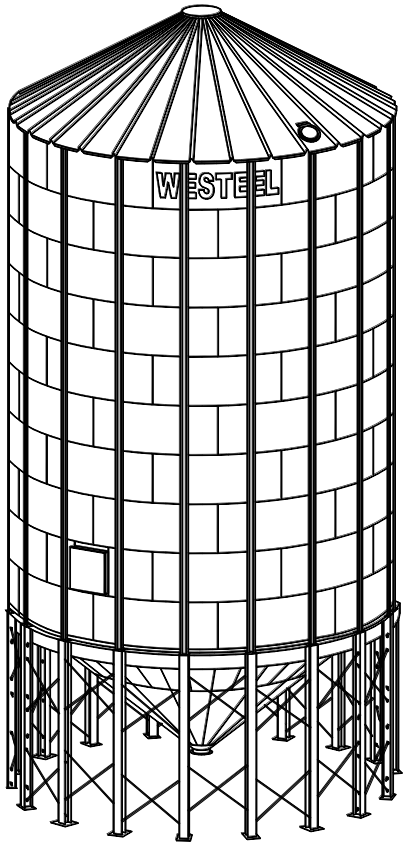
WESTEEL

Wide Corr Grain Bins
15’ to 36’ Centurion
Commercial Hopper Tank Series

Installation and Storage Instructions



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.

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AGI AG GROWTH INTERNATIONAL

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1. Introduction

This manual describes how to assemble a Westeel Wide Corr Centurion Grain Bin.

Before assembling the grain bin, please read this manual. Familiarize yourself with the process and the necessary precautions for efficient and safe assembly.

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

The safety information in the safety section of this manual applies to all safety practices. Specific safety information (such as Operation Safety), can be found in the appropriate section.

YOU are responsible for the **SAFE** use and maintenance of your grain bin. **YOU** must ensure that you and anyone else who is going to work around the grain bin understands all procedures and related **SAFETY** information contained in this manual.

Remember, **YOU** are the key to safety. Good safety practices not only protect you, but also the people around you. Make these practices a working part of your safety program. All accidents can be avoided.

- It is the grain bin owner, operator, and maintenance personnel's responsibility to read and understand **ALL** safety instructions, safety decals, and manuals and follow them when assembling, operating, or maintaining the equipment.

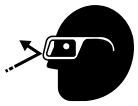
- Owners must give instructions and review the information initially and annually with all personnel before allowing them to operate the grain bin. Untrained users/operators expose themselves and bystanders to possible serious injury or death.
- The grain bin is not intended to be used by children.
- Use the grain bin for its intended purposes only.
- Do not modify the grain bin in any way without written permission from the manufacturer. Unauthorized modification may impair the function and/or safety, and could affect the life of the grain bin. Any unauthorized modification of the grain bin will void the warranty.

2.3. Personal Protective Equipment

The following Personal Protective Equipment (PPE) should be worn at all times when assembling 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.

2.5. Decal Installation/Replacement

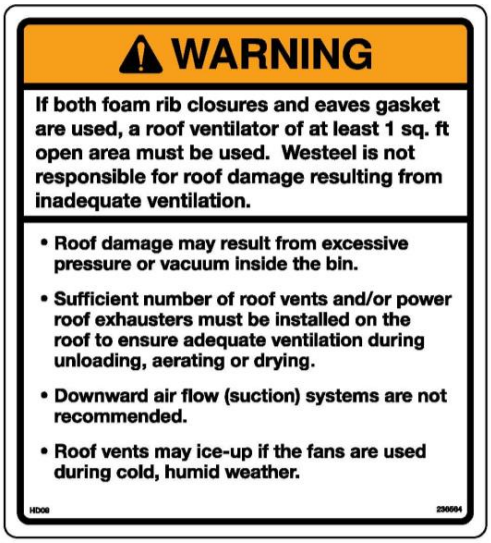
1. Decal area must be clean and dry, with a temperature above 50°F (10°C).
2. Decide on the exact position before you remove the backing paper.
3. Align the decal over the specified area and carefully press the small portion with the exposed sticky backing in place.
4. Slowly peel back the remaining 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 sign backing paper.

2.6. Safety Decal Locations and Details

Replicas of the safety decals that are attached to the grain bin and their messages are shown in the figure(s) that follow. Safe operation and use of the grain bin 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



3. Before You Begin

3.1. Bin Design and Capacity

Standard Westeel Grain Bins are designed for:

1. Non-corrosive free-flowing materials up to 55 lbs/ft^3 (880 kg/m^3) average compacted bulk density.
2. Maximum horizontal gusted wind speed of 94 mph (151 km/h)
3. Zero seismic activity

   Note

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

4. Roof loading capabilities vary with diameter, peak load and snow load.
   a. Peak Loads – standard peak loads follow. ***Upgrades are available.***

Table 1. Peak Loads for Various Roofs

Size	Type of Roof	Load (lbs)	Load (kg)
15’ to 24’	non-structural	4000 lbs	1814 kg
27’ to 48’	non-structural	5000 lbs	2268 kg
51’ & 54’	non-structural	8000 lbs	3629 kg
48’ to 108’	structural	20,000 lbs	9072 kg

   b. Roof Snow Loads (RSL) – at the above stated standard peak loads, standard RSLs vary with diameter and range from 16 psf (78 kg/m^2) to 49 psf (239 kg/m^2). ***Upgrades are available***.

      Note

      The correlation between ground snow load (GSL) and roof snow load (RSL) for grain bin designs vary with jurisdictions. In the US GSL = 2 x RSL. In Europe GSL = 1.25 x RSL. In Canada the correlation between GSL and RSL varies and is site specific.

   c. For maximum roof snow load capacities for various sizes and types of roofs, refer to the Roof Design Capacities sections that follow.

3.1.1 Roof Design Capacities for Non-Structural Roofs

Table 2. Maximum Roof Snow Load at STANDARD Peak Load

Bin Series	Std Peak Load	Standard Roof		Plus Upgrade 1		Plus Upgrade 2		Plus Upgrade 3	
	lbs (kN)	psf	kPa	psf	kPa	psf	kPa	psf	kPa
15	4000 (17.8)	49	2..35	n/a		n/a		n/a	
18		49	2.35						
21		33	1.58	50	2.39				
24		23	1.10	36	1.72				
27	5000 (22.2)	26	1.24	42	2.01				
30		22	1.05	34	1.63	43	2.06		
33		16	0.77	26	1.24	36	1.72	47	2.25
36		26	1.24	33	1.58	42	2.01	n/a	
39		24	1.15	29	1.39	39	1.87		
42		21	1.01	27	1.29	37	1.77		
45		18	0.86	26	1.24	35	1.68		
48		23	1.10	28	1.34	36	1.72		
51	8000 (35.6)	22	1.05	31	1.48	n/a			
54		19	0.91	30	1.44				

Table 3. Maximum Roof Snow Load at UPGRADED Peak Load

Bin Series	Upgraded Peak Load	Standard Roof		Plus Upgrade 1		Plus Upgrade 2		Plus Upgrade 3	
	lbs (kN)	psf	kPa	psf	kPa	psf	kPa	psf	kPa
15	8000 (35.6)	31	1.48	n/a		n/a		n/a	
18		31	1.48						
21		26	1.24	41	1.96				
24		19	0.91	29	1.39				
27	10000 (44.5)	20	0.96	30	1.44				
30		17	0.81	25	1.20	36	1.72		
33		12	0.57	20	0.96	26	1.24	40	1.92
36		20	0.96	25	1.20	34	1.63	n/a	
39		18	0.86	23	1.10	32	1.52		
42		16	0.77	21	1.01	30	1.44		
45		14	0.67	19	0.91	27	1.29		
48*		18	0.86	23	1.10	28	1.34		
51*	12000 (53.4)	16	0.77	23	1.10	n/a			
54*		14	0.67	22	1.05				

Note

1. Standard roofs are adequate for many applications but additional capacity is available when optional upgrade packages are used.
2. Upgrade packages include roof stiffening rings and/or rib supports. For 21' and 24' roofs, the upgrade uses heavier gauge roof sheets.
3. For peak load between the standard and upgraded, a straight line interpolation can be used to determine maximum roof snow load.
4. *Structural 48’, 51’ and 54' roof with rafters is available to support peak ring loads greater than loads on Table 3.

3.1.2 Roof Design Capacities for Structural Roofs

Table 4. Maximum Roof Snow Load at STANDARD Peak Loads

Bin Series	Std Peak Load	Standard Roof	
	lbs (kN)	psf	kPa
48	20000 (89.0)	42	2.01
51		42	2.01
54		42	2.01
60		42	2.01
66		41	1.96
72		41	1.96
75		40	1.92
78		40	1.92
84		40	1.92
90		40	1.92
96		40	1.92
102		35	1.68
105		35	1.68
108		35	1.68

Table 5. Maximum Roof Snow Load at UPGRADED Peak Loads

Bin Series	Upgraded Peak Load	Standard Roof	
	lbs (kN)	psf	kPa
48	60000 (266.9)	41	1.96
51		41	1.96
54		41	1.96
60		41	1.96
66		40	1.92
72		40	1.92
75		39	1.87
78		39	1.87
84		39	1.87
90		37	1.77
96		37	1.77
102		34	1.63
105		34	1.63
108		34	1.63

3.1.3 Roof Snow Load vs. Ground Snow Load

The Roof Design Capacity tables reflect roof snow load (RSL) values. These are design values. Often, comparisons are made to ground snow values (GSL). These are not the same. The conversion from GSL to RSL varies between jurisdictions and is governed by building codes:

- In the United States, for grain bins, GSL = RSL x 2
- In Europe, for grain bins, GSL = RSL x 1.25
- In Canada, for grain bins, the GSL/RSL conversion varies with every location across the country. However, for comparison purposes, the US conversion can be used as an approximation.

Therefore, when comparing against competitive GSL values in the US, double the above values. When comparing against competitive GSL values in Canada, double the above values for a reasonably close approximation.

3.2. Foundation Design and Loads

The foundations for the stiffened bin models are based on 4000 lbs. per sq. ft. (192 kPa) soil bearing capacity. All foundation designs use 3000 lbs. per sq. in. (21 MPa) ultimate compressive strength (after 28 days) for concrete and 43,500 lbs. per sq. in. (300 MPa) re-bar. The foundation designs included in this manual are suggestions only, and will vary according to local soil conditions. Westeel will not assume any liability for results arising from their use.

Important

Foundation should be uniform and level. Level should not vary by more than ¼" over a span of four feet under the bottom ring angle. Any variance from level must be shimmed under upright base assembly. If being utilized to support a full floor aeration system, this levelness requirement should extend across the complete floor area.

3.3. 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:

- Bin location and bin siting
- Soil conditions and corresponding foundation requirements (note that the examples provided in manuals are for specifically stated soil conditions)
- Bin assembly (Westeel recommends the use of qualified bin installers; contact Westeel for information on installers in your area)
- Field modifications or equipment additions that affect the bin 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.

3.4. Methods of Installation

The recommendations for assembling and installing Westeel grain bins must be closely followed to achieve the full strength of the bin and to achieve adequate weather sealing. The product warranty is void if:

1. Wall sheets and/or uprights 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.
4. Off-center loading or unloading is used. (This does not apply to the use of approved side unloading systems.)
5. Materials stored are not free-flowing or have a compacted bulk density greater than 55 lbs/ft^3 (880 kg/m^3).

If using bin jacks during assembly, always lift on an upright. Choose a hoist with a adequate capacity for the expected empty bin deadload. Make sure the rated capacity of the hoist is not exceeded.

3.5. Cutting Openings in Wide Corr Grain Bins

This section provides instructions for cutting openings to accommodate fan transitions, unloading augers and roof vents.

General Rules for Cutting openings

1. Never cut any uprights, roof ribs, or wall sheet bolted vertical seams to create an opening.
2. Openings shall be located so equipment being installed won't interfere with any bin components/ accessories.
3. Openings shall be minimized as much as possible for structural integrity of grain bins.
4. Corners in openings shall be cut with minimum radius of 1/8" to reduce stress concentration.
5. Openings shall be sealed all the way around for all weather conditions.
6. Instructions shall be followed closely to avoid damage to bin structure.
7. Except cutting openings described below, any other modification to Westeel bins shall be approved by a professional engineer.

Openings for Fan Transitions of Aeration Floors

1. Consult aeration floor installation instructions for information on Planning floor layout.
2. Openings shall be centered to a wall sheet in horizontal direction.
3. Opening shall be cut as tight as it can be for the transition to go through and shall have no more than 1/4" gap on any side to the section of a fan transition going through a bin wall.
4. Opening height for fan transition shall be limited to 12.5" inches from bottom edge of a bottom wall sheet.
5. Opening width shall not exceed 46.5" for stiffened bins and 72.5" for unstiffened bins.
6. Vertical support shall be required to support load above opening.
7. Bottom angles may be cut flush to the sides of an opening to form part of opening.

Openings for Unloading Augers of Wide Corr Bins with Full Floor Aeration

1. Consult aeration floor installation instructions for information on Planning floor layout.
2. Openings shall be centered to a wall sheet in horizontal direction.
3. Openings shall be cut as tight as it can be for unloading auger to go through and shall have no more than 1/ 4" gap to auger flange section on any side.
4. Opening height for any auger shall be limited to 12.5" from the bottom edge of a bottom wall sheet.
5. Vertical flange of a bottom angle may be cut flush to sides of an opening to form part of opening.

Openings for Roof Vents in Roof Sheets

1. Openings shall be centered between roof ribs and have 2.5" minimum distance between edge of opening and base of a roof rib.
2. Openings can be square, rectangular, or round.
3. Openings shall be the same size as the inlet opening of a vent being installed.
4. Any side of a square/rectangular opening shall have a maximum length of 18" and a circular opening shall have a maximum diameter of 24".

3.6. 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 grain bin 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 grain bin 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.
7. When installing roof stiffening rings, if it is necessary to shorten the stiffening ring tubes, shorten them as little as possible. Initially the nuts on the expanders should be centered and as close together as possible. When tightening, share the amount of take-up between expanders such that the nuts remain centered, and the amount of engagement between all expanders on the same ring is equalized.
8. If extending an existing bin or tank, ensure that the foundation is adequate for the increased loads it must support.
9. If installing an existing bin on a hopper, make sure the bin is designed for a hopper application, and that the foundation is capable of withstanding the substantial point loads that the hopper legs apply. If uprights are present, make sure that they are supported.
10. Make sure that an integral end-to-end connection exists between all mating uprights. Successive uprights must not overlap.
11. Vertical tolerances between uprights and wall sheets are tight. This can be affected by “jacking” techniques, which can allow the tolerance to grow or shrink depending on the technique used. The gapping between successive uprights must be monitored to ensure that upright holes align with wall sheet holes.
12. If catwalks are being installed on the structure, upright catwalk upgrades are likely required. The upgraded stiffeners must be installed in the correct locations to support the intended catwalk loads. Also, the

structure must be properly oriented to ensure the eventual correct alignment between the catwalks and the supporting uprights. Finally, the connectors that tie into the uprights and support the catwalks are best installed during assembly of the structure. See the catwalk assembly manual for additional details.

3.7. Product Storage

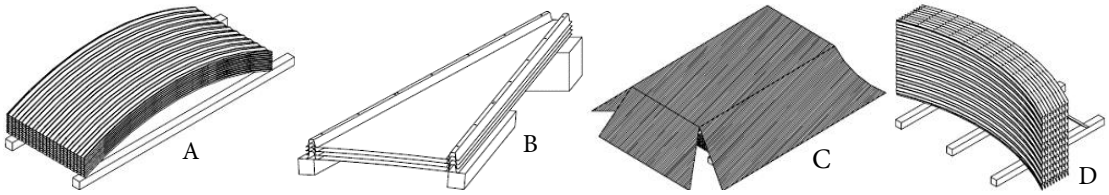
Rust on Galvanized Parts

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” to 8” off the ground on wood blocks or timbers. (See Detail A in Figure 2 on page 15.)
- Store curved wall sheets ‘hump-up’. (See Detail A in Figure 2 on page 15.)
- All other bundles material should be placed so that they are well sloped to promote good drainage. (See Detail B in Figure 2 on page 15.)
- Roof sheets must be elevated at least 12” at the small end of the sheets. (See Detail B in Figure 2 on page 15.)
- Temporary storage can be provided by erecting a simple framework supporting a waterproof tarp. (See Detail C in Figure 2 on page 15.)
- All bin boxes, ladder boxes and 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 parts become submerged or wet, the bundles should be opened as soon as possible, sheets or material separated and dried. Keep separated until assembly.

Brace parts properly so as to avoid damage or injury from material falling when in storage. (See Detail D in Figure 2 on page 15.)

2. Any boxed parts 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.

3.8. Grain Bin Use

- Do not off-center unload a grain bin. It is imperative to unload from the center of the bin first, until as much grain as possible has been removed, and only then proceed to unload from the next closest unload gate to the center. Continue utilizing the unload gates in succession from the center towards the outside. Gate control mechanisms should be clearly marked and interconnected to prevent an external gate from being opened first.
- The only exception to center unloading is when a properly designed and installed side draw system is utilized. However, as bins tend to go out of round when employing side draws, the bin must be completely emptied before refilling.
- When unloading a bin with a mobile auger through a properly designed auger chute, the entry end of the auger should be pushed into the center of the bin before the auger is engaged. Slower rates of flow are preferable and should not exceed the capacity of an 8” auger.
- Ensure that the inner door panels of grain bin doors are completely closed and latched before filling the grain bin.
- Never enter a loaded grain bin for any reason. Grain can be a killer.

3.9. Important Notes

- Westeel does not provide a foundation design for this product, and is not liable for any damages or injuries related to inadequately designed or constructed foundations. Customers must contract professional services for all foundation design and construction work. For information on foundation design requirements, refer to Section 3.2. – Foundation Design and Loads on page 12.
- 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 sheet ends pointing upwards.
- To keep an even pressure on walls, the bin must always be unloaded from the centre.
- Contact local power officials for minimum power line clearance.
- See Section 3.6. – Critical Assembly Requirements on page 14 for mandatory siting and assembly requirements.
- Store only non-corrosive, free-flowing materials up to 55 lbs/ft^3 (800 kg/m^3) average compacted density in Westeel bins.
- Tighten all bolts to the recommended torque settings.
- Do not locate grain bins close to high buildings, which might cause snow to fall onto or build up on the roof of the grain bin. Consider future expansion and allow space for loading and unloading of the bin. Your dealer and local government agricultural consultants can help you plan your storage system for maximum efficiency.

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 the delivering carrier, followed by a confirming letter requesting inspection by the carrier, if required. Order any 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.

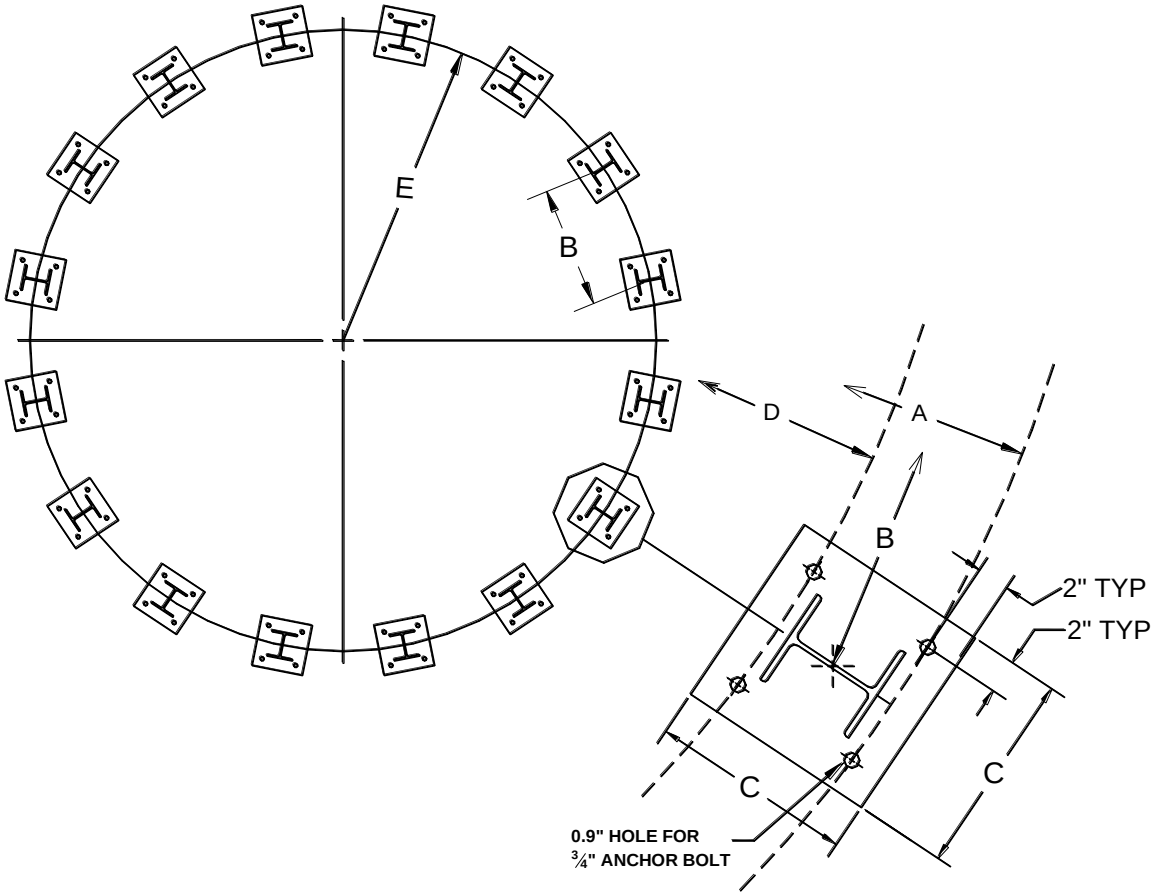
5.1. Assembly Safety

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 grain bin.
- 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.

5.2. Anchor Bolt Layout

Figure 3. Anchor Bolt Layout



Tank Size	No. of Legs	Dimensions(inches)					No. of Anchor Bolts	Anchor Bolt Size (inches)	Non-factored Leg Loads (kips/leg)		
		A (Radius)	B	C	D (Radius)	E (Radius)			Vertical	Shear	Uplift
15	10	96.83	57.32	12	88.84	92.75	40	3/4	52	1.9	14.2
18	12	114.82	57.30	12	106.83	110.75	48	3/4	63	1.9	12.1
21	14	132.71	57.23	12	124.72	128.65	56	3/4	74	1.9	10.6
24	16	150.56	57.16	12	142.55	146.50	64	3/4	92	2.1	10.6
27	18	168.65	57.16	12	160.65	164.60	72	3/4	103	2.0	8.7
30	20	186.69	57.15	12	178.69	182.65	80	3/4	116	2.1	7.8
33	22	207.56	57.64	14	197.56	202.50	88	3/4	128	2.0	6.3
36	24	225.46	57.53	14	215.46	220.40	96	3/4	141	2.1	5.7

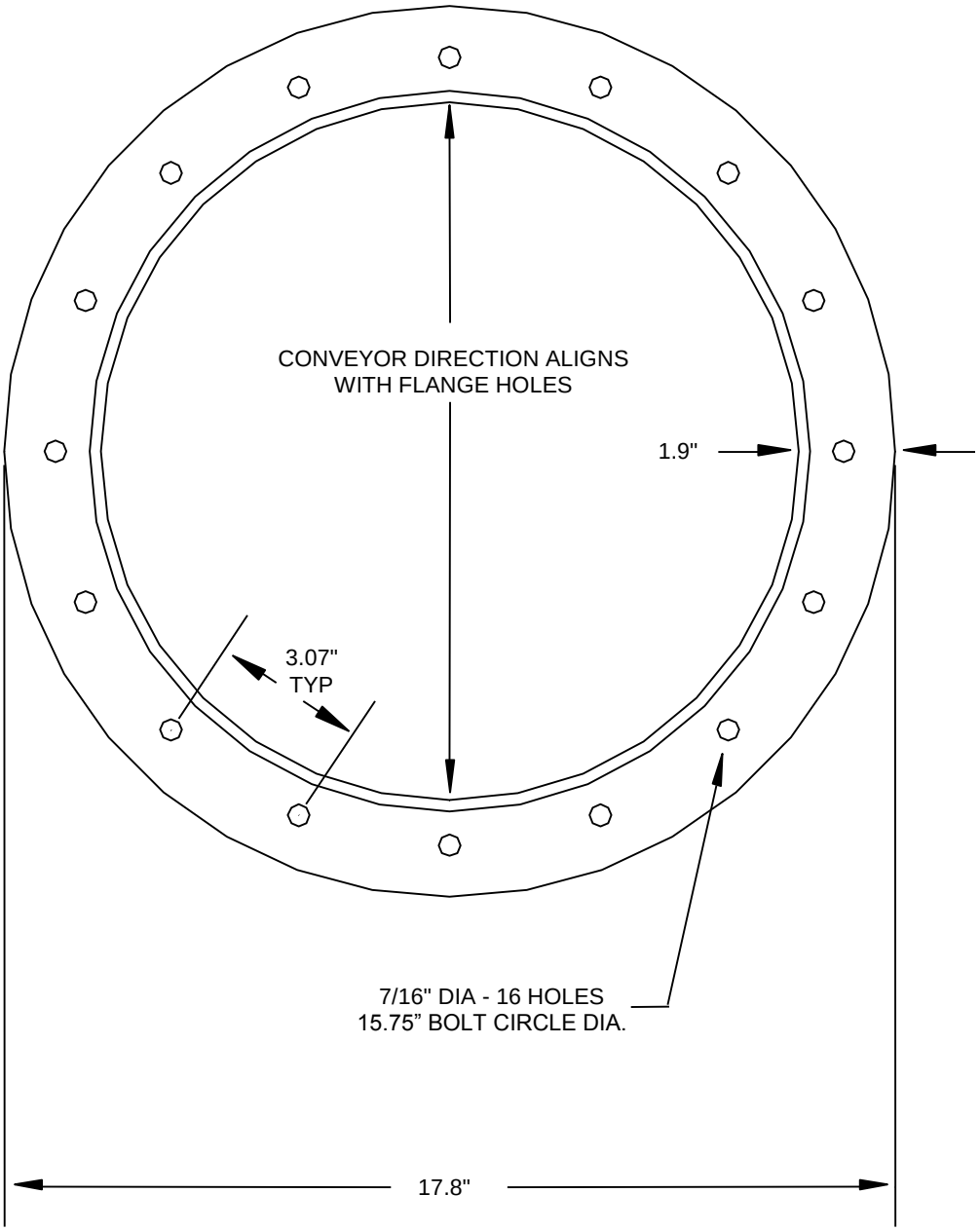
Legs loads are based on the following:

1. Non-corrosive, free-flowing materials up to 55 lbs/ft3 (880 kg/m3) bulk density
2. Maximum horizontal wind speed of 94 mph (151 km/h) = 24 lb/ft2 (1.15 kPa) wind pressure
3. Maximum roof snow load of 24 lb/ft2 (1.15 kPa)
4. Maximum roof cap load of 4,000 lbs (17.8 kN) for 15’-24’ bins and 5,000 lbs (22.2 kN) for 27’-36’ binsevenly distributed on peak ring
5. 15’-21’ leg loads are for 13 tier tanks; 24’-36’ leg loads are for 14 tier tanks

5.3. Bottom Flange Detail

14” diameter discharge cone

Figure 4. Detail of Bottom Flange of Discharge Cone



The 14” diameter discharge cone comes standard with all Wide-Corr Commercial Hopper Tank Series bins. Other options are available at time of order, please contact Westeel Limited in more information is needed.

5.4. Hopper Assembly

Assembly Instructions

1. Install the support columns, compression rings and tie rods
2. Caulk the compression ring seams to prevent moisture penetration.

   Important

   Ensure that the complete support structure is circular before installing the hopper sheets. Sealing strip outside diameter should be as noted in Detail A. Measure the diameter at several locations.

3. Before lowering the bin onto the completed hopper structure, loosely attach the base assembly to the bottom upright.

   Bolts in the vertical seam of the bottom wall sheets may have to be loosened or removed to facilitate connection to the compression ring.

Refer to the following pages for additional instructions, detail views and parts lists for various sizes of hoppers:

- Assembling 15' and 18' Hoppers on page 22
- Assembling 21' and 24' Hoppers on page 23
- Assembling 27' and 30' Hoppers on page 24
- Assembling 33' and 36' Hoppers on page 25

Assembling 15' and 18' Hoppers

Figure 5. 15’ and 18’ Hoppers

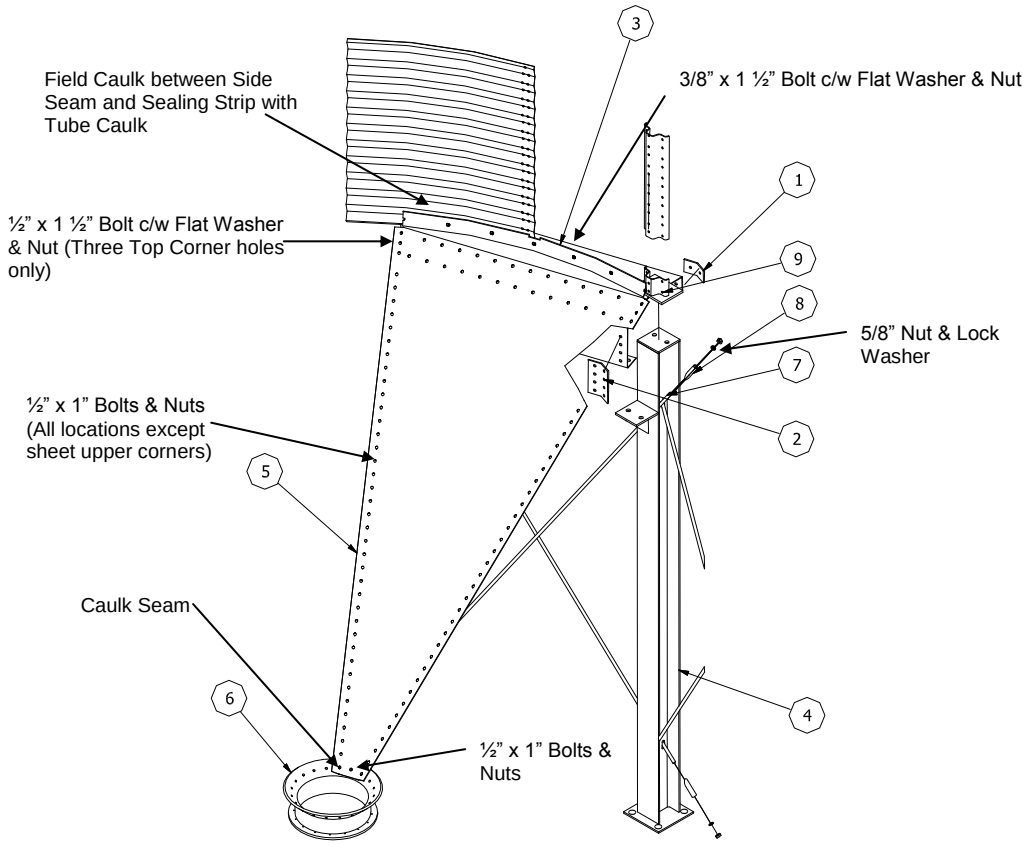


Table 6. 15’ and 18’ Hoppers Parts List

Item	Description	Series 15	Series 18
1	Splice Angle 3" x 6"	195290	195292
2	Splice Angle 6" x 8"	195291	195293
3	Compression Ring Assembly	195280	195282
4	Support Column Assembly	195300	195302
5	Hopper Sheet	197040	197041
6	Discharge Cone 14'	197046	197047
7	Tie Rod (15' = 112", 18' = 128")	195326	195328
8	Bevelled Tie Rod End	195313	195313
9	Upright Base Assembly	232777	232777

Assembling 21' and 24' Hoppers

Figure 6. 21’ and 24’ Hoppers

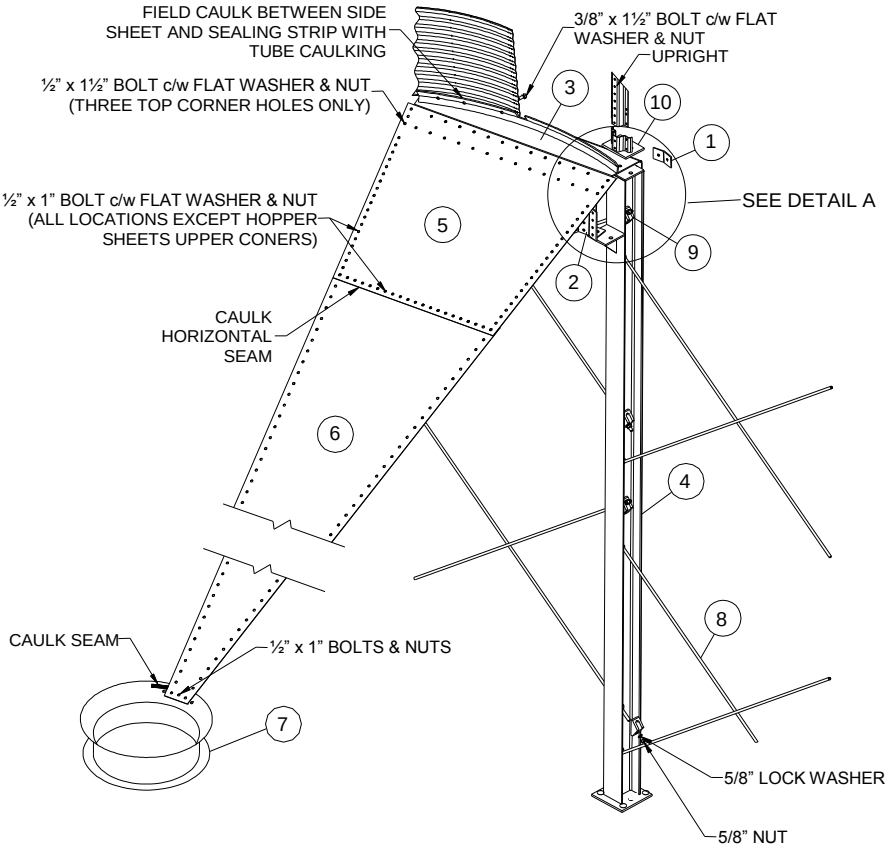


Table 7. 21’ and 24’ Hoppers Parts List

Item	Description	Series 21	Series 24
1	Splice Angle 3" x 6"	195294	195296
2	Splice Angle 6" x 8"	195295	195297
3	Compression Ring Assembly	195284	195286
4	Support Column Assembly	195304	195306
5	Upper Hopper Sheet	197042	197044
6	Lower Hopper Sheet	197043	197045
7	Discharge Cone 14'	197049	197052
8	Tie Rod (21' = 152", 24' = 89")	195312	195314
9	Bevelled Tie Rod End	195313	195315
10	Upright Base Assembly	232777	232777

Assembling 27' and 30' Hoppers

Note

Column assemblies are not symmetrical - locate the top plate so that 3" dimension faces toward inside (see Detail B).

Figure 7. 27’ and 30’ Hoppers

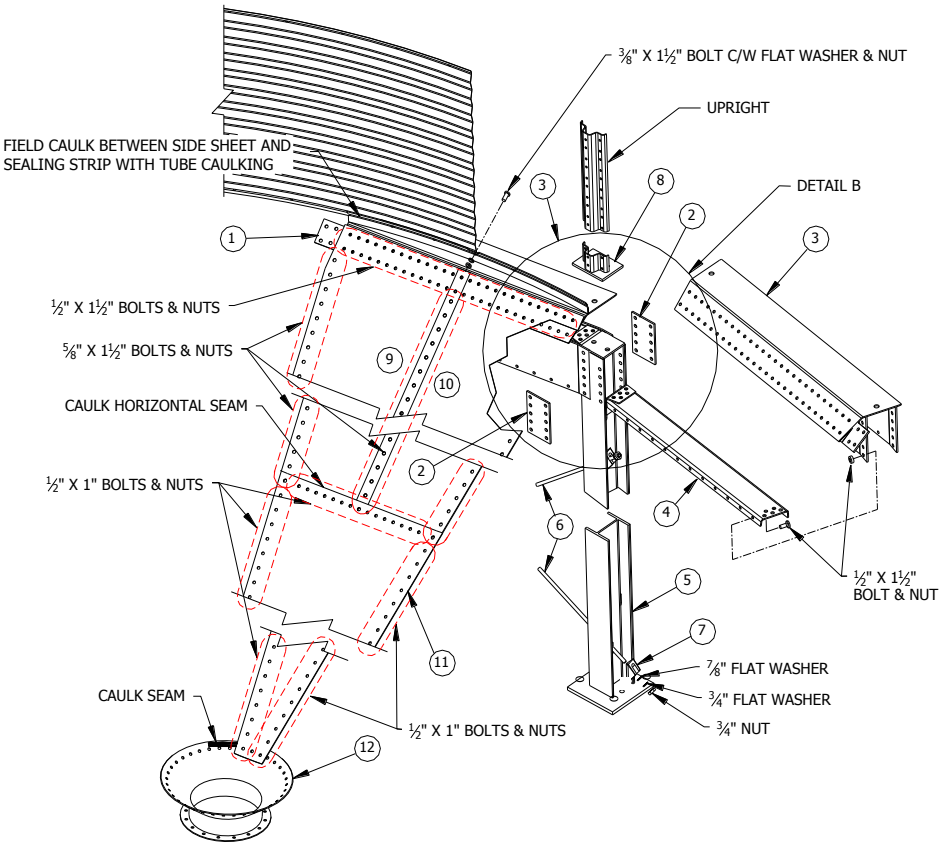
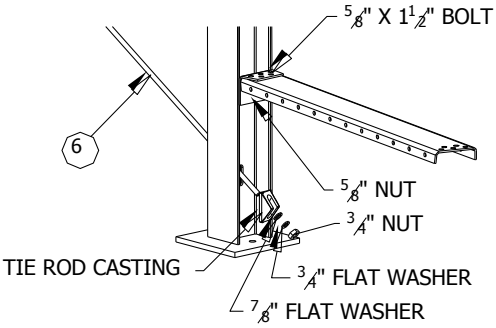


Table 8. 27’ and 30’ Hoppers Parts List

Item	Description	Series 27	Series 30
1	Splice Angle 5" x 10"	195378	195358
2	Splice Angle 6" x 10"	195346	195346
3	Compression Ring Assembly	195360	195338
4	Upper Channel	195365	195345
5	Support Column Assembly	195370	195348
6	Tie Rod 79"	195349	195349
7	Tie Rod Casting	193807	193807
8	Upright Base Assembly	232777	232777
9/10	Upper Hopper Sheet L & R	195375/6	195355/6
11	Lower Hopper Sheet	195377	195357
12	Discharge Cone 14"	197056	197060

Figure 8. Model 3014 ONLY Installation of lower compression ring channel



Assembling 33' and 36' Hoppers

Note

Column assemblies are not symmetrical - locate the top plate so that 3" dimension faces toward inside (see Detail B).

Figure 9. 33’ and 36’ Hoppers

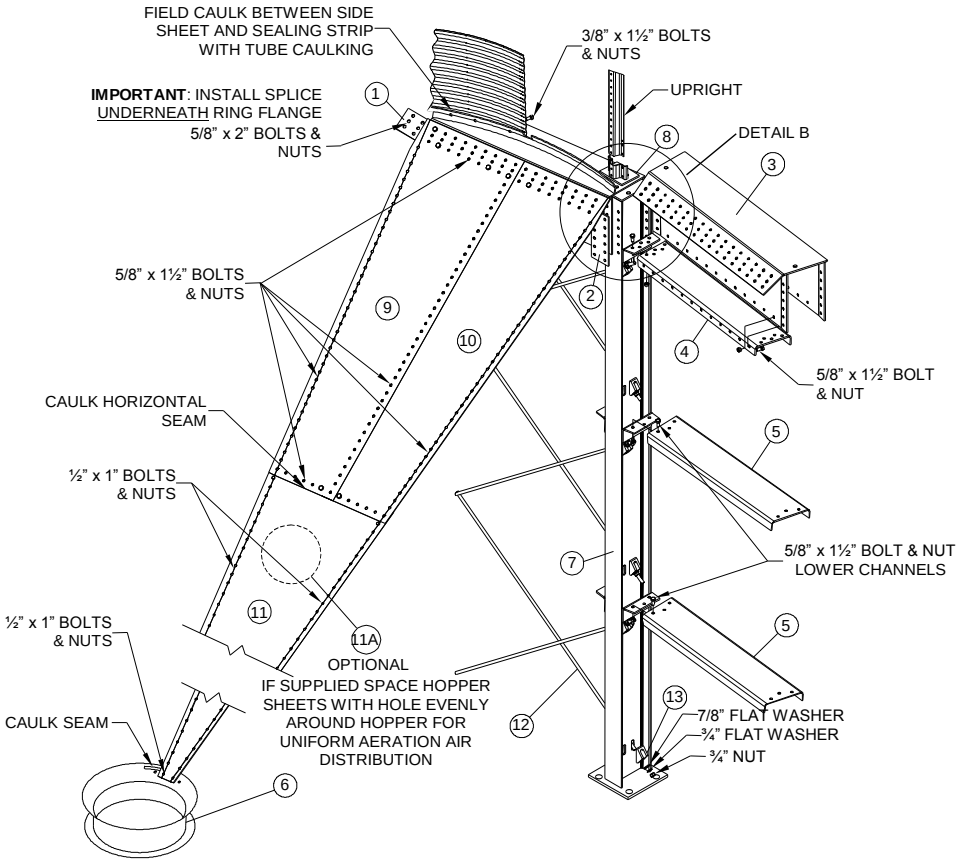
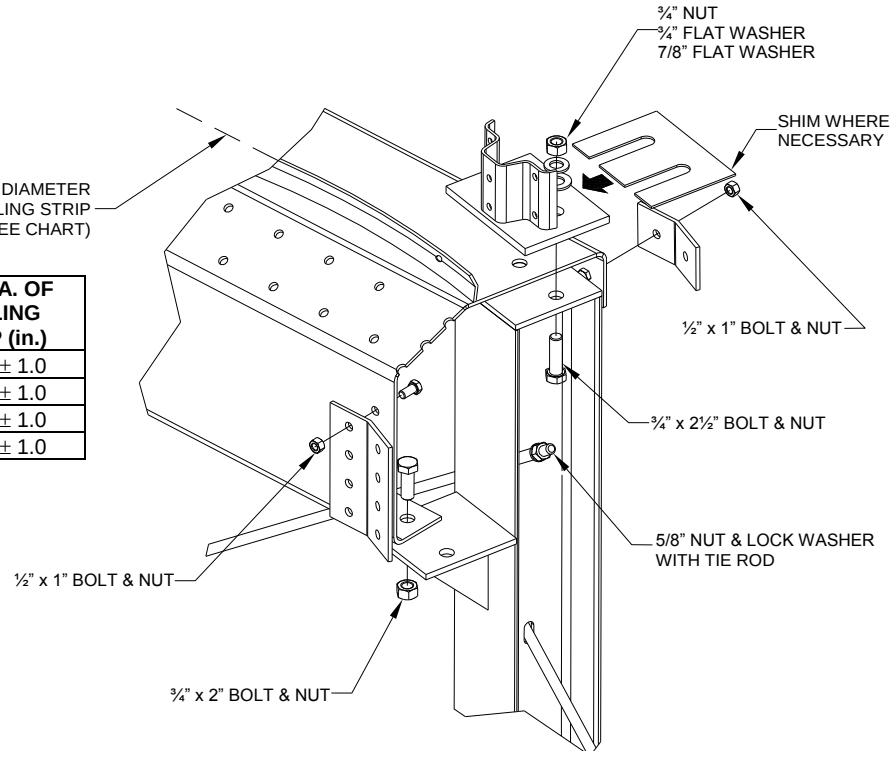


Table 9. 33’ and 36’ Hoppers Parts List

Item	Description	Series 33	Series 36
1	Splice Angle 6" x 15"	197015	197015
2	Splice Angle 6" x 15"	197014	197014
3	Compression Ring Assembly	197032	197007
4	Upper Channel	197012	197012
5	Lower Channel	197013	197013
6	Discharge Cone 14"	197025	197020
7	Support Column Assembly	197030	197001
8	Upright Base Assembly	232777	232777
9/10	Upper Hopper Sheet L & R	197035/6	197017/8
11	Lower Hopper Sheet	197037	197019
11A	Aeration Hopper Sheet c/w Hole	197037AER	197019AER
12	Tie Rod 79"	195349	195349
13	Tie Rod Casting	193807	193807

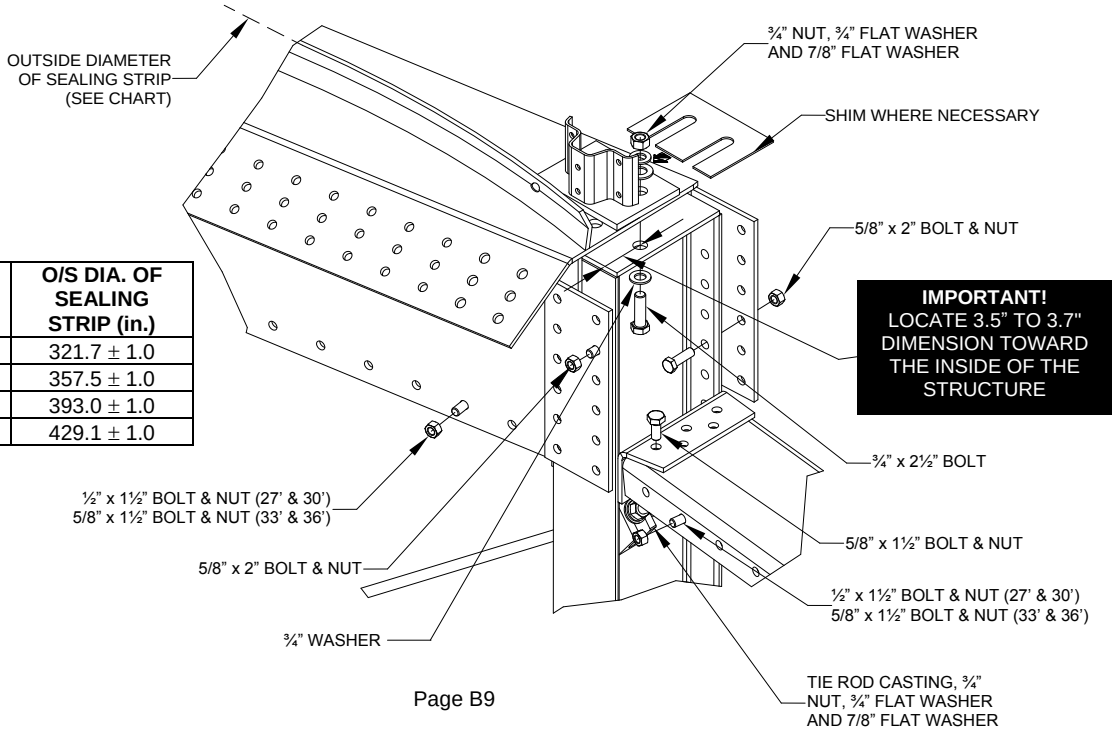
5.5. Compression Ring and Support Assembly Details

Figure 10. Detail A — Series 15 — 24



BIN SERIES	O/S DIA. OF SEALING STRIP (in.)
15’	178.5 ± 1.0
18’	214.3 ± 1.0
21’	250.1 ± 1.0
24’	285.1 ± 1.0

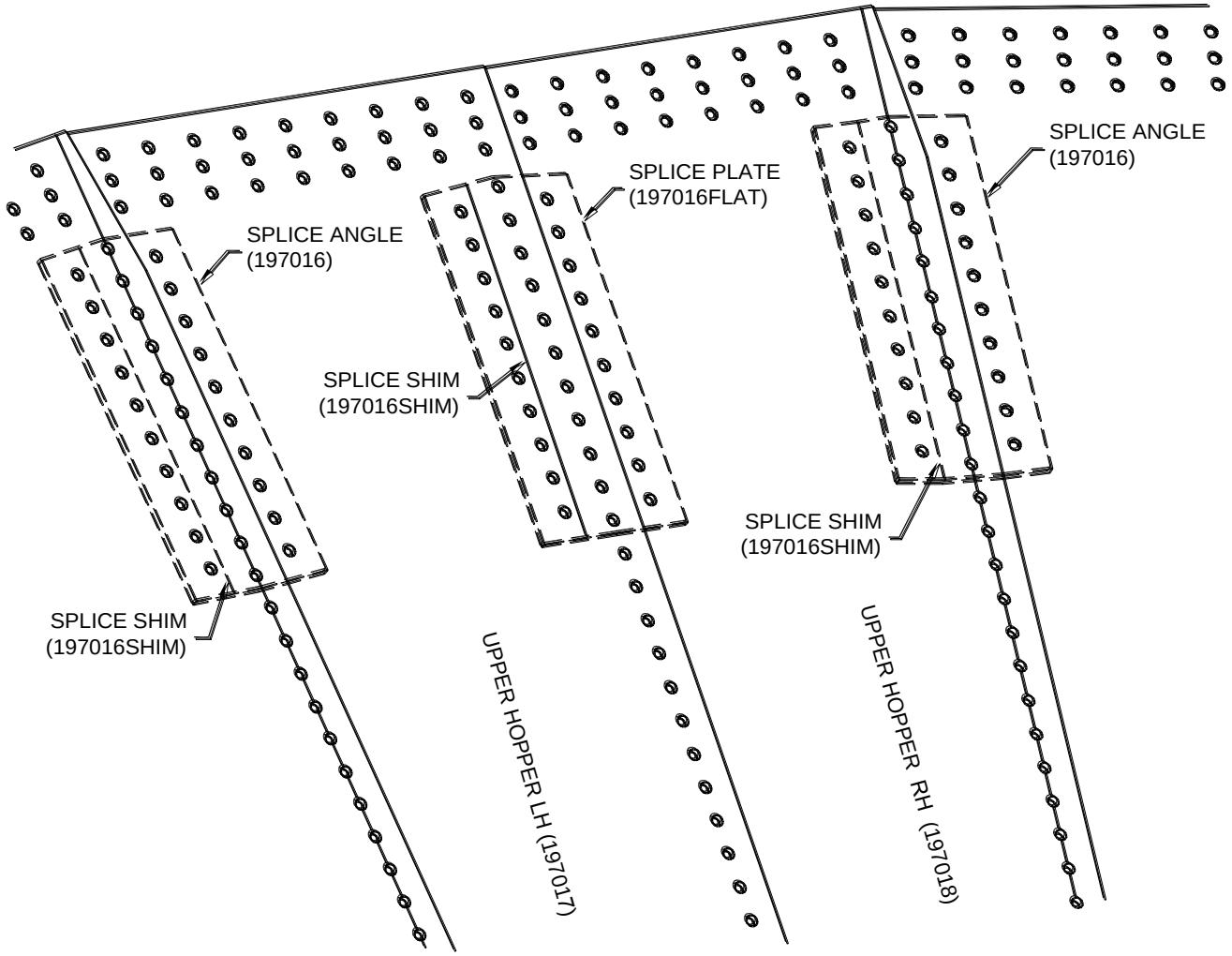
Figure 11. Detail B — Series 27 — 36



BIN SERIES	O/S DIA. OF SEALING STRIP (in.)
27’	321.7 ± 1.0
30’	357.5 ± 1.0
33’	393.0 ± 1.0
36’	429.1 ± 1.0

5.6. Connection Detail for 36' Upper Hopper Sheets

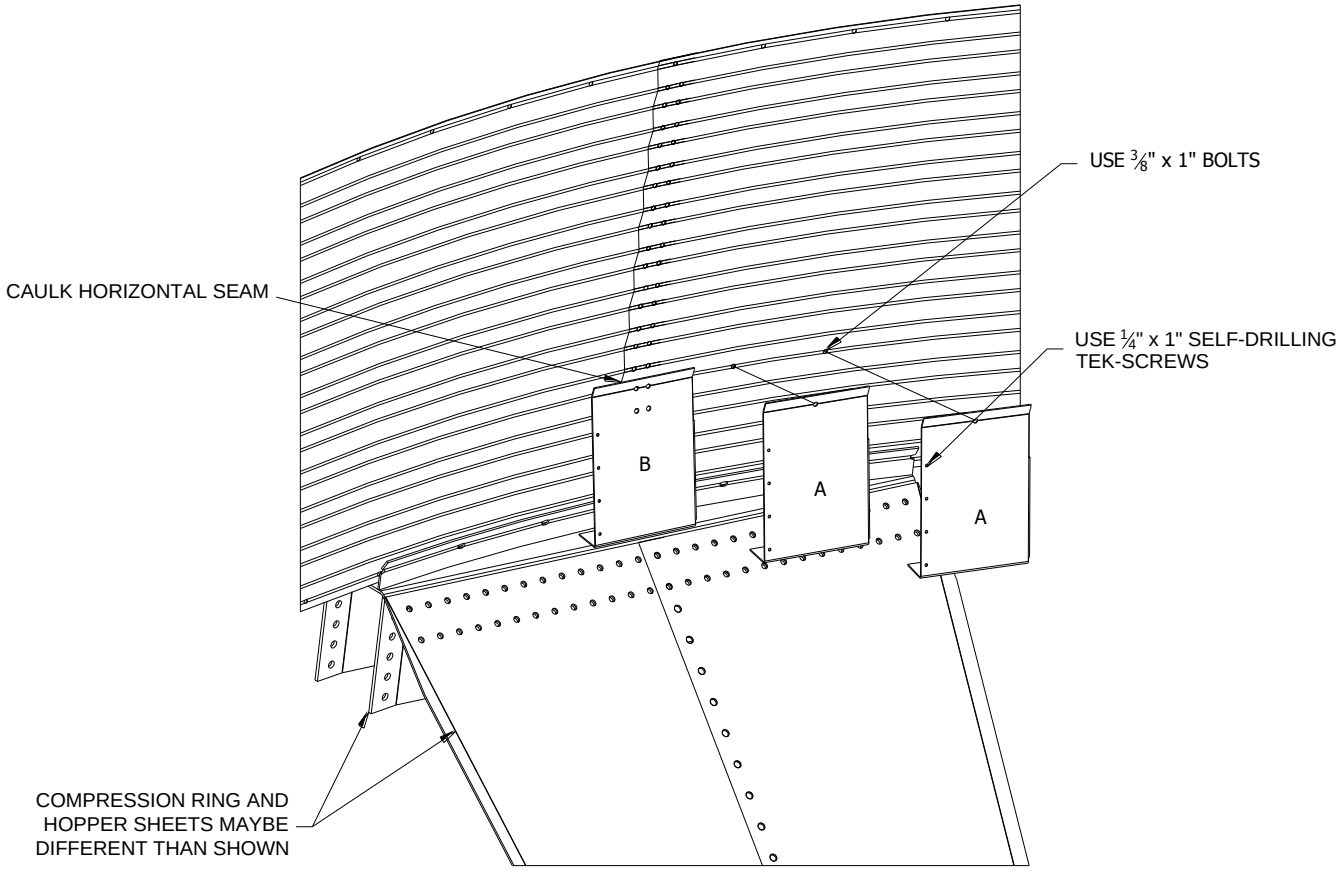
Figure 12. Connection Detail for 36’ Upper Hopper Sheets



- Shims are used between splice and hopper sheet (one side only) to all for thickness of overlapping hopper sheet
- Splices and shims are installed **under** the hopper sheets
- Each 36’ hopper uses:
  - 24 splice angles
  - 24 splice plates
  - 48 shims

5.7. Commercial Hopper Flashing Instructions

Figure 13. Commercial Hopper Flashing Assembly



1. After the bin wall is bolted to the hopper compression ring, install the hopper flashing (019450) to the bottom wall sheet as shown in Figure 13 on page 28.

   For each wall sheet, 12 pieces of flashing are required. 11 pcs (A) have 1 hole at the top and 1 pce (B) has 4holes at the top. The B flashing is for use at the vertical wall seam.

2. Install 3/8” x 1’ bolts in the horizontal row of holes, 12 ¾” from the bottom of the wall sheet.
3. Caulk the horizontal seam on the flashing panel to ensure the seal.
4. Place the next panel, working in a clockwise pattern. Fasten using ¼” x 1” self drilling TEK screws.
5. Caulk the vertical seams, if required.

5.8. Typical Non-Structural Roof Installation

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

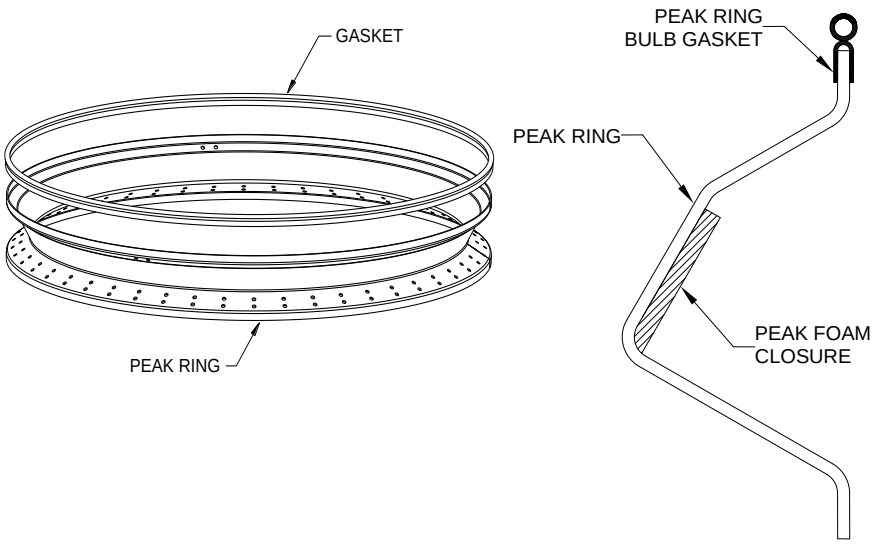
Preparation

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 bin orientation.
   b. Determine the locations of bin features and accessories (Westeel logo, Grain Gauge, 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. Prepare the peak ring:
   a. Install the supplied bulb gasket around the top of the peak ring.
   b. Install the foam closure gasket around the center section of the peak ring.

   Refer to Figure 14 on page 29.

Figure 14. Gasket and Foam Closure Assembly to Peak Ring



4. Install the center post making sure the post is vertical, braced and anchored properly for safe installation.
5. Lay out the bin 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 10 on page 30.

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 bin circumference onto the foundation.

Important

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

Table 10. Scribe Radius and Peak Ring Height (1 and 2 tier)

Nominal Bin Dia.	Scribe Radius		Top of Peak Ring Height “H” with 1 tier of wall sheets		Top of Peak Ring Height “H” with 2 tiers of wall sheets	
(ft)	(ft in)	(m)	(ft in)	(m)	(ft in)	(m)
15	7’ 4 -3/4”	2.255	7’ 9-3/8”	2.372	11’ 5-3/8”	3.489
18	8’ 10-11/16”	2.710	8’ 7-3/4”	2.635	12’ 3-3/4”	3.753
21	10’ 4-9/16”	3.164	9’ 6-1/16”	2.897	13’ 2-1/16”	4.015
24	11’ 10-1/2”	3.619	10’ 4-7/16”	3.160	14’ 0-7/16”	4.279
27	13’ 4-3/8”	4.074	11’ 2-3/4”	3.423	14’ 10-3/4”	4.540
30	14’ 10-5/16”	4.529	11’ 7-5/8”	3.546	15’ 3-5/8”	4.664
33	16’ 4-3/16”	4.984	12’ 5-15/16”	3.808	16’ 1-15/16”	4.910
36	17’ 10-1/8”	5.438	13’ 4-1/4”	4.071	17’ 0-1/4”	5.188
39	19’ 4”	5.893	14’ 2-5/8”	4.334	17’ 10-5/8”	5.452
42	20’ 9-15/16”	6.348	15’ 0-15/16”	4.596	18’ 8-15/16”	5.714
45	22’ 3-13/16”	6.803	15’ 11-5/16”	4.859	19’ 7-5/16”	5.977
48	23’ 9-3/4”	7.258	16’ 9-5/8”	5.121	20’ 5-5/8”	6.239
51	25’ 3-5/8”	7.712	17’ 5-5/8”	5.325	21’ 1-5/8”	6.442
54	26’ 9-9/16”	8.167	18’ 4”	5.588	22’ 0”	6.706

Assemble the Bottom Tier of Wall Sheets

1. Assemble a single tier of wall sheets if single-tier uprights are included in the bin package.
2. Assemble two tiers if two-tier uprights are included in the bin package.
3. Refer to the Appendix for information on proper hardware usage.
4. After the first ring of wall sheets has been assembled, check the position and roundness of the ring:
   a. Verify that the bin is round, with **no more than 0.75" variation** on the radius, when measured from the center of the bin.
   b. Verify that the wall sheets form a smooth circle with no flat spots or cauliflower shaped curves.
   c. Before anchoring the bin to the foundation, re-check to ensure that the bin is round and within tolerance.

   Note

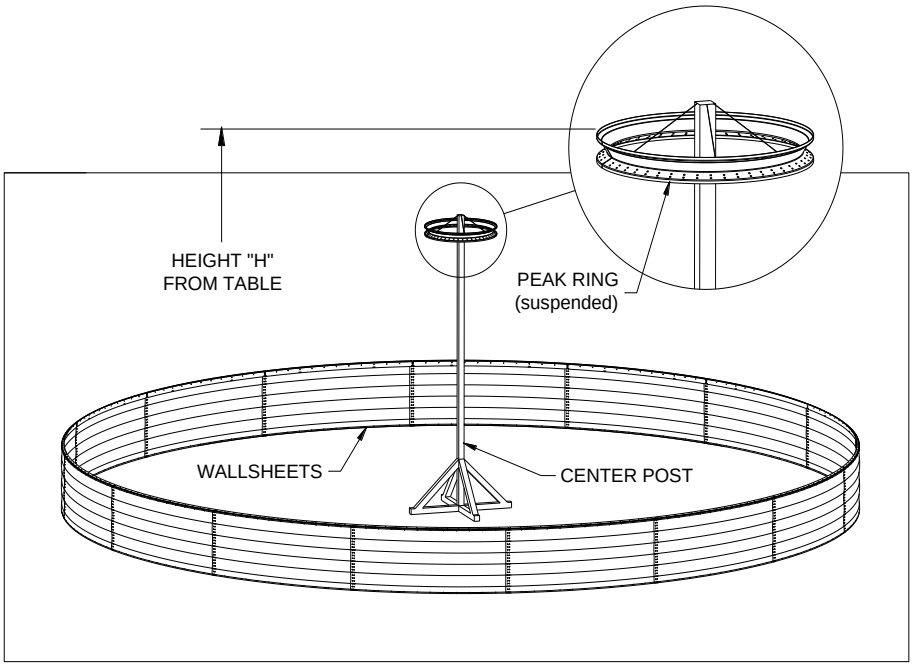
   Correcting for roundness becomes much more difficult the longer you wait.
5. Locate anchor bolts towards the outside of the anchor bolt slots (away from bin) to permit the incremental expansion that can occur with the initial filling of the bin.
6. When setting jacks, make sure they are also set round and that they are anchored to the concrete.
7. Attach the top ring angle to the inside top of the wall sheets.
   - Do not align the top ring angle joints with wall sheet joints.

- Make sure that top ring angle joints are is at least two or three wall sheet holes away from the Grain Gauge cutout.

Install the Peak Ring

1. Determine the correct peak ring height (H) for the bin size from Table 10 on page 30.
2. Attach the peak ring assembly to the top of the center post at the correct height for the bin being assembled.

Figure 15. Peak Ring Installation

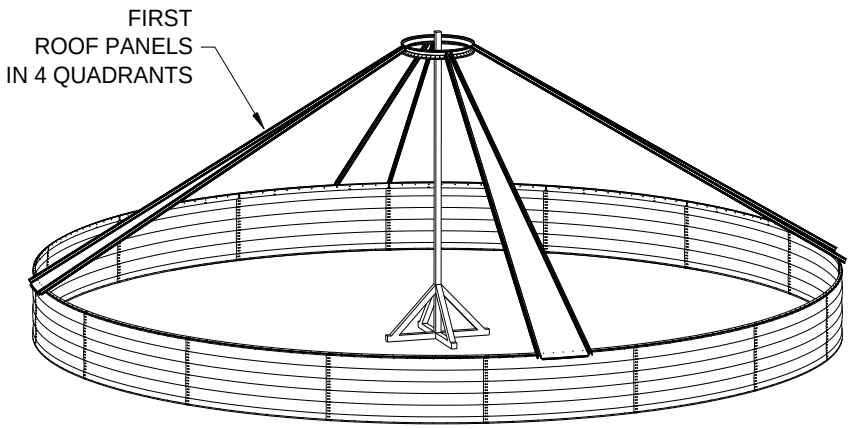


Install the Roof Sheets

1. Attach roof sheets with the narrow end to the peak ring and the wide end to the top ring angle.
2. Initially, attach four roof panels at the quarter points of the bin. (See Figure 16 on page 32.)

   This will stabilize and support the peak ring for the rest of the install.

Figure 16. Roof Panel Installation



Tip

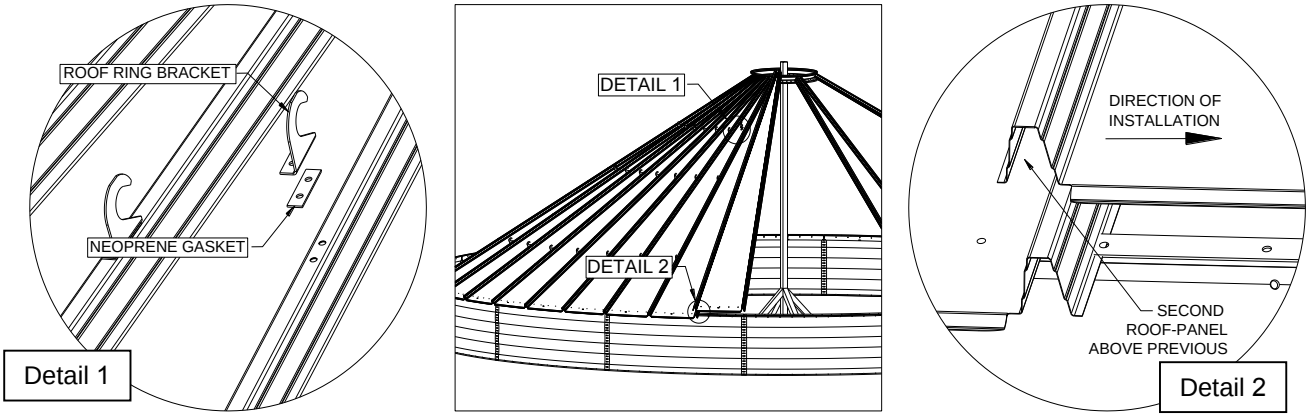
The narrow end of the roof panels gets pushed into the foam closure. Once this occurs there is little room for adjustment at the top end as the roof panel is embedded in the foam. Sometimes the roof panels get “flattened” slightly from bundling, shipping and handling. It is relatively easy to push the rigs together slightly but this should occur before the panel is seated in the foam. Monitor the alignment of mating roof panels with the underlying holes in the peak ring and make adjustments, if necessary, before anchoring the roof panel into the foam.

Important

Be careful when attaching the bottom of the roof panels to the top ring angle. The center round holes at the bottom of the roof panels must align with round holes in the top ring angle. This locks in the correct centering location for the roof sheet. The other holes in the bottom of the roof sheet align with the round holes in the top ring angle.

3. Make sure that the gap between the roof panel and the peak-ring is sealed by the foam closure.
4. Make sure the center hole in the roof panels aligns with round holes in the top ring angle.
5. Install the remaining roof panels, working in a counter clockwise direction:
   a. Attach the center roof panel hole first.
   b. Use two bolts at each roof panel to peak ring connection.
   c. Fill in every bolt hole in roof panel ribs with rubber washered bolts to the outside and nuts on the underside.
   d. Make sure the left roof rib overlaps the right rib of the preceding panel. (See Detail 2 in Figure 17 on page 33.)

Figure 17. Roof Rib Orientation & Roof Ring Bracket Assembly



Important

As assembly proceeds, additional support is advised to keep the peak ring level. Alternatively sequentially add roof panels in the different quadrants such that the weight of the panels on the peak ring remains uniformly distributed. Leave all roof bolts loose until the roof is completely assembled, especially those at the peak ring and top ring angle locations.

e. If the number and diameter of optional roof stiffening rings is known, install the roof ring brackets (with a neoprene gasket under each) in the double rib hole locations as you add roof panels. (See Detail 1 Figure 17 on page 33.)

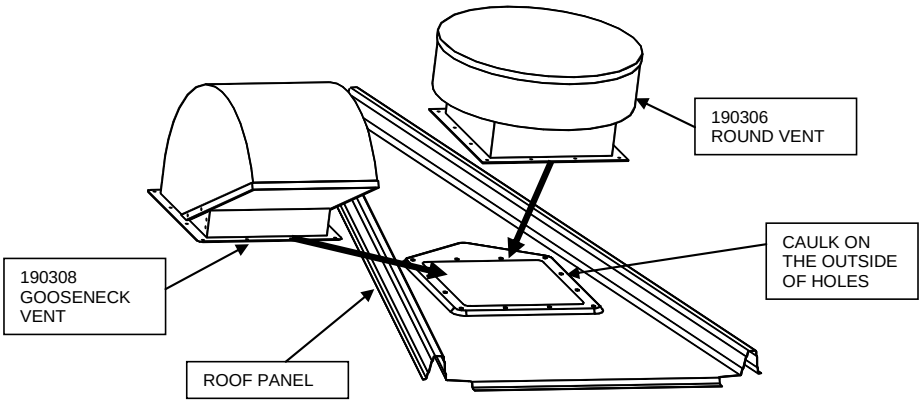
6. Install vent roof panels where required, as the roof is being assembled.

Distribute vent roof panels evenly around the roof. Ensure that they do not interfere with other roof elements such as roof stairs or rungs, temperature cables, etc.

Note

Westeel supplied roof vents come in two styles: Gooseneck and Round. Both have pre-formed bolt holes for mounting to the roof panel. The vent roof panels have a raised mount section, mounting holes and a pre-cut ventilation opening. No on-site cutting is required. A recommended practice is to assemble the vents to the roof panels at ground level before installing. Place a strip of caulking all the way around the weather side of the connection, position the vent, and bolt into place.

Figure 18. Roof Vent Assembly



7. Install inspection hatch roof panel where required.

The inspection hatch can be pre-assembled if desired. (See Section 5.11. – Inspection Hatch Details (15’ — 54’) on page 41.)

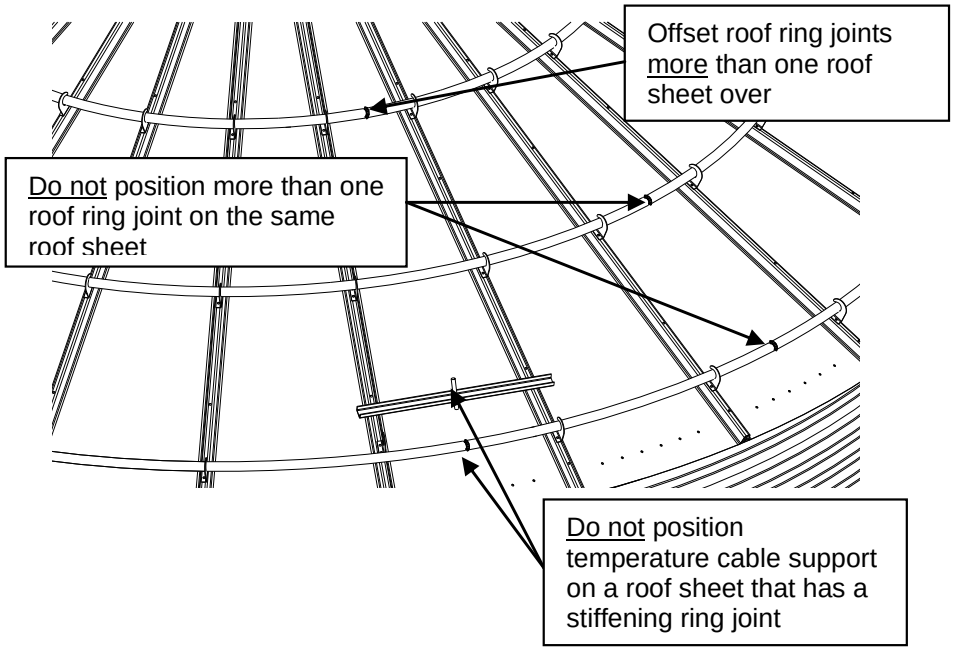
8. Install the roof ladder on the roof sheet to the left of the inspection hatch. (See Section 5.9. – Roof Ladder Details on page 39.)

   Enough roof ladder rungs are supplied to bridge across every pair of holes on a single roof panel. Where roof stiffening ring brackets are placed, the ladder rung can be skipped. The roof ring will serve as a rung in this location. Roof ladder rungs are installed with the higher vertical flange facing the peak ring.

Install Roof Stiffening Rings

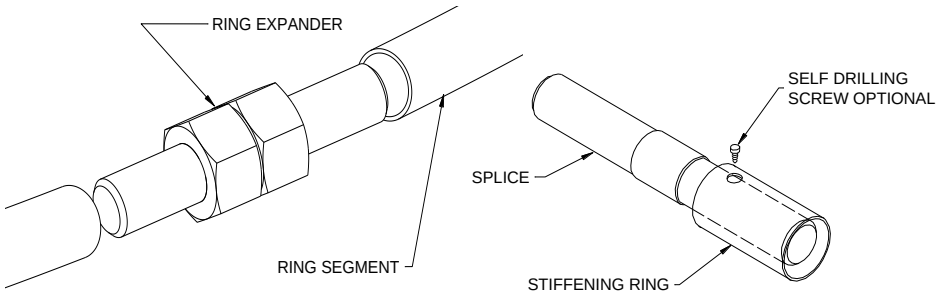
1. Add roof stiffening rings (if required):
   a. See Table 11 on page 36 for standard roof stiffening ring locations.
   b. On roofs with multiple stiffening rings, stagger the ring joints to avoid having more than one joint on same roof sheet. (See Figure 19 on page 34.)

Figure 19. Roof Stiffening Rings Installation



   c. Join roof stiffening rings together by inserting a ring splice into the facing ends and pushing everything together tightly.
   d. Secure the splice to the roof ring with a self-drilling screw.

Figure 20. Stiffening Ring Connection



e. Field cut the last stiffening ring segment so there is a 2½" gap between the mating tubes.

f. To make the final connection, insert a ring expander between the final ring sections.

g. With nuts close to one end, insert the long end of the ring expander into one tube and, by flexing both tubes, make the connection to the mating tube.

(See Figure 20 on page 35.)

h. Thread both nuts toward the center.

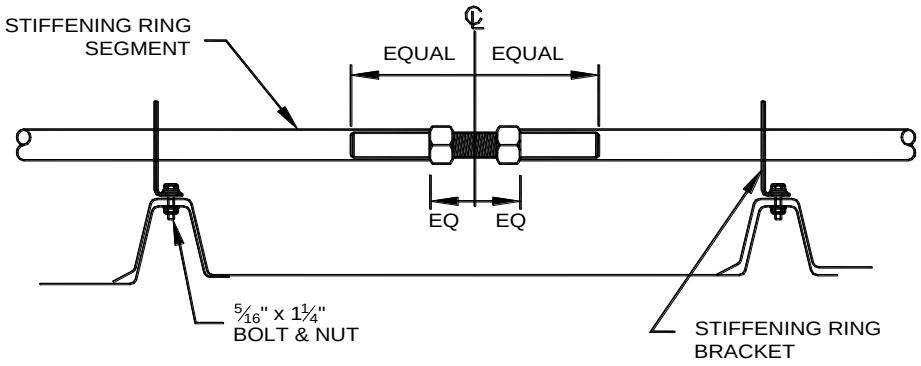
The green paint on the threaded portion indicates the center.

i. Slide stiffening ring tubes into the brackets.

Note

Before expanding, or tightening the roof, all nuts on the ring expanders should be tight together and centered.

Figure 21. Stiffening Ring Connection (side view)



2. Install the remaining stiffening ring clips.
3. Tighten the roof hardware.
4. Expand the nuts on the stiffening ring expanders until the slack has been taken up and the roof is snug.
   a. Do not overtighten and crown the roof.
   b. Nuts must be centered on the threaded rod.
   c. Use the painted marking as a guide.

d. On rings with multiple expanders, the distance between the nuts on all of them should be equal. (See Figure 21 on page 35.)

Table 11. Roof Reinforcing Matrix

Component →	Roof Stiffening Ring Tubes				Rib Supports
Location & Colour →	1st - Yellow	2nd - Black	3rd - Red	4th - Green	Under ribs
Chord length (in) →	103.8	167.4	197.6	200.4	Varies
Qty of Expanders →	2	2	3	4	n/a
Bin Series	**Component Part Numbers (and Quantity)**				
15	n/a	n/a	n/a	n/a	n/a
18					
21					
24					
27	195100 (5)				
30	195100 (5)				212755 (30)
33	195100 (5)	195101 (5)			212756 (33)
36	195100 (5)	195101 (5)			212757 (36)
39	195100 (5)	195101 (5)	195102 (6)		212758 (39)
42	195100 (5)	195101 (5)	195102 (6)		212759 (42)
45	195100 (5)	195101 (5)	195102 (6)		212760 (45)
48	195100 (5)	195101 (5)	195102 (6)	195103 (7)	212761 (48)
51	n/a	195101 (5)	195102 (6)	195103 (7)	212762 (51)
54		195101 (5)	195102 (6)	195103 (7)	212763 (54)
Notes:	• Roofs are supplied as standard or with optional upgrades for higher load capacity				
	<– standard components for all roofs				
	<– optional components supplied with all roof upgrade levels 1, 2 & 3				
	<– optional components supplied with roofs upgraded to level 2 & 3				
	<– optional components supplied with roofs upgraded to level 3 (33' only)				
	• For 21' & 24' only, the upgraded roof uses a heavier gauge roof sheet bundle				
	• Structural roofs with rafter system is available for 48' bins and larger. These raftered roofs do not require stiffening rings or rib supports				

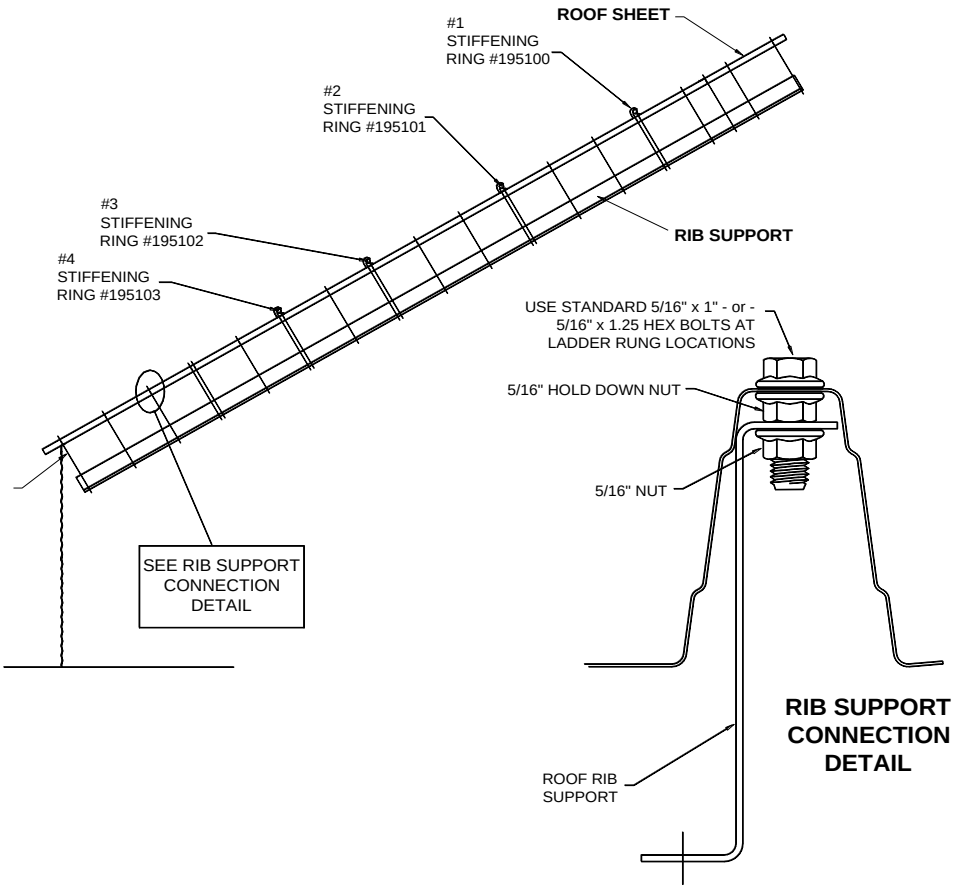
5. Once all the roof panels have been installed, make sure all nuts have been tightened.

Install Roof Rib Supports

Rib supports are an upgrade that provides additional load capacity when required. Rib supports vary in length, depending on roof size and are designed to fit under the roof panel ribs and run along the length of the rib from the eave (at the bottom) to near the peak ring (at the top).

1. Install one rib support at each roof rib location:
   a. Fit the rib support onto the shanks of the existing bolts used to join mating roof ribs.
   b. Add a second nut to secure the rib supports to the ribs. (See

Figure 22. Roof Rib Support Assembly



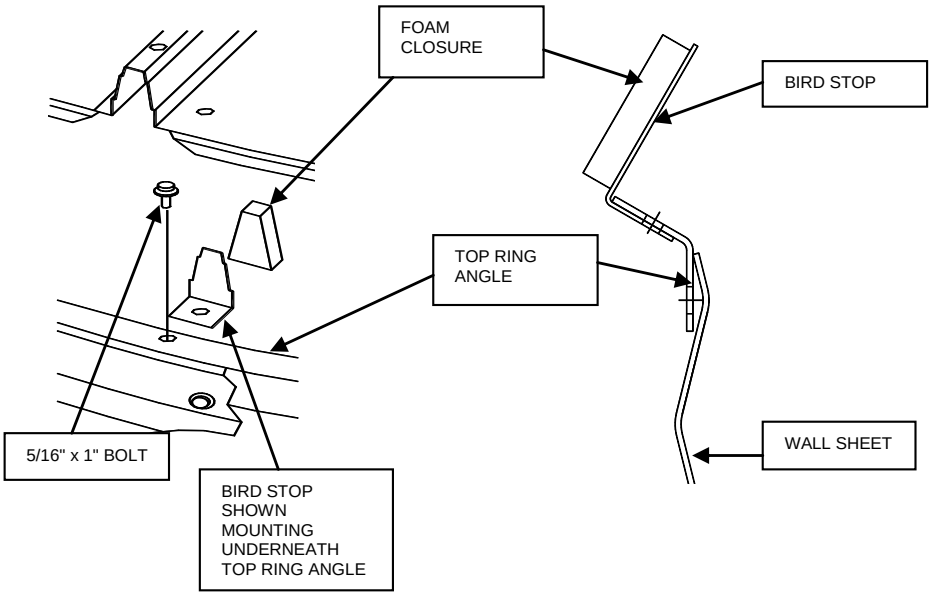
(Drawing represents a non-specific example only)

Install Bird Stops

Bird stops consist of a metal bird stop bracket, an adhesive backed foam closure and a nut and bolt.

1. Install bird stops at the bottom end of all roof panel ribs:
   a. Best practice is to install bird stops before attaching the roof panels. (Easier access to bolts and aids with timing)
   b. Install bird stops at locations that are five holes to the left or right of the roof panel center mounting holes in the top ring angle.
   c. Best practice is to mount the bird stop under the top ring angle.

Figure 23. Bird Stop Installation



Tip

Mounting the bird stop under the top ring angle prevents it from turning when tightening the nut. Other methods of installing are acceptable.

Install Associated Components

1. Assemble roof cap, roof cap opener, ladders and associated components (if applicable).

- See Section 5.10. – Flat Roof Cap Assembly on page 40
- See Section 5.9. – Roof Ladder Details on page 39

5.9. Roof Ladder Details

1. Locate the roof panel containing the roof ladder components to the left or right of the inspection hatch, and in line with the outside ladder.
2. Recommended (for convenience): Attach the ladder and a section of the outside ladder early, when the roof section is at ground level.
3. Start at the bottom with the longest ladder rung supplied and move up the roof using progressively shorter ladder sections.
4. Bolt ladder rungs to the roof panel ribs using the pre-drilled holes in the ribs.
5. Use 5/16" x 1 1/4" hex bolts and hex nuts (bolts above and nuts underneath).

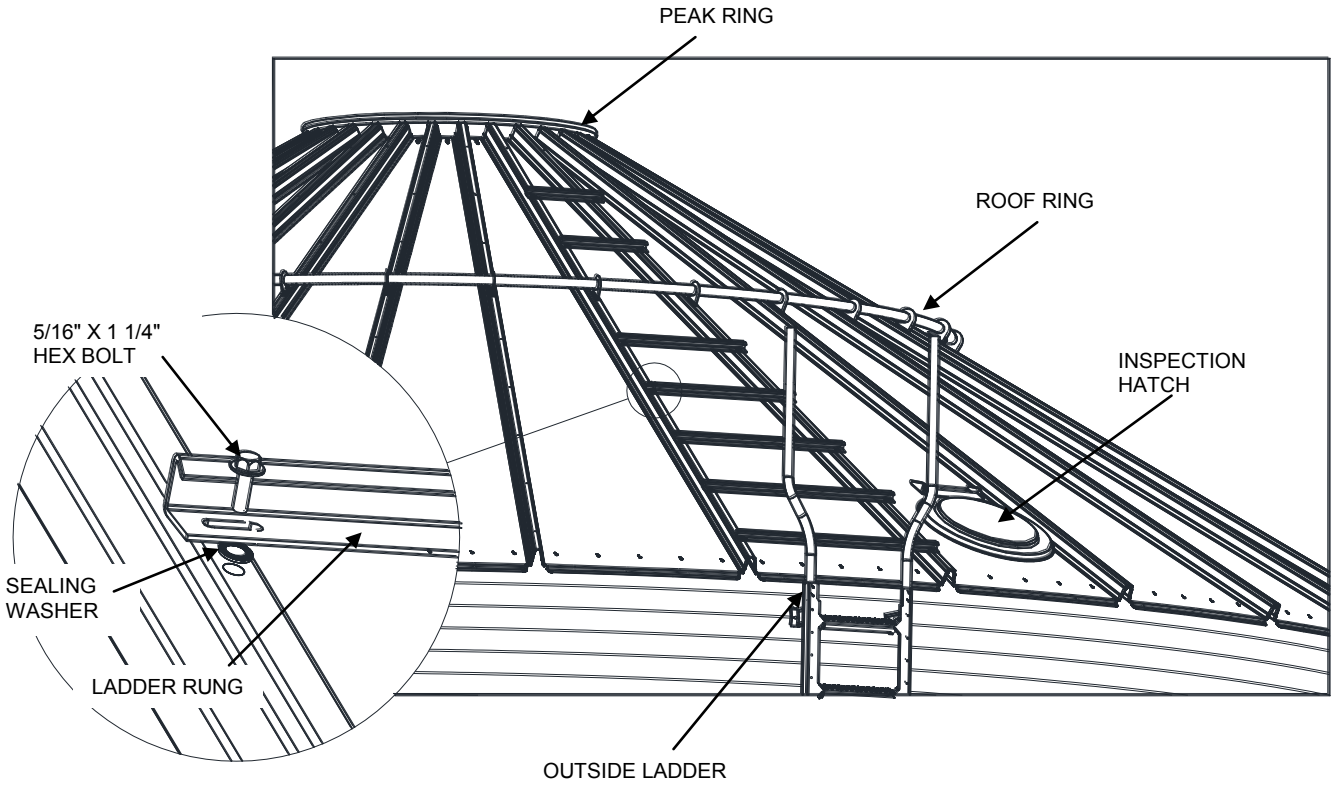
   Note

   Make sure that a sealing washer is installed between the last part and the roof sheet.

Note

The ladder rung is oriented with the vertical portion facing up towards the peak ring. When a ladder rung is located at a double hole pattern designed for a roof-ring element, bolt through the upper holes and fill the other hole with a 1" hex bolt. No ladder rung is used at a roof-ring location. The ring itself will serve as a step. This ladder rung can be discarded or saved for another job.

Figure 24. Roof Ladder Details



5.10. Flat Roof Cap Assembly

Figure 25. Flat Roof Cap Assembly Detail

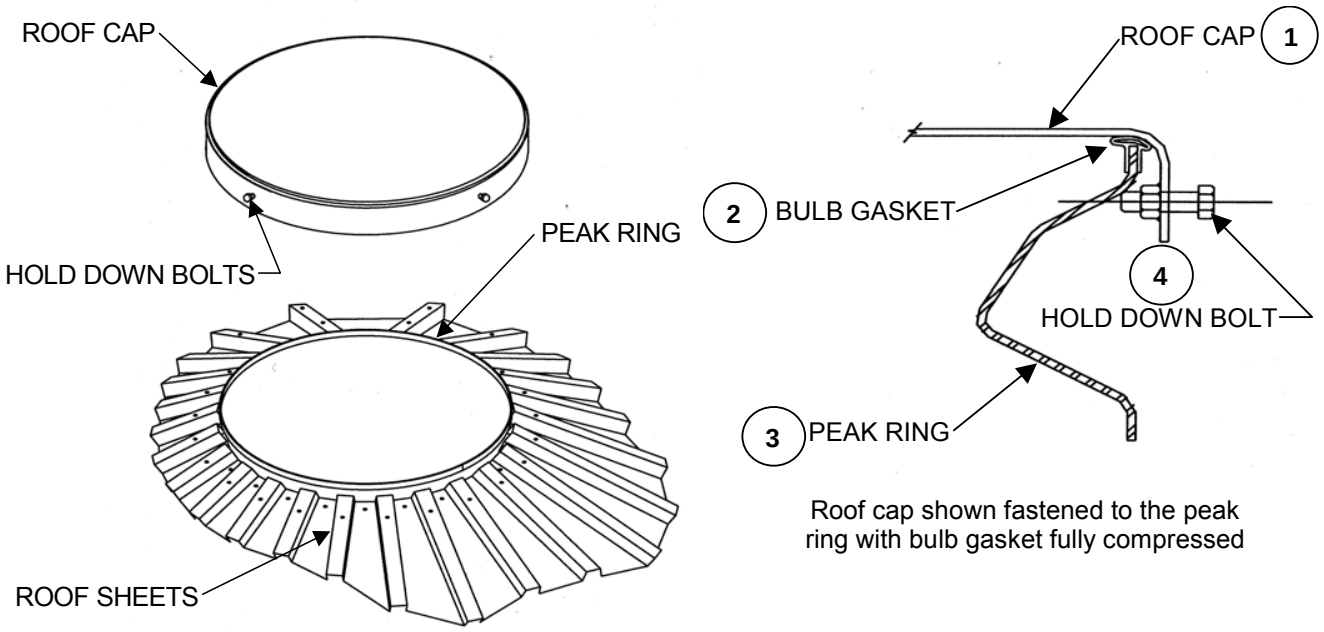


Table 12. Flat Roof Cap Part Numbers

Item	Description	Part No.	Used On
1	34” HEAVY DUTY FLAT CAP (for use with 33” peak ring)	195090	15' to 27' Bin
	53.5” HEAVY DUTY FLAT CAP (for use with 52” peak ring)	195087	30' to 48' Bin
	61.5" HEAVY DUTY FLAT CAP (for use with 60” peak ring)	195091	51' & 54' Bin
2	PEAK RING BULB GASKET 105” LONG	195149	15' to 27' Bin
	PEAK RING BULB GASKET 168” LONG	195150	30' to 48' Bin
	PEAK RING BULB GASKET 105” LONG	2x 195149	51' & 54' Bin
3	3/8” x 1½” HEX FLANGE BOLT (supplied with the lid)	193797	All

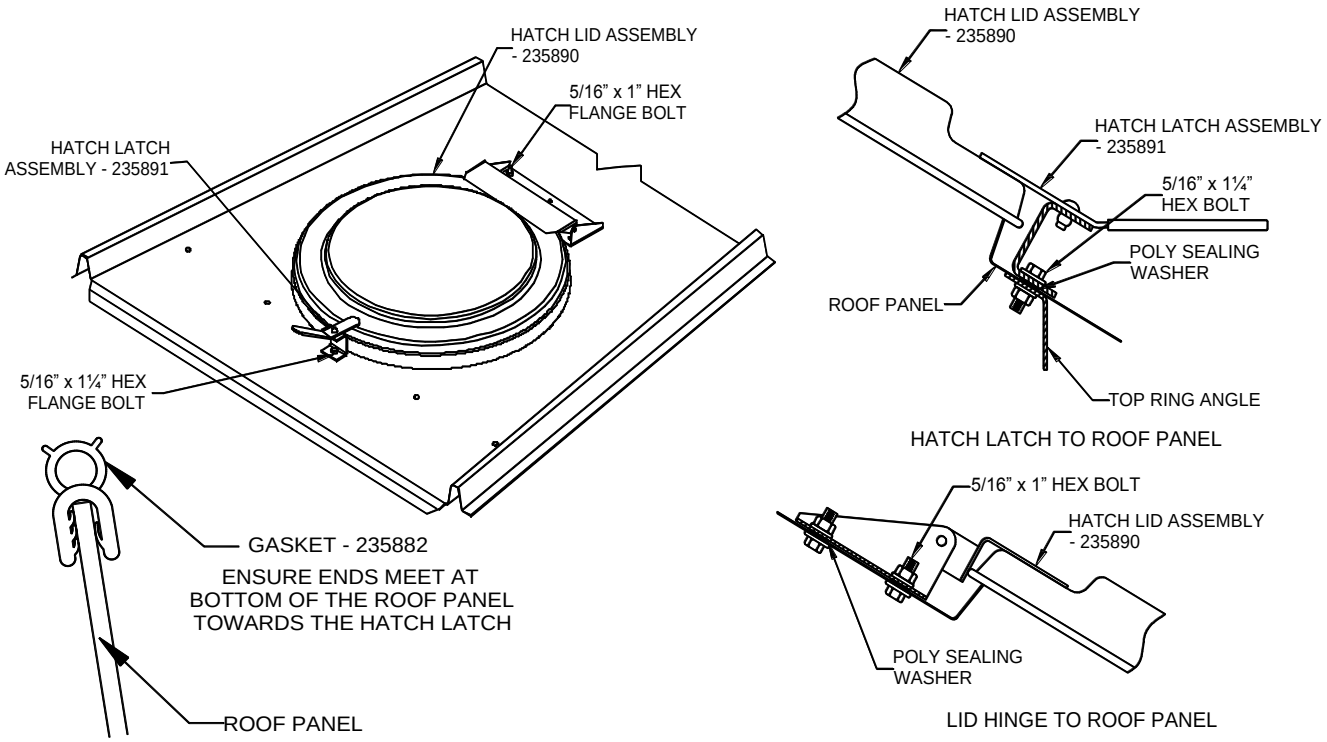
1. Fasten the bulb gasket onto the top rim of the peak ring.
2. Trim to fit.
3. Place the roof cap on the peak ring with two of the hold down bolts, making sure they are clear of the roof ladder.
4. Locate bolts between the roof ribs.
5. Tighten the hold-down bolt opposite the roof ladder until approximately 3/8" of the bolt is protruding past the welded nut.
6. Tighten the two bolts near the roof ladder until the roof cap pulls down firmly and cannot be moved.
7. Tighten all other roof cap bolts similarly.
8. Ensure that the roof cap is fully secured around the peak ring.
9. For a non-structural roof that is supporting a catwalk, install six flat cap clips (213437) as shown in the Westeel catwalk manual 213440. These clips are provided in the Westeel catwalk peak support modules.

5.11. Inspection Hatch Details (15’ — 54’)

Installation of inspection hatch (15’ to 54’)

1. Place the inspection hatch gasket (235882) around the lip of the inspection hatch opening. Trim the gasket to fit if necessary.
2. Bolt on the hatch lid assembly (235890) with 5/16” x 1” bolts provided for the roof. For best sealing results, the bolt heads should be on the underside of the roof panel, with the sealing washers pressed against the roof panel.
3. Bolt on the latch assembly (235891) as shown below. The latch is positioned on the center hole of the roof panel and bolts through the top ring angle as shown.

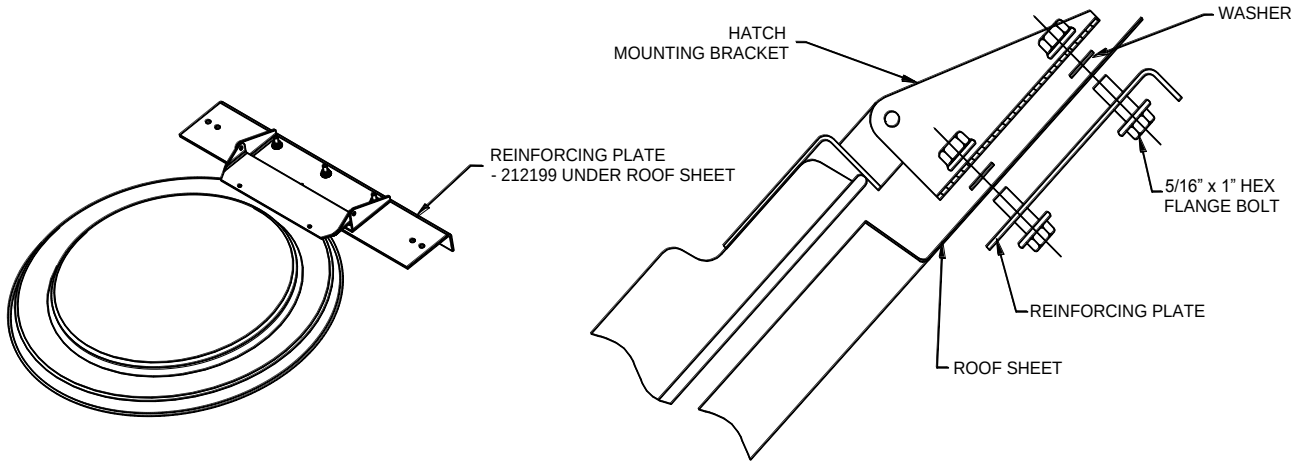
Figure 26. Inspection Hatch Details



5.12. Inspection Hatch Reinforcing Plate

1. For high wind applications, place the inspection hatch reinforcing plate under the roof sheet and secure with 5/16” x 1” hex flange bolts and nuts.
2. The flange on the plate must be located away from the hatch opening to minimize the possibility of interference or injury with inspector.
3. The four outermost mounting holes are used for extra stiffening when the roof sheet width permits. Field drill the roof sheet as needed.

Figure 27. Inspection Hatch Reinforcing Plate Detail



5.13. Wall Sheets

Note

Proper bolt tightening sequence must be followed at all times.

1. Loosely assemble the top tier overlapping sheets.
2. Be sure to wipe all areas of the sidewall sheets to remove excess oil in order to ensure that the caulking will adhere properly.
3. Always install the caulking strip on the weather side of every vertical seam to avoid moisture penetration. (See Section 5.18. – Wall Sheet Caulking Detail on page 48.)
4. Bolt all horizontal and vertical seams using 3/8" bolts.

   Note

   The bolt heads go on the outside of the bin on the roof and sidewall sheets, but on the inside of the bin for stiffeners and at outside sidewall ladder connections.
5. DO NOT tighten any bolts until the roof is completely assembled and the peak ring is level.
6. Lift the bin and assemble the second tier, overlapping the sheets.
7. The horizontal bolts between the first and second tier may now be tightened. Start from the center of a sheet and work towards a vertical seam.
8. After these bolts are tightened, the vertical seams on the first tier may now be tightened, working from the center outwards.
9. Assemble the third tier:
   a. Tighten the horizontal bolts between the second and third tier.
   b. Work from the center of a sheet toward the vertical seams.
10. The vertical seam bolts on the second tier may now be tightened working from the center of the sheet outward.
11. Install stiffeners and sidewall ladders as you proceed with the assembly of the bin

The bolting sequence mentioned above is extremely important. Failure to tighten the bolts in this manner may cause a bubbling effect on the horizontal seams. These areas, if severe enough, may cause grain leakage.

5.14. Centurion Wall Sheet Part Number Matrix

Table 13. Wall Sheet Part Number Table

Corrugated Wall Sheets						Punched Wall Sheets	
Thickness nom (min)	Gauge	Label Colour	Weight lbs	Length (overall)	Flat	Regular	Bottom
.040 (.036)	20	Yellow	58.3	116.5”	194654	194660 Stencil	
					194657	194663 Stencil	
					194679	194730	
.050 (.045)	18	Orange	72.8		194655	194661 Stencil	
					194658	194664 Stencil	
					194680	194731	194771
.057 (.052)	17	Red	83.0		194681	194732	194772
.066 (.061)	15	Pink	97.7		194682	194733	194773
.076 (.070)	14	Lime	112.2		194656	194662	
					194659	194665	
					194683	194734	194774
.096 (.088)	13	Green	141.1		194684	194735	194774
.116 (.107)	12	Blue	171.4		194685	194736	194776
.126 (.117)	11	Purple	189.0	117.0”	194606	194737	194777
.139 (.130)	10	Black	209.4		194607	194738	194778
Short Sheets Installed Beside Walk-In Door							
.057 (.052)	17	Red	66.3	93.0”		194780	
			26.2	36.8”			194783
.076 (.070)	14	Lime	89.6	93.0”		194781	
.096 (.088)	13	Green	44.6	36.8”			194784
.116 (.107)	12	Blue	136.8	93.0”		194782	
			54.1	36.8”			194785

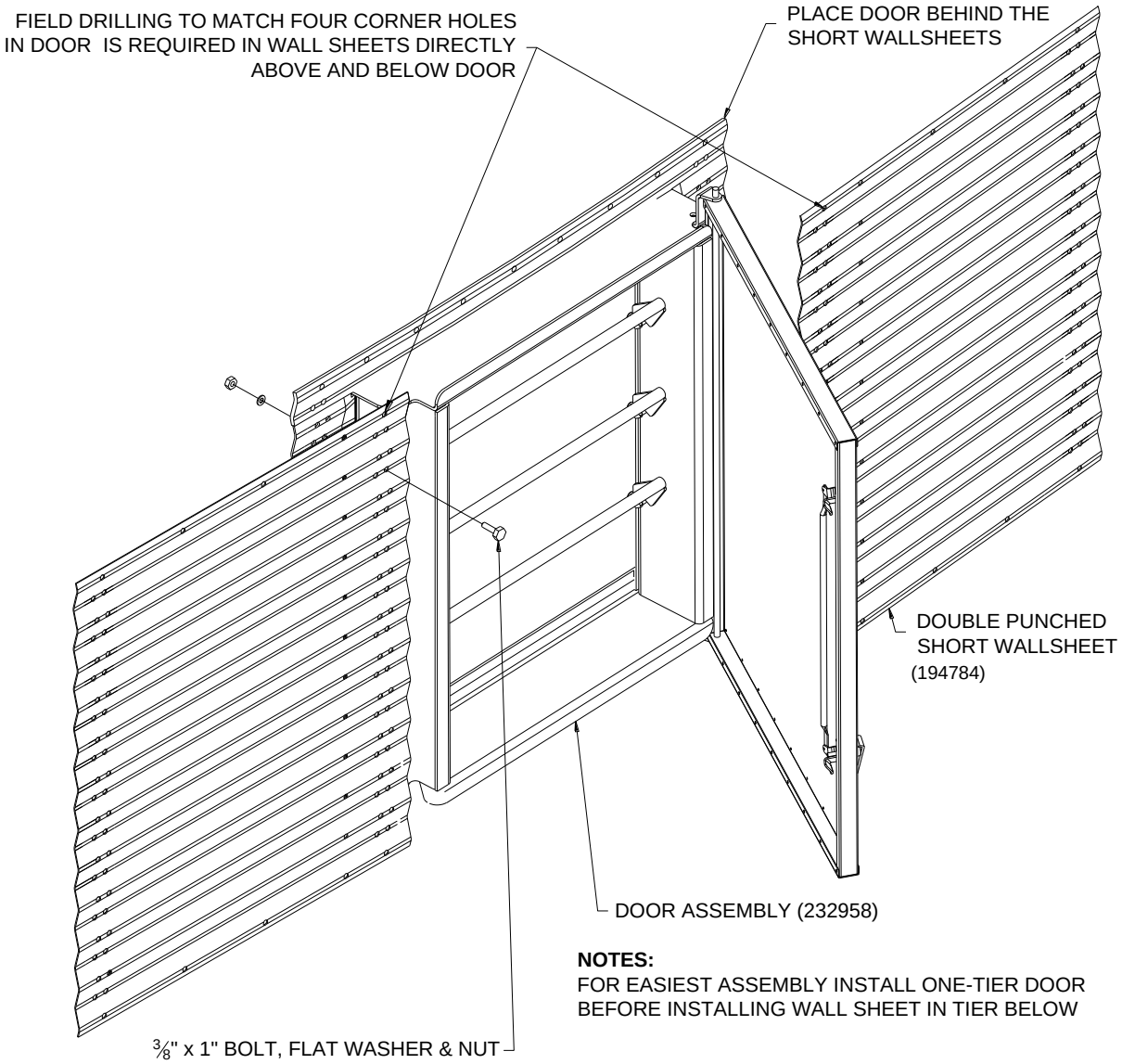
Bottom wall sheets are punched for full floor aeration flashing. Use bin bolts provided to plug unused holes if a full floor aeration system is not being used.

5.15. One-Tier Light Duty Door Installation

Important

Inner door board must be closed and latches completely engaged before filling. Failure and collapse of the bin could result if bin is filled without properly closing inner door board.

Figure 28. One-Tier Light Duty Door Detail

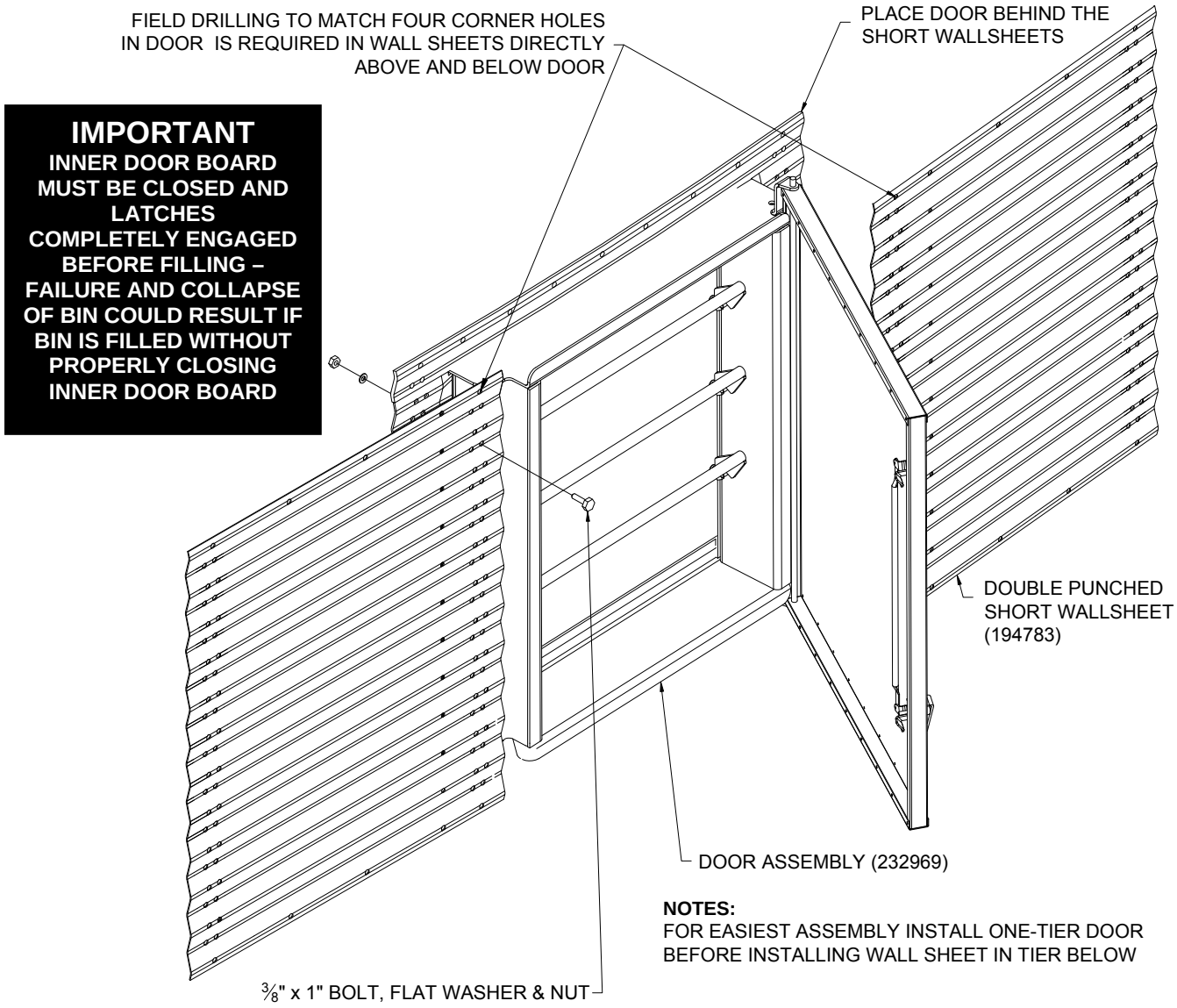


Important

Inner door board must be closed and latches completely engaged before filling. Failure and collapse of bin could result if the bin is filled without properly closing inner door board.

5.16. One-Tier Light Duty door Installation (15-27)

Figure 29. One-Tier Light Duty door Installation (15-27)

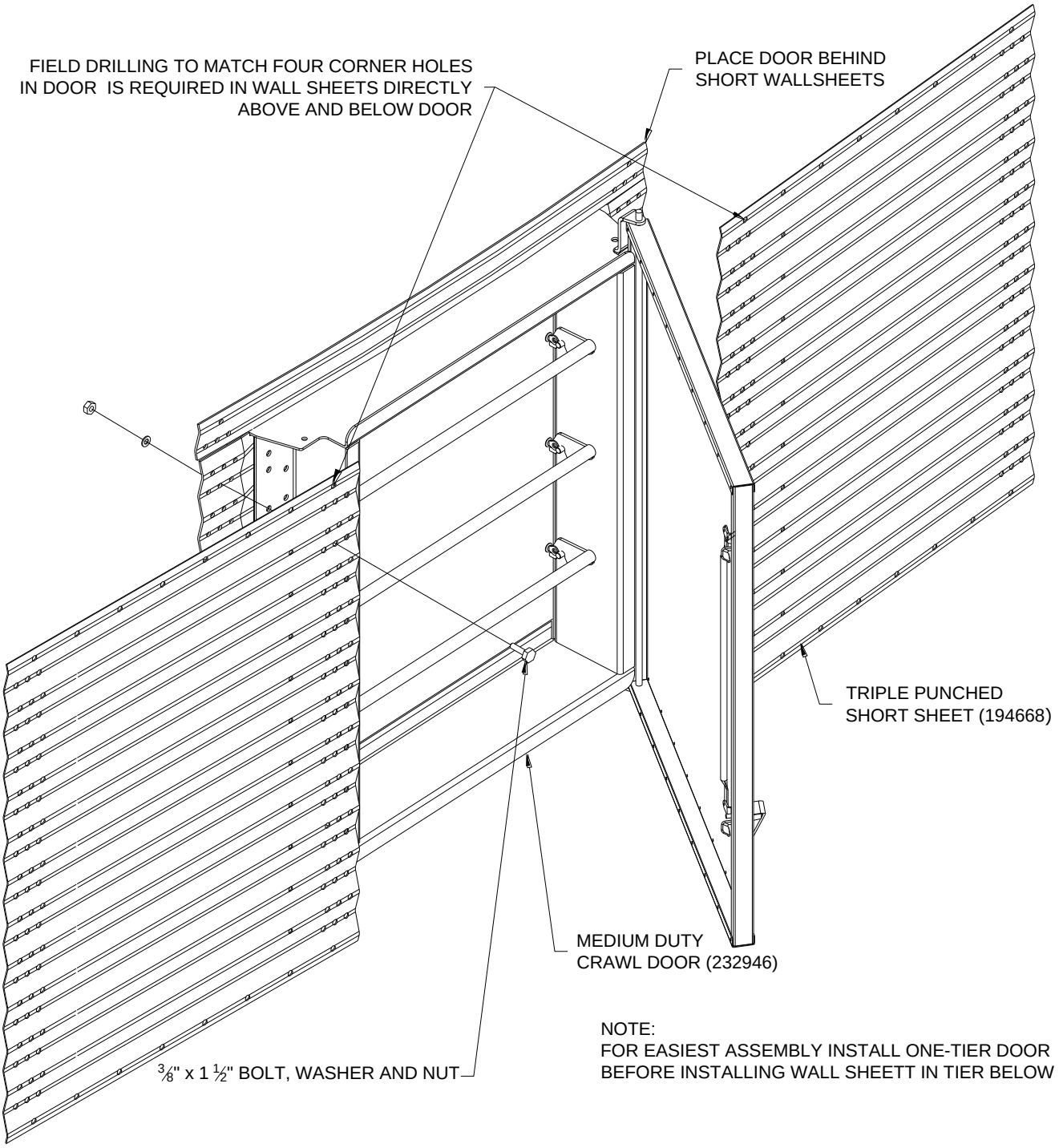


Important

The inner door board must be closed and latches completely engaged before filling.Failure and collapse of the bin could result if the bin is filled without properly closing the inner door board.

5.17. One-Tier Medium Duty Door Installation

Figure 30. One-Tier Medium Duty Door Installation

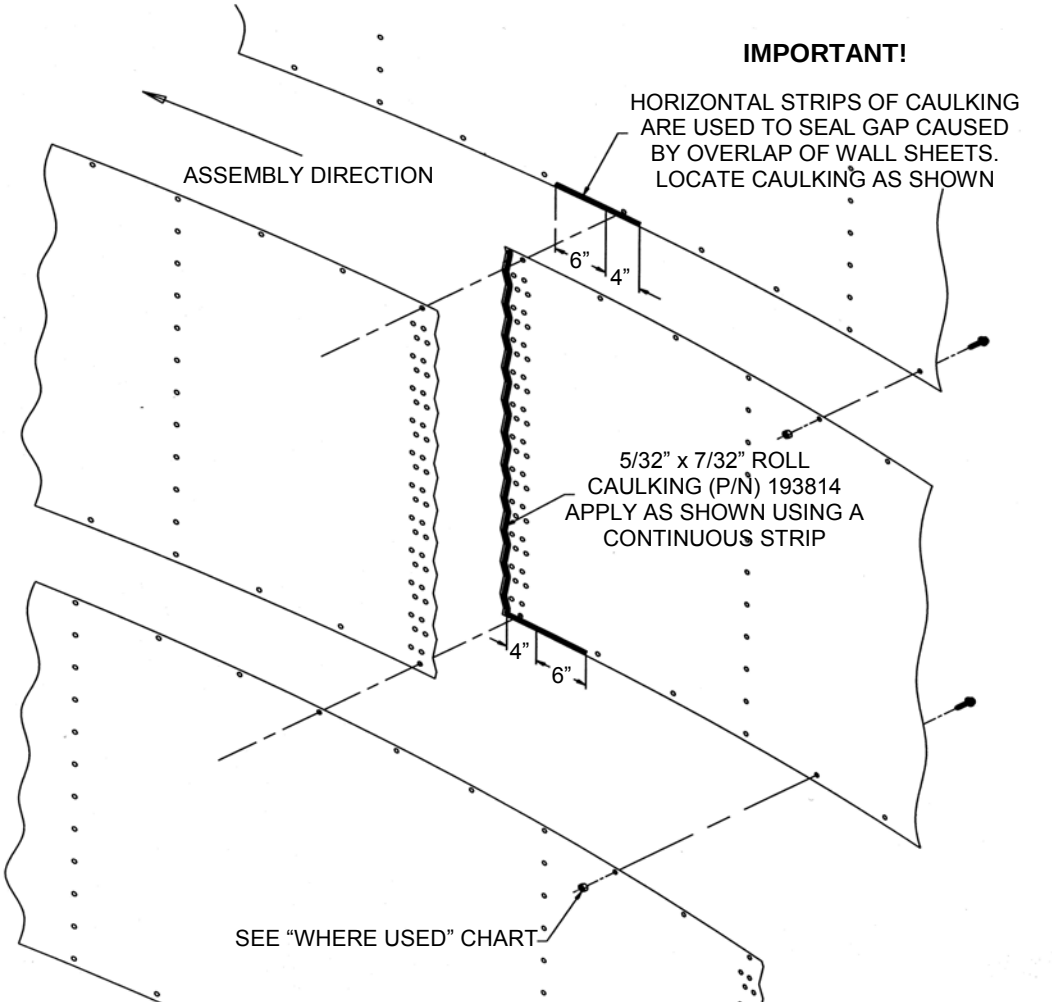


Important

The inner door board must be closed and latches completely engaged before filling.Failure and collapse of the bin could result if the bin is filled without properly closing the inner door board.

5.18. Wall Sheet Caulking Detail

Figure 31. Wall Sheet Caulking Detail (inside view)



5.19. Commercial Bin Upright Assembly

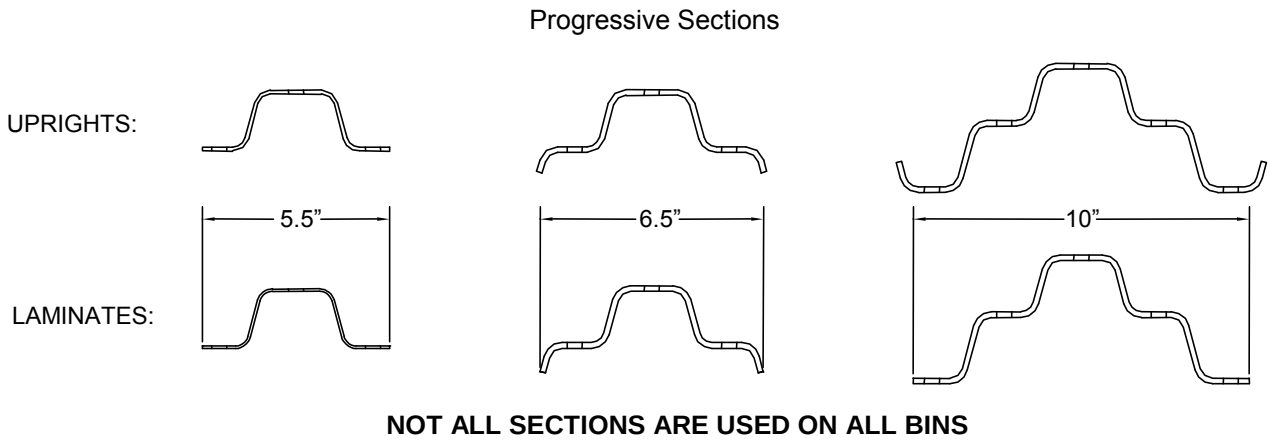
This section provides information needed to assemble uprights for commercial bins.

Introduction

The Westeel Commercial upright system consists of uprights and laminates. Single uprights, joined by splice plates, are used at the top of bins. Laminate sections are introduced when vertical load requirements dictate. Once introduced the laminates continue to be utilized for the balance of the assembly.

A unique feature of the Westeel upright system is the progressive section. Not only do the uprights and laminates increase in gauge from the top to the bottom of the bin, they also increase in section.

Figure 32. Progressive Sections



Both upright and laminate sections measure 88” long. In the center of each there are vertical holes spaced at 2” centers. This permits use on both internally and externally stiffened bins. There are two locations on each wall sheet for attachment of the uprights. The wall sheet holes that mate with the uprights are spaced at 4” centers. Therefore only half of the center upright holes get used. Which set of holes depends on whether the bin is internally or externally stiffened. The center holes not being used do not need to be filled with bolts. All other upright holes must be filled with bolts.

Upright/Laminate Identification

In order to properly erect the bin it is necessary to distinguish uprights from laminates, it is necessary to determine the gauge of the part, and it is necessary to determine the width of the section. The various combinations are provided in the upright/ laminate table. It is also necessary to determine the orientation of the parts as there is a distinct top and bottom. All the information that is required for assembly is contained on the label.

The label, is the easiest means of identification. It contains all of the necessary information. For assembly purposes, the label is placed on the bottom of both uprights and laminates.

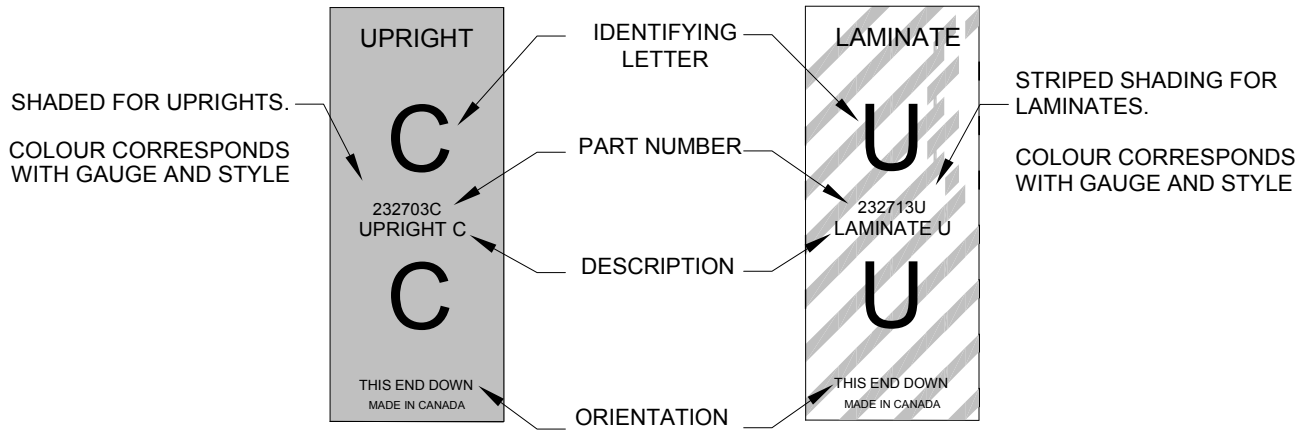
Upright labels have solid colours and laminate labels are striped. For both uprights and laminates, the colour corresponds with gauge and style.

Each upright and laminate has a unique identifying letter. This is prominently displayed on the label, and corresponds with the respective assembly charts provided (see Figure 33 on page 50).

Tip

For error free installation, make sure that the identifying letter on the label coincides with the wall sheet/upright layout for the bin being assembled, and that the labels on both uprights and laminates remain on the bottom. There is a definite top and bottom orientation for uprights and laminates. It is imperative that they are oriented correctly.

Figure 33. Upright and Laminate Labels



Short Upright

There is one short upright measuring 44” long for use in odd tier bins. The alpha character for this part is “S”. There is no corresponding laminate as it is used at the top of the bin before the laminates are introduced. The short upright always goes in the top tier.

Tip

The short “S” upright is located in the top tier of odd-tiered bins.

Upright/Laminate Assembly

Use the wall sheet/upright layout provided for the bin in question, to determine the proper order of the various upright and laminate components. The identifying letter on the label is the easiest means of identification. In addition to the identifying letter, every upright and laminate is also identified by gauge and width. If for some reason the label is missing from a part, the following table contains information that will aid in the identification of the various parts.

Tip

In all cases laminates nest inside uprights. The uprights are placed against the bin wall sheets and the laminates are away from the wall sheets.

It is important to get the first uprights started correctly. The top hole in the top upright does not bolt into the top horizontal wall sheet seam (see Figure 34 on page 51).

Tip

For proper upright orientation align the bottom of the first upright with the bottom edge of a wall sheet.

Figure 34. Upright Orientation Detail

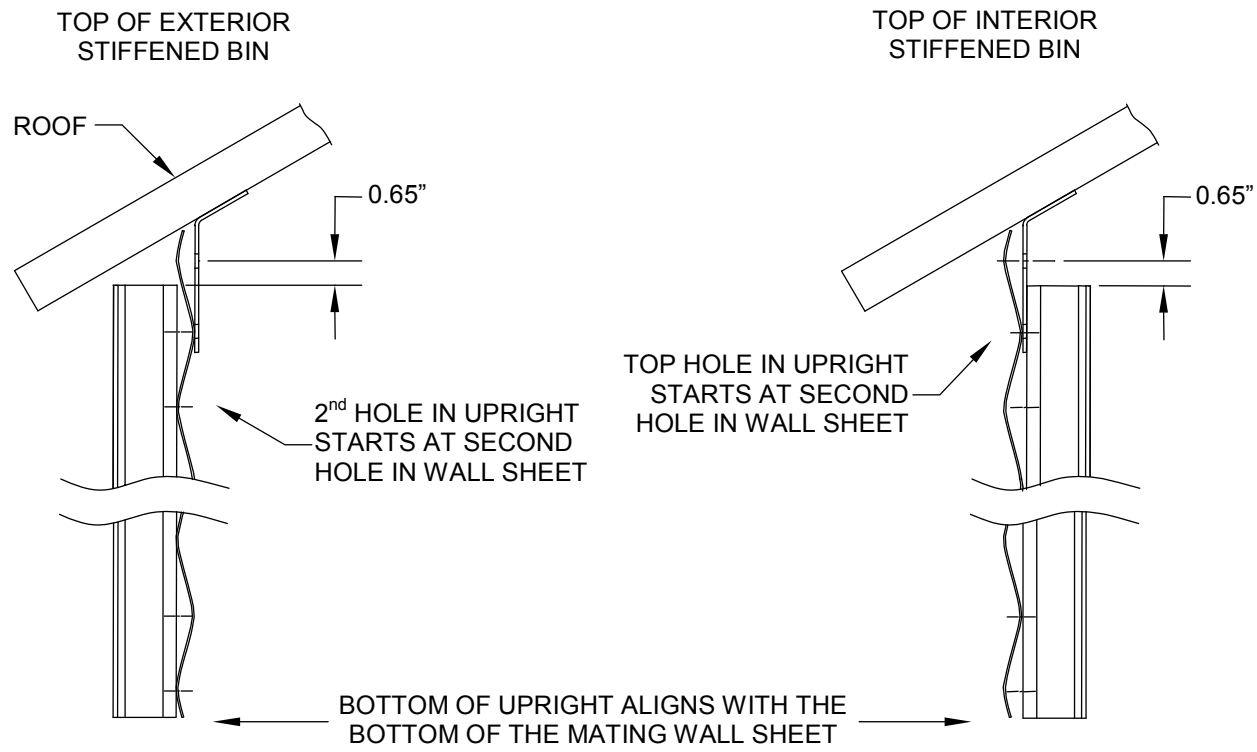


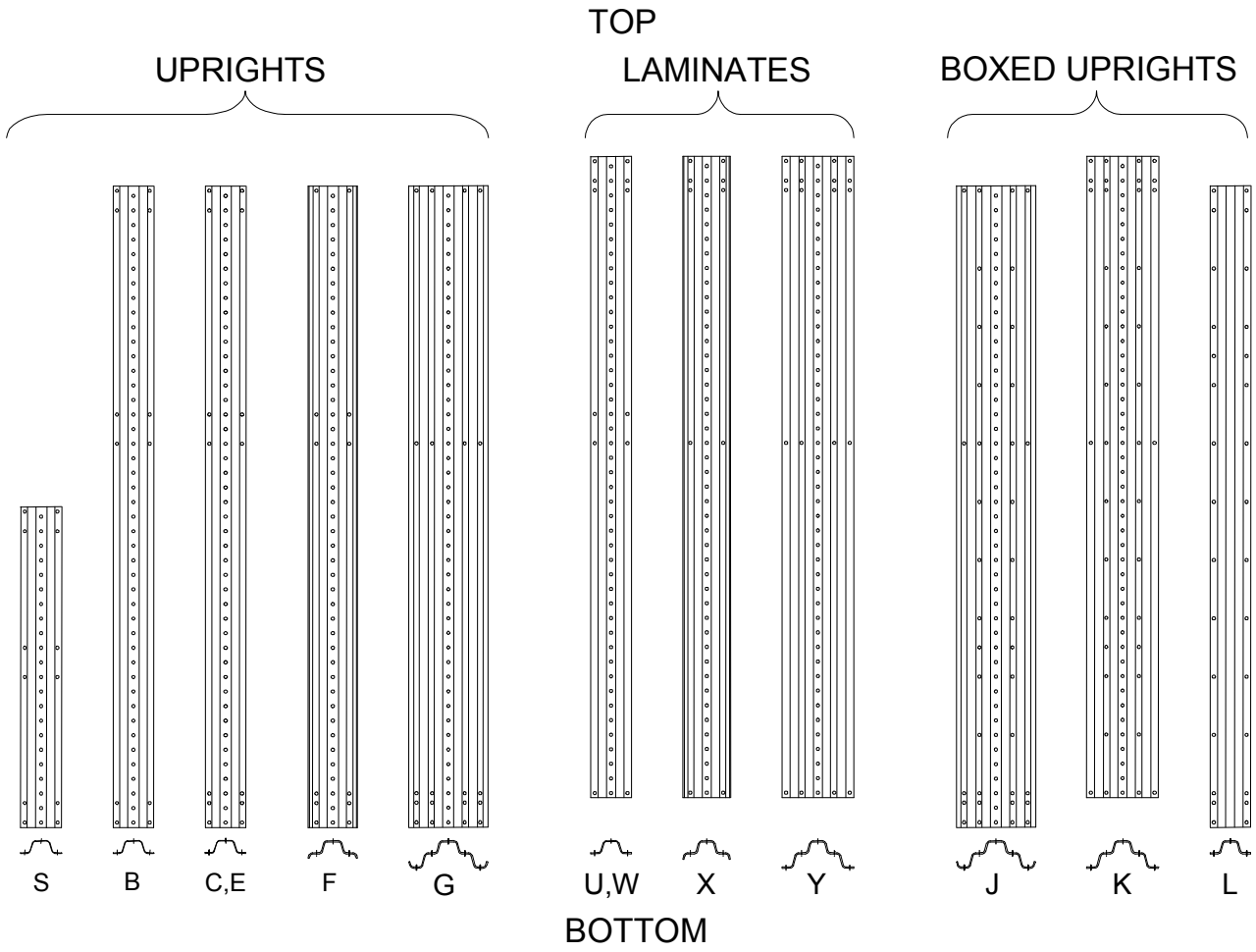
Table 14. Upright/Laminate Identification Table

	Identifying Letter	Part Number	Description	Gauge	Label Colour	Width of Section (in)
Uprights	S	232700S	Upright S .076" Short	14	Light green	5.5"
	B	232702B	Upright B .076" x 5.5"	14	Light green	5.5"
	C	232703C	Upright C .116" x 5.5"	12	Blue	5.5"
	E	232705E	Upright E .168" x 5.5"	8	Brown	5.5"
	F	232706F	Upright F .168" x 6.5"	8	Silver	6.5"
	G	232707G	Upright G .168" x 10"	8	Gold	10"
Laminates	U	232713U	Laminate U .116" x 5.5"	12	Blue striped	5.5"
	W	232715W	Laminate W .168" x 5.5"	8	Brown striped	5.5"
	X	232716X	Laminate X .168" x 6.5"	8	Silver Striped	6.5"
	Y	232717Y	Laminate Y .168" x 10"	8	Gold striped	10"
Boxed	J	232709J	Upright Boxed J .168" x 10"	8	Red	10"
	K	232710K	Laminate Boxed K .168" x 10"	8	Red Striped	10"
	L	232711L	Laminate Boxed L .168" x 5.5"	8	Red Striped	5.5"

Note

Not all sections are used on all bins.

Figure 35. Upright and Laminate Components



Catwalk Support Uprights

The upright/laminate requirements under catwalk support locations are likely different from the normal upright/laminate order. Consult your Westeel representative for specifications.

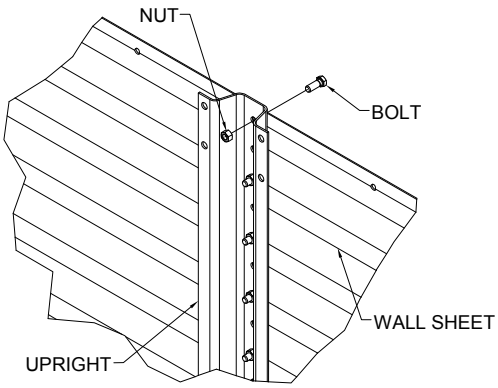
Bolt/Nut Orientation

To allow for a good seal install the bolts from the inside of the bin as shown for an externally stiffened bins.

Upright/Splice Pre-Assemblies

At the top of a bin, laminates are not utilized and a splice is required to make the connection between mating uprights. The splice nests inside the upright similar to a laminate. When pre-assembling uprights to splices, insure that the splice goes on the top end of the upright, such that the label on the bottom of the upright remains visible. Keeping the label visible will help prevent subsequent errors. This practice will also prevent ground interference when adjusting jack locations.

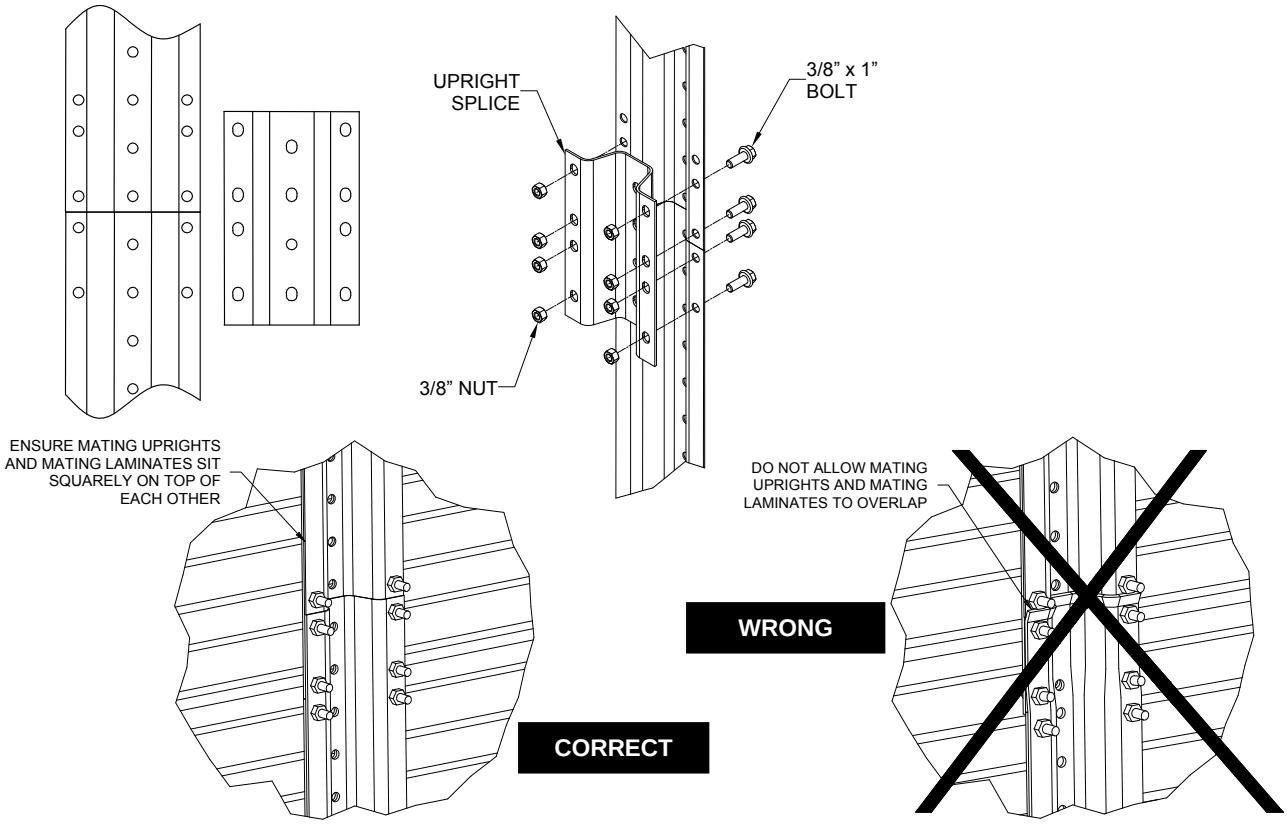
Figure 36. Upright / Wall Sheet Bolt and Nut Orientation



Tip

It may be advantageous to conduct pre-assemblies during the installation process. This can be a real time saver.

Figure 37. Pre-Assembling Uprights/Splices



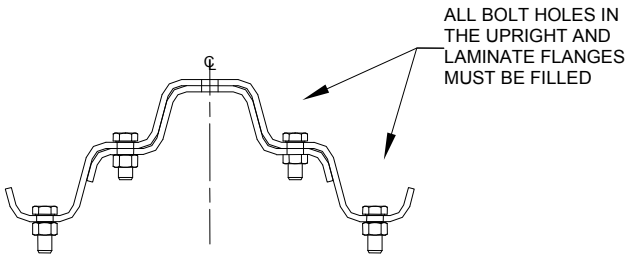
Upright and Laminate Assembly

Uprights and laminates are designed to transfer vertical loads through an end to end, butt connection. Ensure that mating uprights sit squarely on top of each other and do not overlap. Ensure that mating laminates sit squarely on top of each other and do not overlap. Secure the joints with the nuts and bolts provided. Failure to do so can result in structural failure.

Upright/Laminate Pre-assemblies

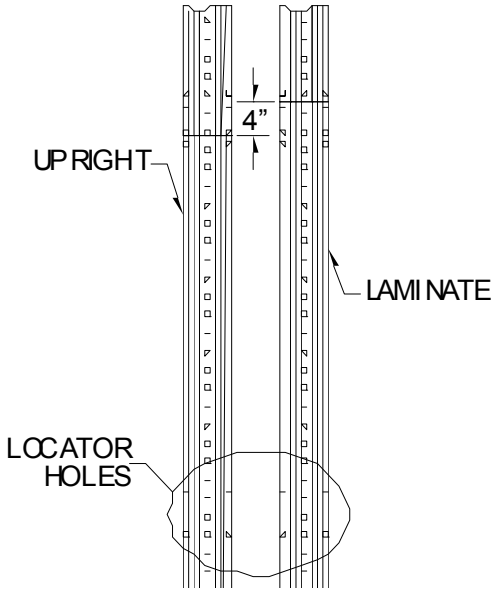
Laminates nest inside of uprights and are offset 4” above the uprights.

Figure 38. Nesting Laminates and Uprights



For proper orientation, ensure that the labels on the upright and laminate are both towards the bottom and that the locator holes in the middle portion of the upright and laminate line up. Bolts can be placed in these locator holes to create a pre-assembly. All locator holes, located in the middle of the upright and laminate flanges, need to be filled with bolts. These include holes in flanges that may only have one thickness of material.

Figure 39. Upright/Laminate Orientation



When properly assembled, both the upright label and the laminate label will remain visible during the pre-assembly phase. Once assembled on the bin the upright label will be covered.

In the assembly layouts, the combination of an upright and a laminate is called an assembly. For example, the combination of a “C” upright and a “U” laminate would be called a “CU Assembly”. Both the “C” on the upright label and the “U” on the laminate label, would remain visible, and would therefore remain distinguishable from other pre-assemblies.

Tip

When creating pre-assemblies, ensure that the labels on both the upright and the laminate are on the same end, and that the locator holes align with each other in the middle of the parts. Once pre-assembled, both labels should remain visible.

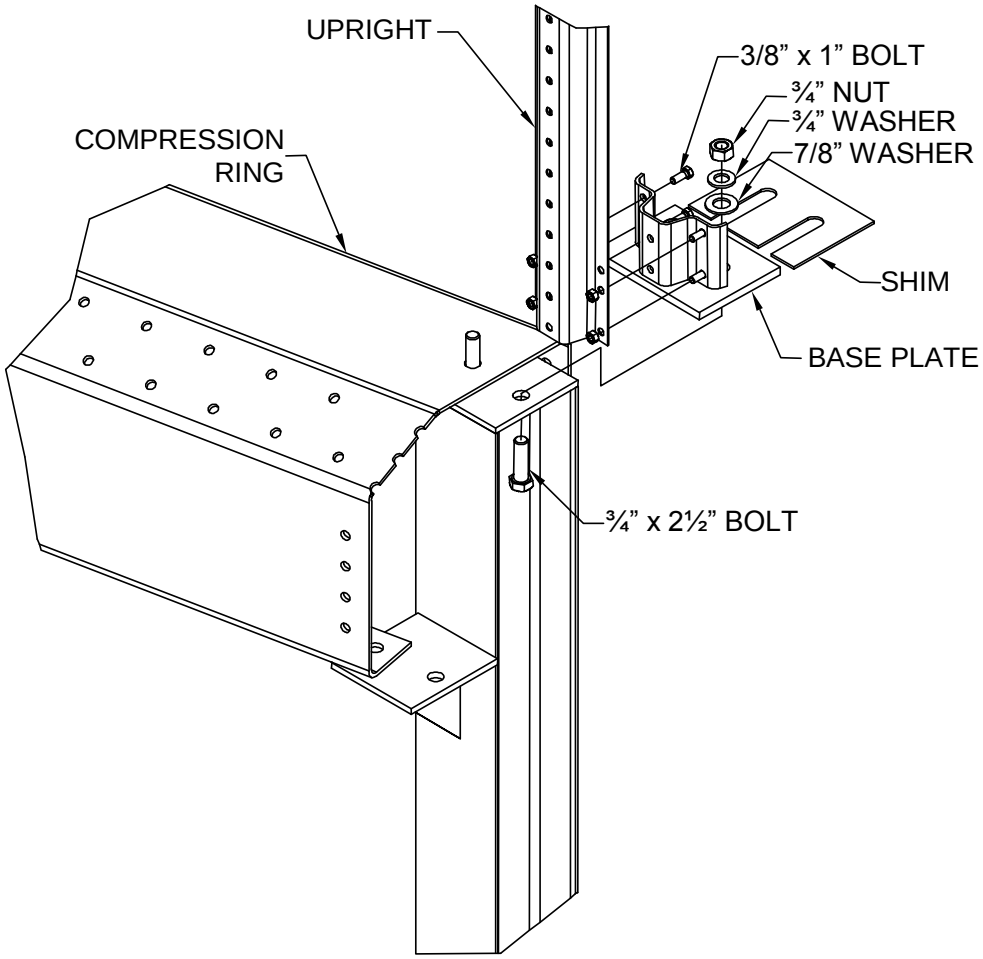
Note

Once completely assembled onto the bin, all visible holes in the upright and laminate flanges must be filled. This does not apply to the center row of holes. Here all mating wall sheet/upright holes must be filled.

5.19.1 Base Assembly

Using ¾” x 2½” bolts attach the base plate to the compression ring. A 7/8” washer, ¾” washer and ¾” nut secure the base plate to the compression ring. At the bottom of an assembled bin that has laminates, there will be a 4” gap between the bottom laminate and the base plate. It is imperative that this area is filled with the 4” laminate section that protrudes from the base plate. In many cases this part can also be added to the bottom upright/laminate assembly during pre-assembly.

Figure 40. Base Assembly



Tip

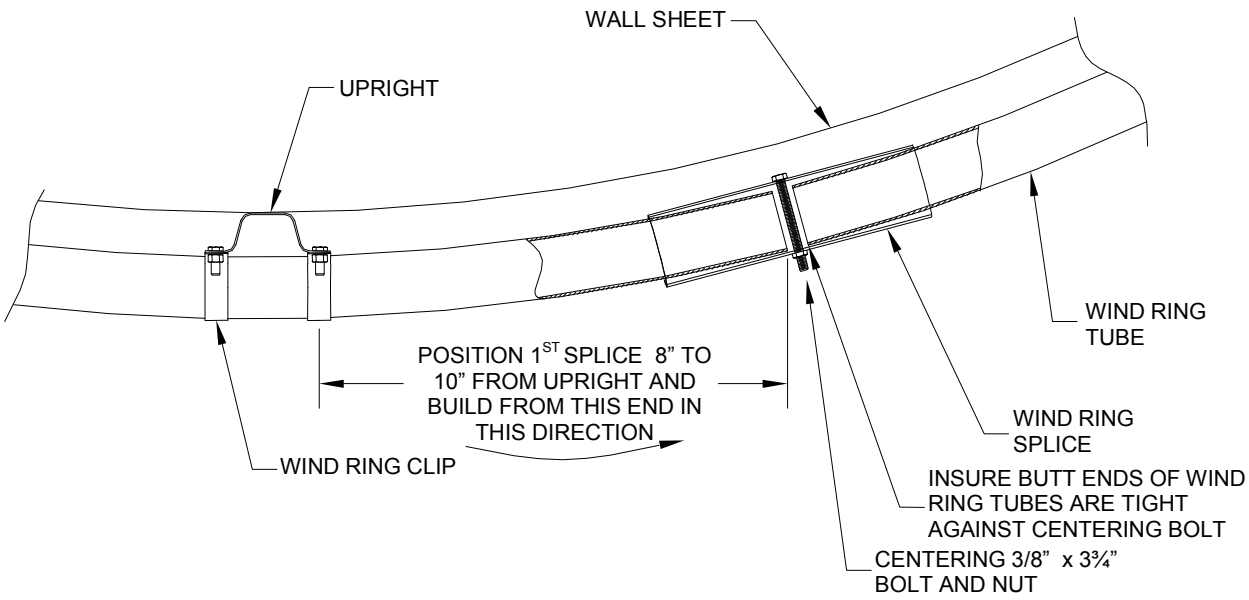
Depending on the assembly procedure, it may be convenient to bolt on the base plates to the compression ring.

5.20. Wind Ring Assembly

Wind rings fulfill their function when the bin is empty or partially filled. In high winds, the wind rings provide extra stiffness and help keep the bin round. Not all bins require wind rings. Bin diameter and height determine the location and the quantity of wind rings required.

Wind ring locations are identified by an O placed beside the relevant uprights within the wall sheet and upright layouts for the bin in question. At these locations wind ring tubes are secured to the upright flanges with a series of clips that bolt into the upright locator holes that are located in the flanges of the 5.5” wide upright and upright/laminate combinations. Adjacent tubes are aligned and secured to each other with wind ring splices. A 3/8” x 3¾” bolt through the splice keeps it centered on the connection.

Figure 41. Wind Ring Assembly

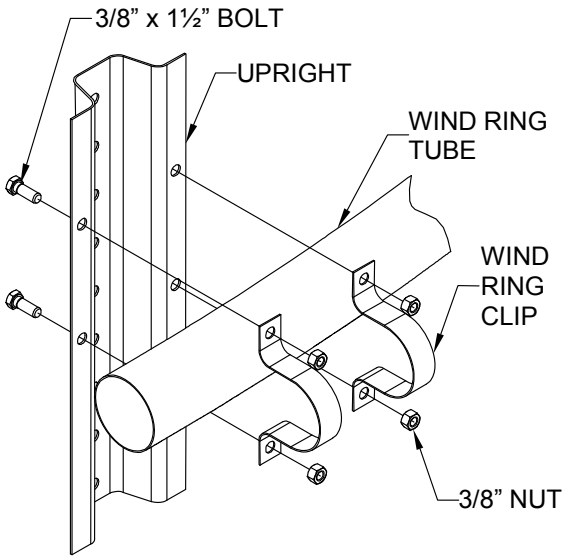


Externally Stiffened Bins

Once the uprights have been secured to the bin walls, position the first wind ring tube and secure it to the upright using the wind ring clips provided. Two clips are required per upright, one on each flange. Position the wind ring such that a wind ring splice (with bolt inserted) can be slipped onto the end of the tube without interfering with the upright or the wind ring clips. The splice should be orientated such that the bolt is horizontal.

Insert the end of the next wind ring tube into the open end of the wind ring splice. Insure that the ends of both tubes are tight against the centering bolt. Secure the wind ring tube to the uprights with the wind ring clips. Continue around the bin.

Figure 42. Wind Ring Mounting Detail (externally stiffened bins)



All wind ring splice connections should be made in the space between uprights, and should not encroach into the area where the wind ring clips are securing the wind ring tube to the uprights. To avoid interference with uprights and the need to make multiple cuts, position an end of the first tube relatively close to an upright, such that the space between the end of the tube and the next upright is maximized, and build from that end. Insure that both ends of the tube are far enough away from the closest uprights to avoid interference with the splice. When progressing around the bin, this space between the end of the tube and the next uprights may shrink with each additional tube that is installed. On large diameter bins, if this space shrinks to the point where the wind ring splice interferes with the upright, then the tube will need to be cut. Make the cut such that the space that is created between the end of the tube and the next upright is similar to the identical space on the first tube that was installed. In this manner, there will not be a shortage of tube.

Note

Assembly Tip: When putting the first wind ring tube in place, locate one end close to an upright with a 8” to 10” overhang, and continue building from that end. This will reduce the need for multiple cuts.

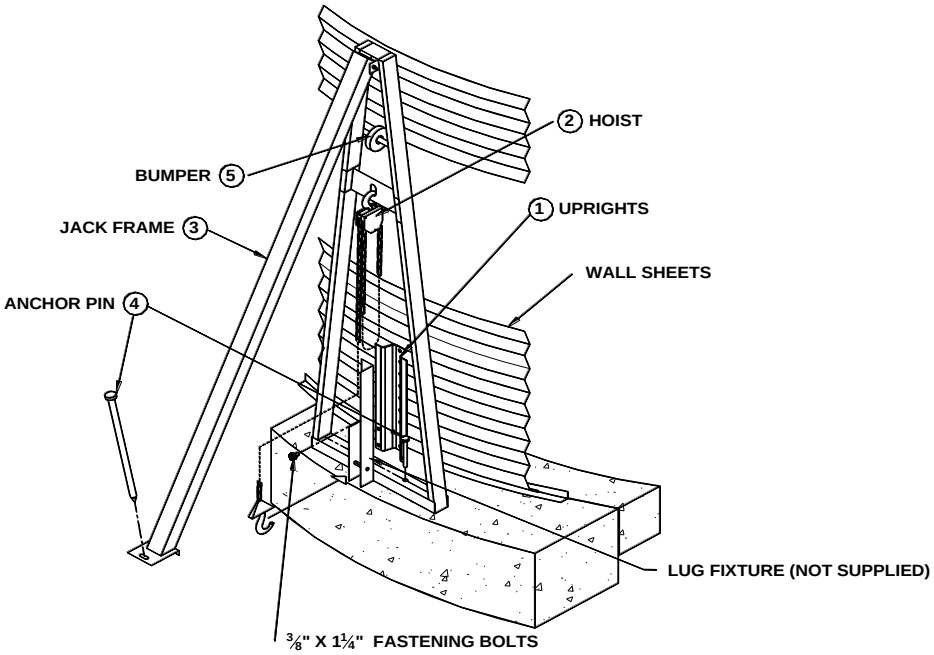
The final wind ring tube in a circle will need to be cut to length. Secure one end of the last tube in the previously installed wind ring splice as described above. Hold the tube in place and mark the cut-line relative to the previously installed tube at the other end. Insure that allowance is made for the 3/8” diameter bolt. Once the tube has been cut, install one end of the tube as described above. On the other end slide the wind ring splice completely onto the free end. Position this end relative to the previously installed tube, and slide the splice onto the second tube until it is centered. Insert the centering bolt. Install all wind ring clips. Tighten all bolts.

Note

Assembly Tip: When tightening wind ring clips, always tighten in sequence starting at the spliced end of the tube, which has already been secured, and work towards the free, and as yet unspliced, end.

5.21. Bin Jack Techniques

Figure 43. External Bin Jack Detail



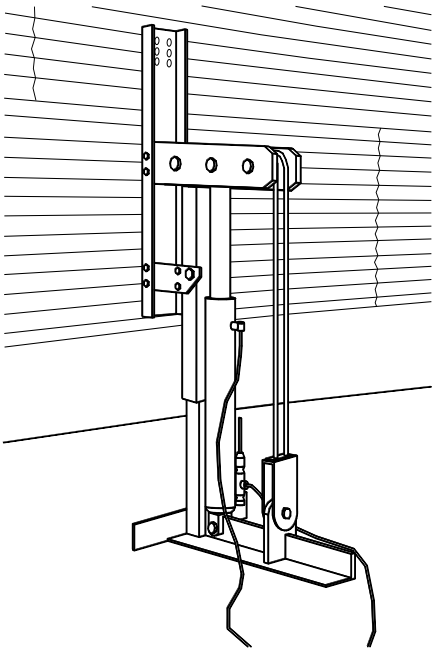
1. Choose a hoist with a suitable capacity for the expected load. Make sure the rated capacity of the hoist is not exceeded.
2. Fabricate custom lifting lugs to suit the assembly equipment. Each lug should have a capacity 5 times the expected load.
3. Have jacks evenly spaced around the bin. Use one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

Note

The bin may also be erected using an internal jacking system.

(not available from Westeel)

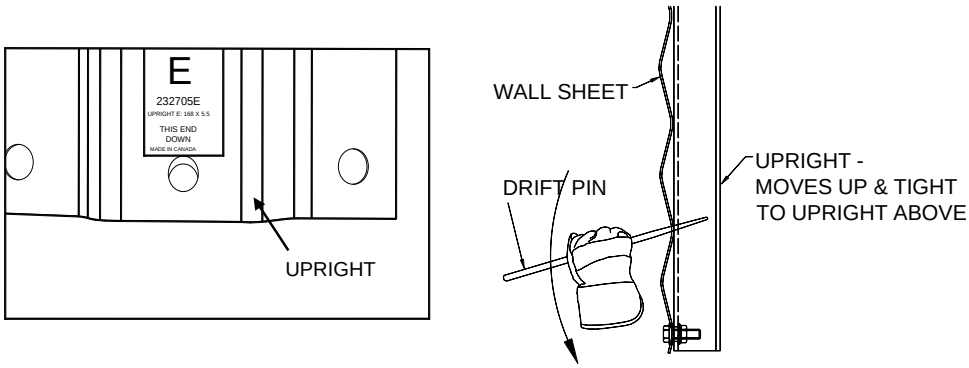
Figure 44. Internal Bin Jack Detail



We recommend:

- Ensure jacks are sized for the job. Do not exceed rated capacity.
- Layout jacks in a proper radius. Setting the jacks in the round makes the bin round.
- Use a minimum of one jack per wall sheet. Anchor them securely to the concrete.
- Jack on uprights. Hang wall sheets for two tiers until uprights are installed. Monitor hole alignment and make adjustments with a drift pin as you go, before tightening. Lifting the uprights towards one another during construction makes for easier realignment should misalignment creep in.

Figure 45. Hole Alignment



- Protect electrical cords.
- A drift pin is your friend. Use them for carrying wall sheets, Aligning holes and forcing uprights up.

6. Specifications

6.1. Wide Corr Hopper Tank Specifications

Table 15. Wide Corr Hopper Tank Specifications Table

Model	Capacity			Estimated Weight (lbs)		Overall Height A	Eaves height B	Hopper Height C	Number of Legs	Hopper Angle	Bin Diameter D	Overall Diameter E	Peak Opening F
	Bushels	m^3	tonnes	Total	Tank Only								
1507H45	4,350	146	118	8,300	3,800	39' 6"	35' 7"	9' 9"	10	45˚	14' 11"	15' 11"	33"
1508H45	4,890	165	133	8,600	4,200	43' 2"	39' 3"						
1509H45	5,440	183	147	9,300	4,800	46' 10"	42' 11"						
1510H45	5,980	201	162	9,800	5,300	50' 6"	46' 7"						
1511H45	6,520	219	177	10,400	6,000	54' 2"	50' 3"						
1512H45	7,060	237	192	11,000	6,500	57' 10"	53' 11"						
1513H45	7,600	255	206	11,600	7,100	61' 6"	57' 7"						
1807H45	6,440	217	175	10,500	4,500	42' 0"	37' 2"	11' 4"	12	45˚	17' 11"	18' 11"	33"
1808H45	7,220	243	196	11,200	5,200	45' 8"	40' 10"						
1809H45	8,000	269	217	11,700	5,700	49' 4"	44' 6"						
1810H45	8,780	295	238	12,400	6,400	53' 0"	48' 2"						
1811H45	9,560	321	259	13,200	7,200	56' 8"	51' 10"						
1812H45	10,330	347	280	13,900	7,900	60' 4"	55' 6"						
1813H45	11,110	373	302	14,800	8,800	64' 0"	59' 2"						
2107H45	8,990	303	244	14,400	5,500	44' 5"	38' 9"	12' 11"	14	45˚	20' 11"	21' 11"	33"
2108H45	10,050	338	273	15,100	6,200	48' 1"	42' 5"						
2109H45	11,140	374	302	15,900	7,000	51' 9"	46' 1"						
2110H45	12,170	409	330	16,700	7,800	55' 5"	49' 9"						
2111H45	13,230	445	359	17,700	8,800	59' 1"	53' 5"						
2112H45	14,290	481	388	18,500	9,600	62' 9"	57' 1"						
2113H45	15,360	516	417	19,700	10,800	66' 5"	60' 9"						
2407H45	12,040	405	327	17,500	6,300	46' 9"	40' 3"	14' 5"	16	45˚	23' 11"	24' 11"	33"
2408H45	13,430	452	364	18,400	7,300	50' 5"	43' 11"						
2409H45	14,810	498	402	19,500	8,300	54' 1"	47' 7"						
2410H45	16,200	545	440	20,800	9,600	57' 9"	51' 3"						
2411H45	17,580	591	477	21,700	10,500	61' 5"	54' 11"						
2412H45	18,970	638	515	23,000	11,900	65' 1"	58' 7"						
2413H45	20,350	684	552	23,900	12,800	68' 9"	62'3"						
2414H45	21,730	730	589	27,800	14,500	72'5	65'11"						
2707H40	15,280	515	415	25,700	7,600	47' 0"	39' 7"	13' 9"	18	40˚	26' 10"	27' 10"	33"
2708H40	17,030	573	462	26,400	8,300	50' 8"	43' 3"						
2709H40	18,790	632	510	28,000	9,900	54' 4"	46' 11"						
2710H40	20,540	691	557	29,700	11,600	58' 0"	50' 7"						
2711H40	22,290	750	605	30,800	12,700	61' 8"	54' 3"						
2712H40	24,050	809	652	32,400	14,300	65' 4"	57' 11"						
2713H40	25,800	868	700	33,900	15,800	69'0"	61' 7"						
2714H40	27,550	927	748	36,700	17,600	72' 8"	65' 3"						
3007H40	19,280	649	523	30,700	8,700	49' 1"	40' 10"	15' 0"	20	40˚	29' 10"	30' 10"	33"
3007H40	21,440	722	582	31,500	9,600	52' 9"	44' 6"						
3009H40	23,600	795	641	33,100	11,200	56' 5"	48' 2"						
3010H40	25,770	867	699	34,600	12,700	60' 1"	51' 10"						
3011H40	27,930	940	758	36,700	14,800	63' 9"	55' 6"						
3012H40	30,100	1,012	817	38,800	16,900	67' 5"	59' 2"						
3013H40	32,260	1,085	875	41,000	19,000	71' 1"	62' 10"						
3014H40	34,430	1,158	934	43,500	20,800	74' 9"	66' 6"						
3307H37	23,490	792	637	45,400	10,300	49' 7"	40' 11"	15' 1"	22	37˚	32' 10"	33' 10"	52"
3308H37	26,110	880	708	46,400	11,300	53' 3"	44' 7"						
3309H37	28,730	967	779	48,100	13,000	53' 3"	48' 3"						
3310H37	31,350	1,055	851	49,600	14,500	60' 7"	51' 11"						
3311H37	33,960	1,143	922	52,300	17,200	64' 3"	55' 7"						

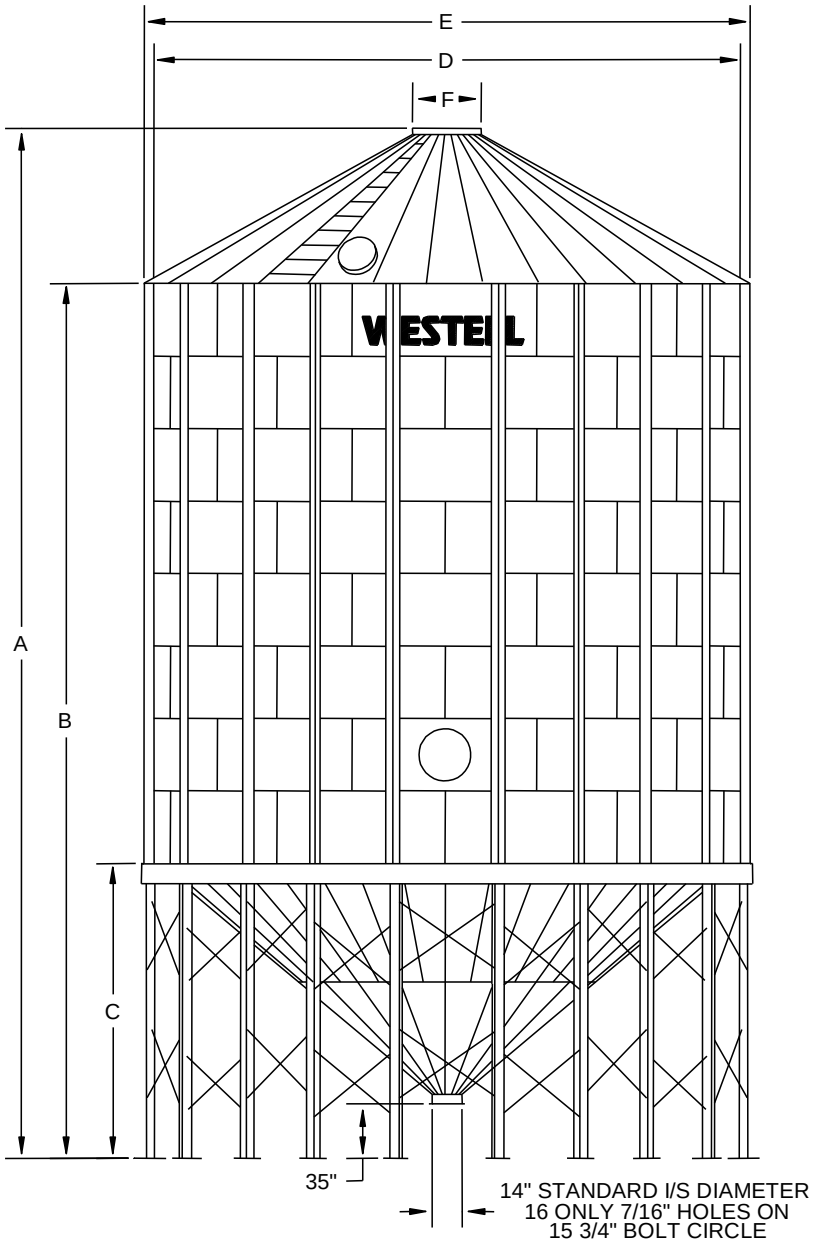
Table 15 Wide Corr Hopper Tank Specifications Table (continued)

Model	Capacity			Estimated Weight (lbs)		Overall Height A	Eaves height B	Hopper Height C	Number of Legs	Hopper Angle	Bin Diameter D	Overall Diameter E	Peak Opening F
	Bushels	m^3	tonnes	Total	Tank Only								
3312H37	36,580	1,231	993	55,000	19,900	67' 11"	59' 3"						
3313H37	39,200	1,319	1,064	57,400	22,300	71' 7"	62' 11"						
3314H37	41,820	1,407	1,135	59,600	24,500	75' 3"	66' 7"						
3607H37	28,510	961	774	52,400	11,400	51' 7"	42' 1"	16' 3"	24	37°	35' 10"	36' 10"	52"
3608H37	31,630	1,066	858	53,500	12,500	55' 3"	45' 9"						
3609H37	34,740	1,170	943	55,300	14,300	58' 11"	49' 5"						
3610H37	37,860	1,275	1,027	57,200	16,100	62' 7"	53' 1"						
3611H37	40,980	1,379	1,112	59,900	18,900	66' 3"	56' 9"						
3612H37	44,100	1,484	1,197	62,800	21,800	69' 11"	60' 5"						
3613H37	47,210	1,589	1,281	66,200	25,200	73' 7"	64' 1"						
3614H37	50,330	1,693	1,366	69,300	28,300	77' 3"	67' 9"						

Capacities are based on:

1. 28° roof cone
2. 1 bushel = 1.244 ft^3
3. 1 m3 = 35.3 ft^3
4. 770 kg/m^3 bulk density
5. 6% compaction in hopper and cylinder (bushels and tonnes)

Figure 46. Wide Corr Hopper Tank Specifications Diagram



7. Appendix

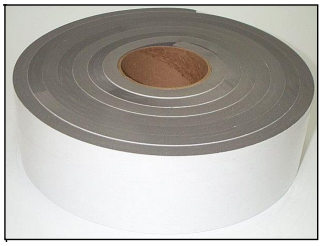
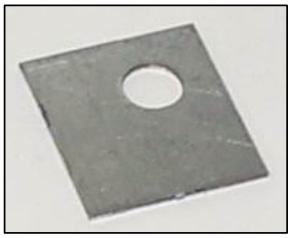
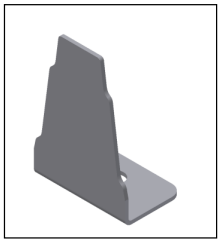
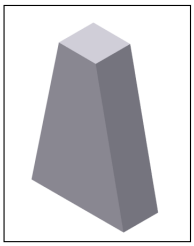
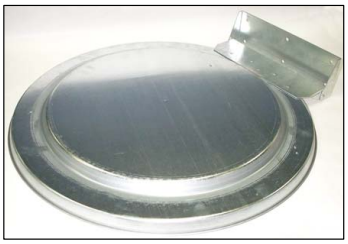
7.1. Roof Parts Box

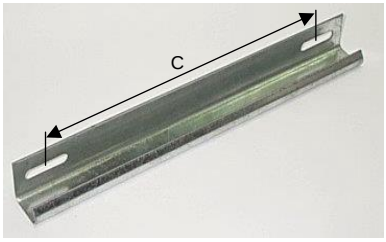
Table 16. Roof Parts Box

Description	Part No.	15’	18’	21’	24’	27’	30’	33’	36’
		235760	235761	235762	235763	235764	235765	235766	235767
PEAK RING		212201	212203	212204	212205	212206			
PEAK RING BULB GASKET 105"	195149	1	1	1	1	1			
PEAK RING BULB GASKET 168"	195150						1	1	1
PEAK RING FOAM 96" (15' - 27')	212228	1	1	1	1	1			
PEAK RING FOAM 160" (30' - 36')	212229						1	1	1
INSPECTION HATCH LID	235890	1	1	1	1	1	1	1	1
INSPECTION HATCH LATCH	235891	1	1	1	1	1	1	1	1
INSPECTION HATCH BULB GASKET 76”	235882	1	1	1	1	1	1	1	1
BIRD STOP	212230	15	18	21	24	27	30	33	36
FOAM for BIRD STOPS	212231	2	2	2	2	3	3	3	3.
STIFFENING RING SPLICE 1.375”	195074							3	3
STIFFENING RING EXPANDER 1.375	195085							2	2
STIFFENING RING BRACKET	195062							33	36
STIFFENING RING GASKET – BAG 50	195080							1	1
LADDER RUNG 14.5 (8")	193063				1	1			1
LADDER RUNG 14.5 (10")	193064			1			1	1	
LADDER RUNG 14.5 (12")	193065		1			1			1
LADDER RUNG 16.5 (14")	193066	1			1		1	1	
LADDER RUNG 18.5 (16")	193067			1		1		1	1
LADDER RUNG 20.5 (18")	193068		1		1		1		1
LADDER RUNG 22.5 (20")	193069			1		1		1	
LADDER RUNG 24.5 (22")	193070	1			1		1		1
LADDER RUNG 26.5 (24")	193071		1			1		1	
LADDER RUNG 28.5 (26")	193072			1			1		
LADDER RUNG 30.5 (28")	193073	1			1	1			1
LADDER RUNG 32.5 (30")	193074		1				1	1	1
LADDER RUNG 34.5 (32")	193075			1	1	1			
LADDER RUNG 36.5 (34")	193076						1	1	1
LADDER RUNG 38.5	193077	1	1	1	1	1	1	1	1
DOOR TIE BACK ASSEMBLY	236801	1	1	1	1	1	1	1	1
SEALING CLIP for BOTTOM ANGLE	235372	5	6	7	8	9	10	11	12
SELFDRILL SCREW .25 x 1.0 – BAG 7	235151							1	1
BOLT HFS .313” x 1.00” GR8.2 – BAG 250	235914	1	1	1	1	2	2	2	3
BOLT HFS .313” x 1.00” GR8.2 – BAG 50	235915			2	4		1	4	/
BOLT HFS .313” x 1.25” GR8.2 – BAG 80	235916	1	1	1	1	1	2	2	1
BOLT HFS .313” x 1.25” GR8.2 – BAG 50	235917		1	1	1	1			2
HEX FLANGE NUT .313” – BAG 250	235923	1	1	1	2	2	3	3	4
HEX FLANGE NUT .313” – BAG 50	235925	1	2	4	1	3		2	
WASHER POLY .313” – BAG 25	235929	1	1	1	1	1	1	1	1
FLAT WASHER .375 – BAG 75	235957	1	2				1	2	2
FLAT WASHER .375 – BAG 200	235956			1	1	1	1	1	1

7.2. Roof Parts Box Identification

Table 17. Roof Parts Box Part Identification

 195085 – Expander (1.375” Dia.)	 195074 – Stiffening Ring Splice (1.375” Dia.)	 195062 – Stiffening Ring Bracket 195080 – Stiffening Ring Gasket (Bag of 50)
 212228 – Peak Ring Foam 15 - 27	 235891 – Inspection Hatch Latch Assembly	 235372 – Sealing Clip for Bottom Ring Angle
 212230 - Bird Stop	 212231 – Foam Roof Rib Closure	 235890 – Hatch Lid Assembly



P/N	C
193061	4
193062	6
193063	8
193064	10
193065	12
193066	14
193067	16
193068	18
193069	20
193070	22

P/N	C
193071	24
193072	26
193073	28
193074	30
193075	32
193076	34
193078	38

“C” Dimension Is In Inches

193060-79 – Roof Ladder Rung

235882 – Inspection Hatch Bulb Gasket

195149 – Peak Ring Bulb Gasket (105”)

7.3. Bin Wall Hardware “Where Used” Chart

Table 18. Bin Wall hardware “Where Used” Chart

CONNECTION LOCATION	3/8" x 1" Flange Bolt & Hex Nut	3/8" x 1½" Flange Bolt & Hex Nut	3/8" x 3¾" Hex Bolt & Hex Nut	3/8" Flat Washer	3/8" Poly Washer & Hex Nut	7/16" x 1½" Flange Bolt & Hex Nut	7/16" x 1¾" Flange Bolt & Hex Nut	1/2" Flat Washer
BOLT Part Number	**193795**	**193797**	**150477**	**154977**	**154951 Washer**	**193768**	**193771**	**154981**
NUT Part Number	**193805**	**193805**	**193805**		**193805**	**193770**	**193770**	
UPRIGHT to WALL SHEET to ROOF CONNECTION UPRIGHT (Outside Stiffened Bins)		•		•	•			
WALL SHEET to UPRIGHT to ROOF CONNECTION UPRIGHT (Inside Stiffened Bins)		•		•				
HORIZONTALand VERTICAL WALL SHEET SEAMS								
WALL SHEETS 194679 to 194685, 194606 to 194607 THICKNESS .040" to .139"	•			•☆				
WALL SHEET 194608 THICKNESS .168"		•		•☆				
WALL SHEETS 194604 to 194605, 194616 to 194617 THICKNESS .096" LAMINATED to .139" LAMINATED						•		•◆
SIDE DRAW SHEETS to SURROUNDING WALL SHEETS		•						
WALL SHEET 194618 THICKNESS .168" LAMINATED							•	•◆
WALL SHEET to UPRIGHT CONNECTIONS								
WALL SHEETS 194679 to 194685 THICKNESS .040" to 0.116"	•							
WALL SHEETS 194606 to 194608, 194604 to 194618 THICKNESS .126" to .168", .096" LAM to .168" LAM		•						
WALL SHEET to UPRIGHT at HORIZONTAL SEAMS		•						
WALL SHEET to UPRIGHT to LAMINATE to CAP PLATE (for bins with Boxed Uprights)		•						
ALL ROOF SHEET CONNECTIONS	5/16" X 1" Flange Bolt & Hex Nut							
UPRIGHT to SPLICE	•							
UPRIGHT to LAMINATE	•							
UPRIGHT to LAMINATE to BOXED UPRIGHT		•						
WIND RING BRACKET to WALL SHEET to UPRIGHT (Inside Stiffened Bins Only)		•			•			
WIND RING CLIP to UPRIGHT or WIND RING CLIP to WIND RING BRACKET		•						
WIND RING SPLICE			•					
DOOR TIE BACK to WALL SHEET or UPRIGHT	•							

✯ — Use washers only at wall sheet to bottom ring angle, non-laminated to laminated wall sheet horizontal seam and wall sheet vertical seams to door (non-laminated sheets only; 3/8” bolts)

◆ — Use washers only at wall sheet to *bottom ring angle*

7.4. Hardware "Where Used" Chart

Part Number	Size	Where Used
193802 193732	5/16” x 1” Bolt c/w Sealing Washer 5/16” Flange Nut	All roof sheet locations except at ladder rungs (as noted below) Bird stop to top ring angle (27’ – 36’ bins only)
193803 193732	5/16” x 1¼” Bolt c/w Sealing Washer 5/16” Flange Nut	Ladder rung (to ladder support angle) to roof sheet rib Stiffening ring bracket to ladder support to roof rib Top wall sheet horizontal seam to top ring angle Stiffening ring bracket to rib cap and roof sheet 2 roof ribs & rib cap
150410 193732	5/16” x 2¾” Bolt c/w Sealing Washer 5/16” Flange Nut	Bird stop to top ring angle (15’ – 24’ bin only)
193806	5/16” Poly washer	Between ladder rungs and ladder support angle or roof ribs
154977	3/8” Flatwasher	5/16” bolt – Wall sheet at top ring angle joints 3/8” bolt – Wall sheet to compression ring sealing strip
193795 193805	3/8” x 1” Bolt c/w Sealing Washer 3/8” Nut	Door tie back Wall sheet to uprights (except at horizontal seams) Wall sheet vertical and horizontal seams (except at upright) Upright to laminate or splice 193805 3/8” Nut Laminate make-up to upright
193797 193805	3/8” x 1½” Bolt c/w Sealing Washer 3/8” Nut	Wall sheet horizontal seam at upright only Wall sheet to compression ring sealing strip Upright to wall sheet to compression ring sealing strip 193805 3/8” Nut Wind ring clips to upright
150477 193805	3/8” x 3¾” Bolt 3/8” Nut	Wind ring splice
193781 154201	½” x 1” Bolt ½” Nut	All hopper sheet connections (15’-24’ except as noted below) Splice angle to compression ring (15’-24’) Lower hopper to upper hopper (27’-30’) Lower hopper to lower hopper (27’-36’)
193782 154201	½” x 1½” Bolt ½” Nut	Top corner of hopper sheet to compression ring (15’-24’) Upper hopper to compression ring (27’-30’)Lower hopper to discharge cone (27’-36’)
154981	½” Flatwasher	Top corner of hopper sheet to compression ring (15’-24’)
193793 154216	5/8” x 1½” Bolt 5/8” Nut	Channel to compression ring and/or support column (27’-36’) All upper hopper joints (33’-36’) Upper hopper to upper hopper (27’-30’) Lower hopper to upper hopper at corners (27’-30’)
193796 154216	5/8” x 2” Bolt 5/8” Nut	Support column to compression ring to splice plate Upper hopper to compression ring to splice angle
154990 154216	5/8” Lockwasher 5/8” Nut	Tie rod ends (15’-24’)
150038 150041	3/4” x 2” Bolt 3/4” Nut	Compression ring to support column (15’-24’)
150591 154978 154979 150041	¾” x 2½” Bolt ¾” Flatwasher 7/8” Flatwasher ¾” Nut	Upright base assembly to compression ring to support column
154979 154978 150041	7/8” Flatwasher ¾” Flatwasher ¾” Nut	Tie rod ends (27’-36’)

7.5. 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 19. 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.

8. Limited Warranty: Westeel Grain Bin Products

Westeel – Ag Growth International ("Westeel") warrants products 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

This warranty will run from the date of purchase from the dealer or distributor, authorized by Westeel. The duration of the warranty is limited as follows:

Galvanized Bins	5 years
EasyFlow2	24 months
Westeel Fans	36 months
Floors	12 months
Catwalk	12 months
Bulk Feed Tanks	24 months
SeedStor-K Cones	
Paint	12 months
Structural	30 months
Elite Cones	
Paint	30 months
Structural	10 years
WESTEEL cones	
Paint	No Warranty
Structural	12 months
Smooth Wall Bins	
Paint	60 months
Structural	10 years
Commercial Smooth Wall Bins	
Paint	12 months
Structural	10 years

Limitation of Remedies 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;
6. any field modifications or substitutions to original bin components;
7. inadequate ventilation or any other circumstance not in keeping with proper maintenance and/or use of the goods;
8. Acts of God, accident, neglect or abuse of the goods by the purchaser and/or any other individual or entity; or
9. 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.

450 Desautels Street
P.O. Box 792
Winnipeg, Manitoba, R3C 2N5 Canada
Phone: (866) 299-4312
Fax: (204) 235-0796

Website: www.westeel.com
Email: info@westeel.com

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