

CB22 GRAIN BIN SIDEWALL



INSTALLATION MANUAL P/N 347861



Trusted. Tested. True.

Chief Industries, Inc. – Agri/Industrial Division

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Manual Revisions

- 10-17-2011
 - Updated sidewall caulking details on laminated sheets
- 12-21-2011
 - Updated sidewall and stiffener gauge charts
- 5-20-2013
 - Updated wind ring information
- 9-24-2013
 - Updated sealing at bottom stiffeners
- 8-31-2015
 - Updated anchors, sign sheet, warranty information
- 1-1-2016
 - General formatting update

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www.agri.Chiefind.com

STANDARD LIMITED WARRANTY

Chief Grain Bin Products

1. **Definitions.** The following terms, when they appear in the body of this Standard Limited Warranty for Grain Bin Products in initial capital letters shall have the meaning set forth below:
 - A. Accepted Purchase Order shall mean the Purchase Order identified below.
 - B. Chief shall mean Chief Agri/Industrial, a division of Chief Industries, Inc.
 - C. Original Owner shall mean the original owner identified below.
 - D. Product shall mean the Agri/Industrial Equipment as described in the Accepted Purchase Order.
 - E. Reseller shall mean the authorized Chief Agri/Industrial Equipment dealer identified below.
2. **Limited Product Warranty.** Upon and subject to the terms and conditions set forth below, Chief hereby warrants to the Reseller, and, if different, the Original Owner as follows:
 - A. All new Products delivered to the Reseller or the Original Owner by Chief pursuant to the Accepted Purchase Order will, when delivered, conform to the specifications set forth in the Accepted Purchase Order;
 - B. All new Products delivered pursuant to the Accepted Purchase Order will, in normal use and service, be free from defects in materials or workmanship; and
 - C. Upon delivery, Chief will convey good and marketable title to the Products, free and clear of any liens or encumbrances except for, where applicable, a purchase money security interest in favor of Chief.
3. **Duration of Warranty and Notice Requirements.** Subject to the **Exceptions, Exclusions and Limitations** set forth below, the warranties set forth in Section 2 above shall apply to all covered non-conforming conditions that are discovered within the first sixty (60) months following delivery of the Product to the carrier designated by the Reseller and/or the Original Owner at Chief's manufacturing facility in Kearney, Nebraska (the "Warranty Period") and are reported to the Chief as provided in Section 4 below within thirty (30) days following discovery (a "Notice Period").
4. **Notice Procedure.** In order to make a valid warranty claim, the Reseller and/or the Original Owner must provide Chief with a written notice of any nonconforming condition discovered during the Warranty Period within the applicable Notice Period specified in Section 3 above. Said notice must be in writing; be addressed to Chief Industries, Inc., Agri/Industrial Division, Customer Service Department, P.O. Box 848, Kearney, NE 68848; and contain the following information: (a) the Customer's name and address; (b) the Reseller's name and address; (c) the make and model of the Product in question; (d) the current location of the Product; (e) a brief description of the problem with respect to which warranty coverage is claimed; and (f) the date on which the Product was purchased.
5. **Exceptions and Exclusions.** Anything herein to the contrary notwithstanding, the warranties set forth in Section 2 above do **not** cover any of the following, each of which are hereby expressly excluded:
 - A. Defects that are not discovered during the applicable Warranty Period;
 - B. Defects that are not reported to the Chief Agri/Industrial Division Customer Service Department in conformity with the notice procedure set forth in Section 4 above within the applicable Notice Period specified in Section 3;
 - C. Any used or pre-owned Products;
 - D. Any Chief manufactured parts that are not furnished as a part of the Accepted Purchase Order;

- E. Any fixtures, equipment, materials, supplies, accessories, parts or components that have been furnished by Chief but are manufactured by a third party;
 - F. Any Products which have been removed from the location at which they were originally installed;
 - G. Any defect, loss, damage, cost or expense incurred by the Reseller or the Original Owner to the extent the same arise out of, relate to or result, in whole or in part, from any one or more of the following:
 - (i) Usual and customary deterioration, wear or tear resulting from normal use, service and exposure;
 - (ii) Theft, vandalism, accident, war, insurrection, fire or other casualty;
 - (iii) Any damage, shortages or missing parts which result during shipping or are otherwise caused by the Reseller, the Original Owner and/or any third party;
 - (iv) Exposure to marine environments, including frequent or sustained salt or fresh water spray;
 - (v) Exposure to corrosive, chemical, ash, smoke, fumes, or the like generated or released either within or outside of the structure on which the Product is installed, regardless of whether or not such facilities are owned or operated by the Reseller, the Original Owner or an unrelated third party;
 - (vi) Exposure to or contact with animals, animal waste and/or decomposition;
 - (vii) The effect or influence the Product may have on surrounding structures, including, without limitation, any loss, damage or expense caused by drifting snow;
 - (viii) Any Product or portion thereof that has been altered, modified or repaired by the Reseller, the Original Owner or any third party without Chief's prior written consent;
 - (ix) Any Product or portion thereof that has been attached to any adjacent structure without Chief's prior written approval;
 - (x) Any Product to which any fixtures, equipment, accessories, materials, parts or components which were not provided as a part of the original Accepted Purchase Order have been attached without Chief's prior written approval;
 - (xi) The failure on the part of the Reseller, the Original Owner or its or their third party contractors to satisfy the requirements of all applicable statutes, laws, ordinances rules, regulations and codes, (including zoning laws and/or building codes);
 - (xii) The use of the Product for any purpose other than the purpose for which it was designed; and/or
 - (xiii) The failure of the Reseller, the Original Owner and/or any third party to:
 - (a) properly handle, transport and/or store the Product or any component part thereof;
 - (b) properly select and prepare a site that is adequate for the installation and/or operation of the Product or any component part thereof;
 - (c) properly design and construct a foundation that is adequate for the installation and/or operation of the Product or any component part thereof;
 - (d) properly set up, erect, construct or install the Product and/or any component part thereof; and/or
 - (e) properly operate, use, service and/or maintain the Product and each component part thereof.
6. **Resolution of Warranty Claims.** In the event any nonconforming condition is discovered within the Warranty Period and Chief is notified of a warranty claim as required by Section 4 prior to the end of the applicable Notice Period set forth in Section 3 above, Chief shall, with the full cooperation of the Reseller and the Original Owner, immediately undertake an investigation of such claim. To the extent Chief shall determine, in its reasonable discretion, that the warranty claim is covered by the foregoing Limited Product Warranty, the following shall apply:

- A. Warranty Claims With Respect to Covered Non-Conforming Conditions Discovered Within the First Three Hundred Sixty Five (365) Days and Reported to Chief Within Thirty (30) Days of Discovery. In the case of a warranty claim which relates to a covered non-conforming condition that is discovered during the first three hundred sixty five (365) days of the Warranty Period and is reported to Chief as required by Section 4 within thirty (30) days of discovery as required by Section 3, Chief will, as Chief's sole and exclusive obligation to the Reseller and the Original Owner, and as their sole and exclusive remedy, work in cooperation with the Reseller and the Original Owner to correct such non-conforming condition, and in connection therewith, Chief will ship any required replacement parts to the "ship to address" set forth in the Accepted Purchase Order FOB Chief's facilities in Kearney, Nebraska, and will either provide the labor or reimburse the Reseller or the Original Owner, as may be appropriate in the circumstances, for any out of pocket expense the Original Owner may reasonably and necessarily incur for the labor that is required to correct such non-conforming condition, provided that if work is to be performed by the Reseller or a third party contractor, Chief may require at least two competitive bids to perform the labor required to repair or correct the defect and reserves the right to reject all bids and obtain additional bids. Upon acceptance of a bid by Chief, Chief will authorize the necessary repairs.
- B. All Other Warranty Claims. Except as is otherwise provided in subsection 6A above, in the case of all other warranty claims which relate to covered non-conforming conditions that are discovered during the Warranty Period and are reported to Chief as required by Section 4 within thirty (30) days following discovery, Chief will, as Chief's sole and exclusive obligation to the Reseller and the Original Owner, and as the Reseller's and the Original Owner's sole and exclusive remedy, ship any required replacement parts to the Original Owner at the "ship to address" specified in the Accepted Purchase Order FOB Chief's facilities in Kearney, Nebraska; and **in such event, Chief shall have no responsibility or liability to either the Reseller or the Original Owner for the cost of any labor required to repair or correct the defect.**
7. Warranty Not Transferable. This Warranty applies only to the Reseller and the Original Owner and is **not transferable**. As such, this Warranty does **not** cover any Product that is sold or otherwise transferred to any third party following its delivery to the Original Owner.
8. Limitation on Warranties, Liabilities and Damages. The Reseller and the Original Owner expressly agree that the allocation of the risk, liability, loss, damage, cost and expense arising from any Product that does not conform to the limited warranty given in Section 2 above are fair and reasonable and acknowledge that such allocation was expressly negotiated by the parties and was reflected in the Purchase Price of the Product. Accordingly the Reseller and the Original Owner expressly agree as follows:
- A. Disclaimer of Implied Warranties. **EXCEPT AS IS OTHERWISE EXPRESSLY SET FORTH HEREIN, CHIEF MAKES NO OTHER REPRESENTATIONS OR WARRANTIES OF ANY KIND WHATSOEVER, WHETHER EXPRESS OR IMPLIED, BY OPERATION OF LAW, COURSE OF DEALING OR OTHERWISE WITH RESPECT TO THE PRODUCT, ANY COMPONENT PART THEREOF OR ANY OTHER GOODS OR SERVICES THAT CHIEF MANUFACTURES, FABRICATES, PRODUCES, SELLS OR PROVIDES TO THE DEALER OR THE ORIGINAL OWNER PURSUANT TO THE TERMS OF ANY ACCEPTED PURCHASE ORDER, INCLUDING WITHOUT LIMITATION ANY REPRESENTATION OR WARRANTY WITH RESPECT TO DESIGN, CONDITION, MERCHANTABILITY OR FITNESS OF THE PRODUCT OR ANY OTHER GOODS OR SERVICES FOR ANY PARTICULAR PURPOSE OR USE.**
- B. Limitation on Liability. **EXCEPT AS IS OTHERWISE EXPRESSLY SET FORTH IN SECTION 6 ABOVE, CHIEF'S LIABILITY TO THE DEALER AND/OR THE ORIGINAL**

OWNER WITH RESPECT TO ANY DEFECTS IN ANY PRODUCTS OR FOR ANY OTHER GOODS OR SERVICES WHICH DO NOT CONFORM TO THE WARRANTIES SET FORTH ABOVE SHALL NOT, IN ANY EVENT, EXCEED THE ACTUAL COST OF SUCH NON-CONFORMING PRODUCT, GOODS OR SERVICES AS DETERMINED PURSUANT TO THE ACCEPTED PURCHASE ORDER; AND

- C. **Limitation on the Nature of Damages.** EXCEPT AS EXPRESSLY PROVIDED IN SECTION 6 ABOVE, CHIEF SHALL NOT, UNDER ANY CIRCUMSTANCES, BE LIABLE TO THE DEALER, THE ORIGINAL OWNER OR ANY THIRD PARTY FOR ATTORNEY FEES COURT COSTS OR ANY OTHER SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL, LIQUIDATED OR PUNITIVE DAMAGES OF ANY NAME, NATURE OR DESCRIPTION AS A RESULT OF THE FAILURE OF ANY PRODUCT OR ANY OTHER GOODS OR SERVICES PURCHASED BY THE DEALER OR THE ORIGINAL OWNER FROM CHIEF PURSUANT TO THE ACCEPTED PURCHASE ORDER TO CONFORM TO THE LIMITED WARRANTIES SET FORTH IN SECTION 2 ABOVE.
8. **Applicable Law.** This Limited Product Warranty has been issued, accepted and entered into by the Reseller, the Original Owner and Chief in the State of Nebraska and shall be governed by, and construed in accordance with, the internal laws of the State of Nebraska. Any legal action or proceeding with respect to any goods or services furnished to the Original Owner by Chief in connection herewith, or any document related hereto shall be brought only in the district courts of Nebraska, or the United States District Court for the District of Nebraska, and, by execution and delivery of this Limited Product Warranty, the undersigned Original Owner hereby accept for themselves and with respect to their property, generally and unconditionally, the jurisdiction of the aforesaid courts. Further, the undersigned Original Owner hereby irrevocably waives any objection, including, without limitation, any *forum non conveniens*, which it may now or hereafter have to the bringing of such action or proceeding in such respective jurisdictions.

4843-5948-9057, v. 1

Warning

Water Sensitive Materials - Read this notice carefully

Bundles must be inspected and carrier advised immediately if damage is noted. White rust is a corrosion attack of the zinc coating resulting from the presence of water. Anywhere rust is found will result in a reduction of the life of the galvanized steel.

If water has entered a bundle or if condensation has formed between sheets, the bundle must be opened, the sheets separated and all surfaces dried.

If sheets are to be installed within 10 days:

Store bundled sheets off the ground high enough to allow air circulation beneath bundle and to prevent water from entering. Store 1 end at least 8" (20.32cm) higher than the opposite end. Support long bundles in the center. Prevent rain from entering the bundle by covering with a tarpaulin, making provision for air circulation between the draped edges and the ground.

Do not wrap in plastic.

If sheets are not to be installed within 10 days:

Provide inside dry storage. Storage beyond 6 months is not recommended. If white rust is apparent upon receipt of shipment, notify Chief immediately. Damage to sheets, resulting from improper storage, is the responsibility of the receiver.



Before You Begin

Before starting the installation of the bin, take time to thoroughly study the construction methods in this manual, this will save you time and money.

Chief makes no warranty concerning components, accessories or equipment not manufactured by Chief.

When using a cutting torch or welding galvanized material, the possibility of developing toxic fumes will exist. Provide adequate ventilation and respiratory protection when using this type of equipment during installation.

Introduction

Thank you for purchasing a Chief grain bin. Proper installation and operation will ensure you the best overall experience with your grain bin and guarantee smooth operation.

This proprietary information is loaned with the expressed agreement that the drawings and information therein contained are the property of Chief Industries, Inc. and will not be reproduced, copied, or otherwise disposed of, directly or indirectly, and will not be used in whole or in part to assist in making or to furnish any information for the making of drawings, prints or other reproduction hereof, or for the making of additional products or equipment except upon written permission of Chief Industries, Inc. first obtained and specific as to each case. The acceptance of this material will be construed as an acceptance of the foregoing agreement.

The technical data contained herein is the most recent available at the time of publication and is subject to modification without notice. Chief Industries, Inc. reserves the right to modify the construction and method of operation of their products at any time without any obligation on their part to modify any equipment previously sold and delivered.

Model Number Description

The model nomenclature distinguishes the application of the grain bin. The information includes a designation of the applicable structure diameter, eave height, roof design and design criteria utilized. The definition of the model number nomenclature is as follows:

Example: CB 22 - 18 - J Rib - SZA

(a) (b) - (c) - (d) - (e)

(a) CB = Chief Bin

(b) 22 = Grain Bin Diameter

Where: 22 = 22 sheets in circumference

(c) 18 = Grain Bin Eave Height

Where: 18 = 18 sheets in height

(d) J Rib = Roof Design Type

Where: J Rib = J Rib design

Where: V Rib = V Rib design

(e) Grain Bin Design Criteria for seismic and wind

General Design Information

All Chief grain bins are designed for storage and handling of free flowing grain with densities as follows:

- 49.5 PCF (793 kg/m³) free flowing grain
- 52.5 PCF (841 kg/m³) (allowable grain compaction @ 6%)

Storage of products other than grain, products heavier than 49.5 PCF (793 kg/m³), products having unusual flow characteristics, or products with unusual corrosive properties must be approved by Chief engineering department prior to quoting. Storage of non-flowing products such as soybean meal or meat scraps in a standard designed bin will void the warranty.

For the grain bin, each individual sidewall ring has been designed to accommodate the vertical and horizontal wall loads imposed by the stored grain. Sidewall sheeting gauge and design strength for each ring is individually analyzed for all bin sizes. Sidewall stiffener gauges and design strength is individually determined for the full sidewall height range. All steel materials are purchased in accordance with the applicable ASTM Standard.

All bolted connections are designed using high strength bolts which meet the specifications of the applicable ASTM or SAE standard.

All grain bins must be filled uniformly at the center and unloaded thru the center discharge only, until grain no longer flows by gravity. Grain bins filled or emptied off-center will void the warranty; with the exception of approved side draw unload systems.

All galvanized steel used for storage and drying bins conform to ASTM specification A653 with the galvanized coating to ASTM specification A924.

Galvanized coating type G-115 specifies galvanization of 1.15 oz/ft² (Z350; 350 gm/m²) total for both sides in the following materials:

- 22 Gauge thickness & lighter = Commercial Steel Type A, 33ksi min yield (grade 230)
- 18 & 20 Gauge thickness = Structural Steel Grade 40, Class I; 40ksi min yield (grade 275)
- 17 Gauge thickness & heavier = Structural Steel Grade 55, Class I; 55ksi min yield (grade 340)

Roof Design Information

All Chief Industries grain bin roof structures are designed to withstand normally anticipated environmental and service conditions per the specified UBC design code.

Important Note: Roof peak loads in excess of the specified rating can cause structural damage and will void all warranties.

J-Rib Roof Design

The CB5 thru CB34 grain bins are designed with a 30 degree roof slope. The CB9 thru CB11 designs incorporate a roof structural bridging ring. These roofs have 4 roof panels per sidewall sheet.

The CB12 thru CB34 grain bin roofs utilize a complete structural framing system which supports the roof panel assembly. CB22 thru CB34 feature a split roof panel design.

The CB5 thru CB34 designs utilize a working ring that provides a continuous ring around the center peak and is attached with heavy gauge brackets located on top of roof ribs, near the roof cap.

For all roofs incorporating a J-Rib panel design, various peak ring diameters and peak loading options are available.



Important Note: The peak load capacities listed must not be exceeded. If your application will exceed the listed values, contact Chief Industries Inc. for recommendations.

Grain Bin Usage

The Chief stiffened bin series may be used for all common storage and drying applications. Bin models 8 rings and up are to be used for storage applications only. If stirring devices consisting of more than six down augers are to be used, contact Chief for recommendations. The stiffened bin series must be used when devices with stirring or down augers are installed.

Accessory Equipment

All accessory equipment should be installed and maintained in accordance with each individual supplier's installation and operation instructions. However, if any sidewall penetrations or other modifications to the Chief standard design are required, contact Chief for special recommendations.

Important Note: Do not modify bin design without Chief approval. It is the responsibility of the general contractor to verify that all equipment is properly installed and that the equipment is compatible with the intended use. A qualified electrician should be contracted to complete all electrical wiring and servicing.

Roof Peak Service Loads

For standard bin models towers located between the bins should support overhead equipment such as conveyors, augers, and catwalks. The bin walls or roof should not support the load from these items. When an alternate site design is required, the grain bin can be specifically designed to support concentrated loads at the peak or eave of the roof with upgraded design stiffeners to support the overhead load.

When determining the service loads on the roof peak, the weight of all accessory equipment suspended or supported by the peak should be considered. The weights should be calculated using the equipment dead load plus the live load from the grain in transit.

For example, the weight of an overhead conveyor should include the catwalk, conveyor head assembly, motors, drives, downspouts, discharges and weight of grain when in operation. If conveyor and catwalk design is such that snow build up is likely during winter months, snow load must be added in the peak load calculation. If a temperature cable is suspended from peak add 1000 lbs. (452 kg.) per 40 foot (12.2 m) of cable length to the peak's service load. Interpolate value for intermediate cable lengths (example: 60 foot (18.3 m) cable would exert 1500 lbs. (680 kg), of load).

Important Note: Do not allow excessive snow and ice to accumulate on any portion of the roof, potentially causing excessive roof loading and structural damage.

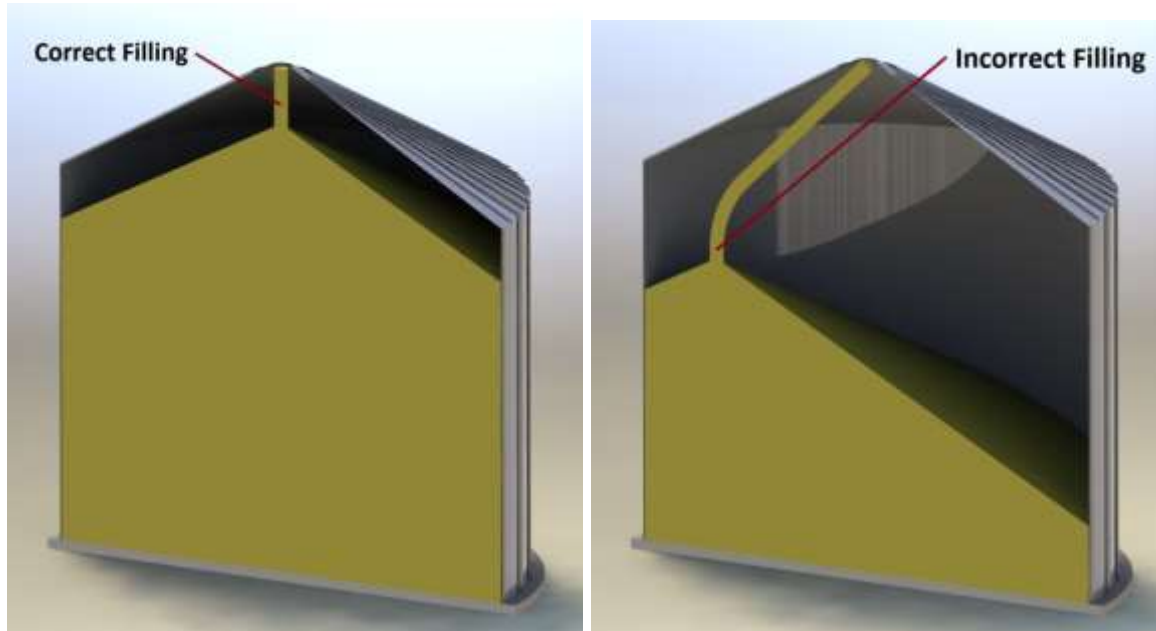
Important Note: Roof peak overloading can cause structural damage to the bin roof. Roof loads in excess of the specified peak rating will void the warranty.

Bin Loading

Standard commercial grain bins (CB18 and larger) can be loaded at a rate below 40,000 bushels per hour. If a loading rate of 40,000 bushels per hour or greater is required, or the grain bin is smaller than a CB18 and requires a loading rate of 40,000 bushels per hour, contact Chief for upgrade recommendations.

Center filling thru the peak opening is recommended for all grain bins. Off center loading will create unequal pressures on the sidewall and results in structural damage. If spouting is to be used, it is recommended that a dead head or cushion box be used to promote uniform filling. Also, the use of spreaders or splash plates are recommended for distributing the grain fines, promoting uniform air flow thru grain and leveling the grain peak.

Important Note: Do not overfill the grain bin. Overfilling can cause structural damage to the roof and creates improper airflow and ventilation issues. The maximum grain level is 1" (2.54cm) below the roof eave.



Bin Unloading (Reclaim)

Standard commercial grain bins CB18 and larger can be unloaded at a rate below 20,000 bushels per hour. If bin is to be unloaded at a rate of 20,000 bushel an hour or greater, or is smaller than a CB18, contact Chief for upgrade recommendations.

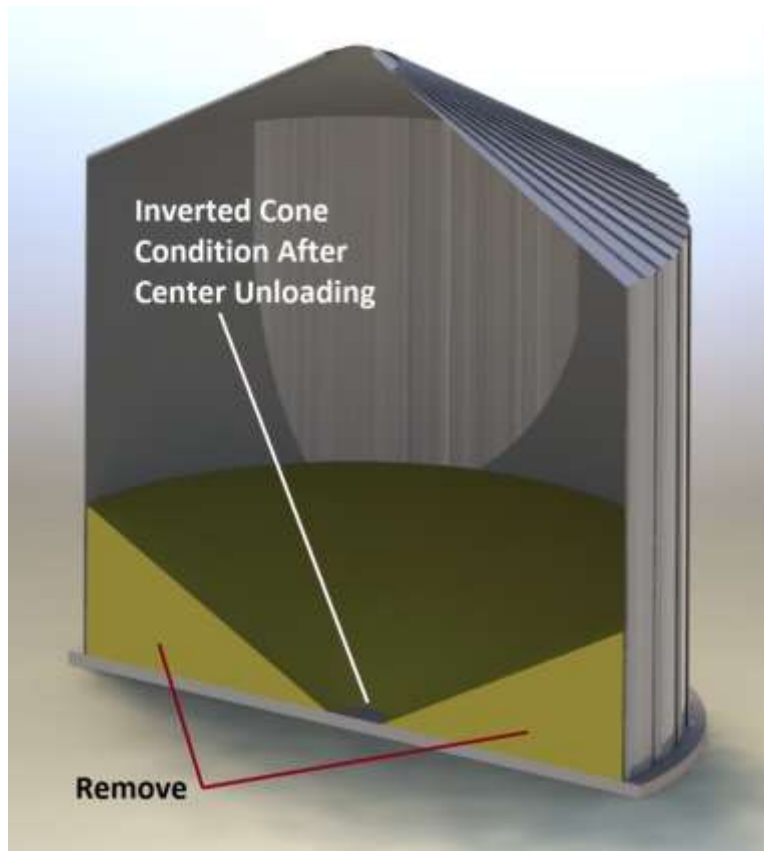
All grain bins must be reclaimed thru a center discharge. As shown in the following illustration, if intermediate sumps are installed in the floor, they must not be opened until all grain is removed above the center sump. Therefore, center and intermediate sumps must have separate control rods.



The center sump sweep auger pivot should be centered in the bin to ensure unobstructed sweep rotation. If unloading auger exits thru the sidewall, thoroughly seal around auger tube to prevent moisture and airflow leakage. Reinforcing of sidewall sheets will be necessary if auger exits thru the sidewall at a point exposed to direct grain pressure. Contact Chief for appropriate reinforcing recommendations.

After unloading grain from the bin thru the center discharge, the remaining inverted cone of grain needs to be removed to prevent spoilage of the grain and degrading the protective zinc coating of the sidewall sheets.

Important Note: Running the aeration fans with the grain in this inverted cone condition will not maintain proper condition of the grain. The airflow from the fans will be discharged thru the lowest grain depth at the center of the bin and will not circulate air at the bin wall.



Bin Side Draw Unloading

Side draw systems are to be used with dry grain only. Do not use a side draw unit with any poor flowing product. Consult Chief for appropriate installation recommendations.

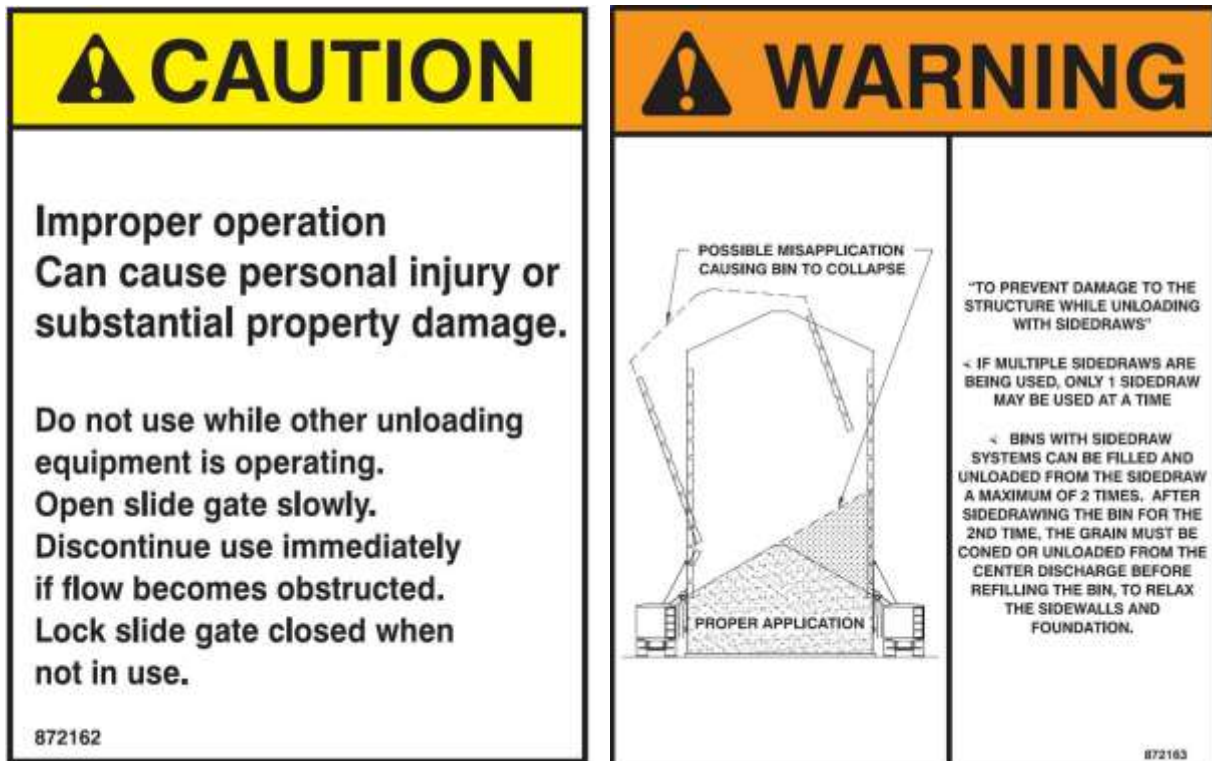
Important Note: Failure to follow the side draw operation instructions can cause structural damage and will void the warranty.

Side draw baffle systems may be installed in the various grain bins specified in Chief catalog.

Important Note: Any side draw unit improperly installed, or side draw units manufactured by a supplier other than Chief could result in structural damage to the bin wall and will void the warranty.

It is recommended that a side draw outlet is placed in the 4th, 5th, or 6th sidewall sheet from the base of the foundation. When installing a side draw system the first interior baffle must be placed on 1st (top) ring located at the bin eave. The first wind ring also needs to be installed on 1st (top) ring of bin, when using a side draw system. It is not recommended that a side draw system be installed in the Chief commercial hopper bin series (CHT's).

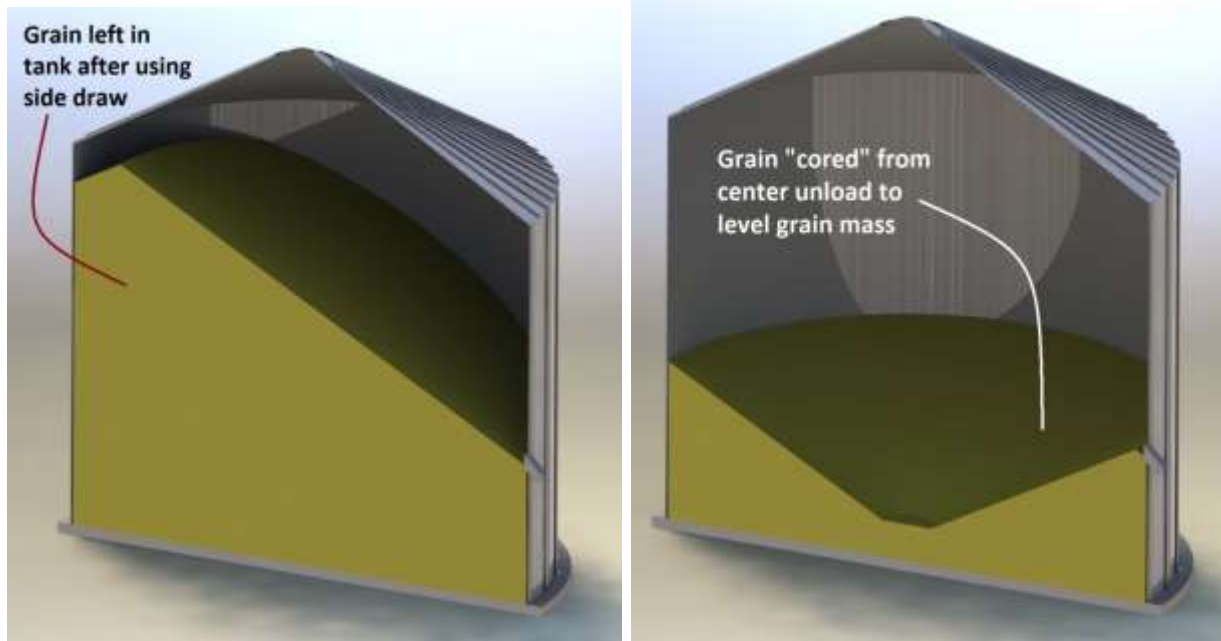
After installing the side draw unit, the operating instruction labels must be installed in plain view at operator level at the control chain operating station. The label must be clearly visible to anyone operating the side draw. Installation of the side draw is not complete until these labels are in place.



Any downspout attached to the gate assembly or discharge spout must be supported by an independent means. The discharge spout and gate assembly are not intended to support downspout loads.

Important Note: Grain bins with side draw systems cannot be loaded at the peak and unloaded from the side draw simultaneously. If multiple side draw systems are installed on a grain bin, only one side draw can be used at a time. If 2 side draw systems are installed on the grain bin, they must be placed 180 degrees apart.

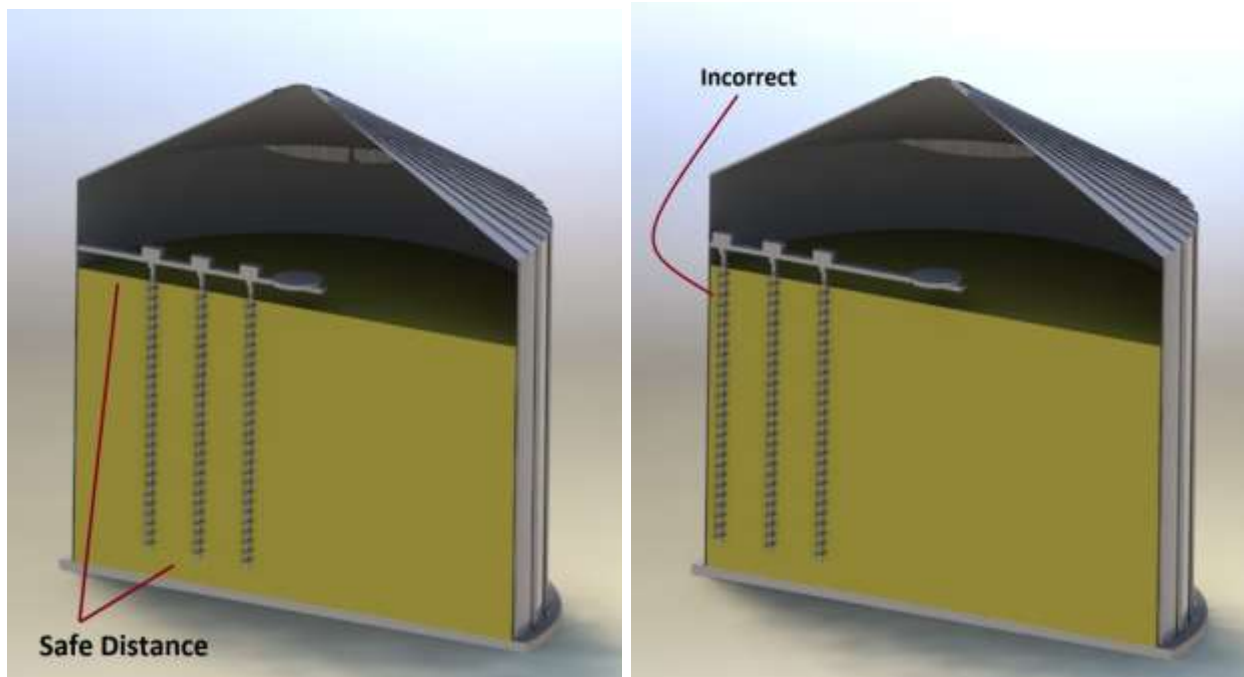
After removing grain from the grain bin using the side draw system it is required that the grain is "cored" from the center discharge to level the grain in the bin before refilling. In addition, prior to prolonged storage, grain should be "cored" or taken to a level condition. "Coring" refers to removing grain from the center discharge to create an inverted cone, where the grain along the sidewall is at the same elevation around the entire bin perimeter.



Stirring Devices

Stirring devices can be installed in any drying bin, with the limitations discussed previously. All stiffened bin models thru 7 rings tall will accommodate a stirring device of no more than 3 down augers. The bin storage capacity will be reduced when installing a stirring device. Drying bin storage capacities listed in the Chief catalog should be used with the additional capacity reduction for the down auger drive unit clearance. Inside ladders may require reduced length brackets for wall attachment to provide the clearance required for the stirring device.

CAUTION: The grain level must not be filled above the stirring device. Grain pressure on the stirring device could cause roof or stirring device damage. Do not operate augers near the sidewall to prevent sidewall damage.



Down augers may require shortening in order to provide minimum floor clearance of 3"-5" (76mm -127 mm) or additional clearance for sweep augers. Always follow the manufacturer down auger shortening procedure.

Continuous Flow Equipment

Re-circulators can only be installed in stiffened CB grain bins. These devices should be installed as instructed by the manufacturer and with the following additional considerations:

1. Consult floor manufacturer for recommended floor reinforcing measures at base of re-circulator.
2. If transfer auger exits thru roof panels, provide sealant around auger tube to prevent water leakage.
3. The weight of the transfer auger must not be supported by the roof panels. The transfer auger should be supported by the re-circulator boot and an adjacent bin or independent support.

Roof Ventilation

Any grain bins using forced air for aeration or drying must be provided with sufficient exhaust or intake vents to prevent excessive internal pressures, either positive or negative. The vent supplier should be consulted for ventilation requirements on each project, with the specific storage structure size, grain type and depth, fan size and floor type taken into consideration. Typically 1 sq ft (.09 sq meter) of exhaust area is required for every 1,000 cfm (28.31 cubic meters per minute) of exhaust. Chief does not recommend the use of negative aeration systems. In the event that negative aeration is to be used, the intake vent requirement should be sized for the storage structure in the empty condition.

Important Note: Roof vents must be open and free of debris or other obstructions prior to operation of the aeration fans.

Important Note: Powered fans should not be operated when ambient temperature is below 35 degrees Fahrenheit (2 degrees Celsius) due to the potential of vent icing. Obstructed or iced vents can significantly increase the internal to external pressure differential and could result in structural damage to the grain bin.

Important Note: High unloading rates can create a vacuum inside the grain bin. If unloading rates exceed 5,000BPH (125MTPH) a minimum of 1 free intake vent (goose neck is recommended) must be installed. 1 unobstructed standard Caldwell bin vent will provide adequate venting for an unloading rate of up to 80,000BPH (2,000MTPH). If substantially higher unloading rates are needed please contact Chief for a recommended venting requirement.

WARNING

**TO PREVENT ROOF AND WALL
DAMAGE OF STRUCTURE**

- 1.) USE POSITIVE AERATION SYSTEM (PUSH SYSTEM)
- 2.) MAKE SURE ALL ROOF VENTS ARE SIZED PROPERLY, OPEN, AND UNOBSTRUCTED.
- 3.) IF USING ROOF EXHAUST FANS, WIRE ROOF AND SUPPLY FANS TO START SIMULTANEOUSLY OR MAKE SURE ROOF FANS ARE STARTED WHEN SUPPLY FANS ARE STARTED.
- 4.) DO NOT OPERATE YOUR AERATION SYSTEM WHEN CONDITIONS EXIST THAT MAY CAUSE ROOF VENT ICING.

(VENT ICING CAN OCCUR WHEN AMBIENT AIR TEMPERATURE IS BELOW 35° (F°) AND AIR RELATIVE HUMIDITY IS 80% AND ABOVE. FOR ANY QUESTION AS TO POSSIBLE ICING CONDITIONS, SHUT DOWN THE SYSTEM AND CONTACT YOUR LOCAL WEATHER SERVICE.)

DETERMINE THE AIR FLOW FROM FAN PERFORMANCE CHARTS AT FREE AIR AND PROVIDE VENTS ACCORDING TO CHART (A).

CONSULT YOUR CALDWELL EQUIPMENT DEALER FOR AID IN SIZING POWER EXHAUST FANS AND / OR ROOF VENTS.

CHART (A)	
BIN VENT	CFM
LOW PROF	2670
HGBV - 1.75	2670
BBV - 19	3000

Fans and Transitions

Aeration fans should be sized in accordance with Chief's engineering specifications for each specific grain bin.

All fans must be installed per Chief's recommendations and leveled prior to operation. A qualified electrician should be contracted to complete all electrical wiring and servicing.

The transition thru the bin wall must be thoroughly sealed around the outside of the transition entrance collar to prevent airflow leakage. Use of caulking in combination with flashing provided by the transition manufacturer is recommended. If the transition interrupts a stiffener line, the special transition stiffener available from Chief must be installed as described in the installation manual. In addition, if the transition enters thru the bottom sidewall sheet (full floor aeration and tube aeration), adequate reinforcing of the bottom sidewall sheet must be added, contact Chief for recommendations. Standard drying bins do not require reinforcing of bottom sidewall sheet as long as transition enters below the false floor level.

Heaters

The heater unit must be properly matched with the fan size to be used. Heater unit and fan must be compatible, and it is recommended that both units be supplied by the same manufacturer to insure compatibility and safety. Heater unit installation and servicing should only be completed by personnel properly trained by the manufacturer of products being used. The fan and heater need to be located on the bin to assure uniform airflow to the bin. The units should be located at a position that is opposite (180 degrees) from the outlet of the unload tube.

- **DANGER:** Fuel bins, lines and all valves must be compatible with the type of fuel to be used. Failure to use certified fuel bins, lines or valves can result in death or severe personal injury.
- **DANGER:** Never use anhydrous ammonia bins or improperly modified fuel bins for L.P. gas storage.
- **DANGER:** L.P. fuel flow control regulators must be installed as recommended by heater unit manufacturer.
- **DANGER:** Natural gas flow regulators at the service entrance must be installed by natural gas supplier and must not be modified.

The drying temperature should be established based on the type of grain to be dried. Excessive heat can result in grain damage, over-drying and potential grain fires. For optimum temperature recommendations, contact Chief Industries Inc.

Aeration Floors

Chief recommends the use of channel-lock floors with steel supports for full floor drying applications. The floor layout support spacing must be followed for the particular bin being constructed. Floor supports, fan locations and unload tube should be oriented as shown in the aeration layout supplied by Chief to provide optimum airflow movement.

1. Commercial drying applications (floors loaded and unloaded more than once per year) require 18 gauge channel-lock floors.
2. Grain depths 60' (18.3 m) to 89' (27.1 m) require 18 gauge channel-lock floors
3. Grain depths 90' (27.4 m) to 110' (33.5 m) require 16 gauge channel-lock floors.

Temperature Cables

Temperature cables can be installed in all standard Chief grain bins. Refer to the installation manual for the correct quantity and location of temperature cables for the size of each grain bin.

Temperature cable support kits supplied by Chief are available and must be used whenever temperature cables are installed. Follow the temperature cable manufacturer's recommendations for installation of the cables and shortening temperature cables if required. Verify adequate clearance for sweep augers or other internal equipment and provide adequate sealant where the temperature cable lead wire exits the storage structure.

Important Note: Support of temperature cables by any method other than a Chief support kit may cause structural damage to the roof structure and will void the warranty. All temperature cables should be secured to the floor to prevent the cable from drifting towards the sidewall during filling. The use of light twine or monofilament line secured to a recessed anchor is recommended.

Important Note: "Structured" roofs are designed for a maximum load of 2,000 lbs. per temperature cable. If this load is exceeded, this may cause structural damage to the roof and will nullify the warranty.

General Contractor Responsibilities

It is the responsibility of the general contractor to verify that the complete bin system (bin, foundation, base sealing, grain transport equipment, aeration equipment and other accessory equipment) is constructed with quality workmanship and that all equipment is installed per the respective manufacturer's instructions.

In addition, the general contractor is responsible for the fitness of use of any system which he constructs. All accessory equipment incorporated into the system should be approved for the intended use by each respective equipment manufacturer.

Field Modifications and Installation Defects

Chief assumes no responsibility for field modifications or installation defects which result in structural damage or storage quality problems. If any field modifications are necessary which are not specifically covered by the contents of the installation manual, contact Chief for approval. Any unauthorized modification or installation defect which affects the structural integrity of the grain bin will void the warranty.

Concrete Design and Construction

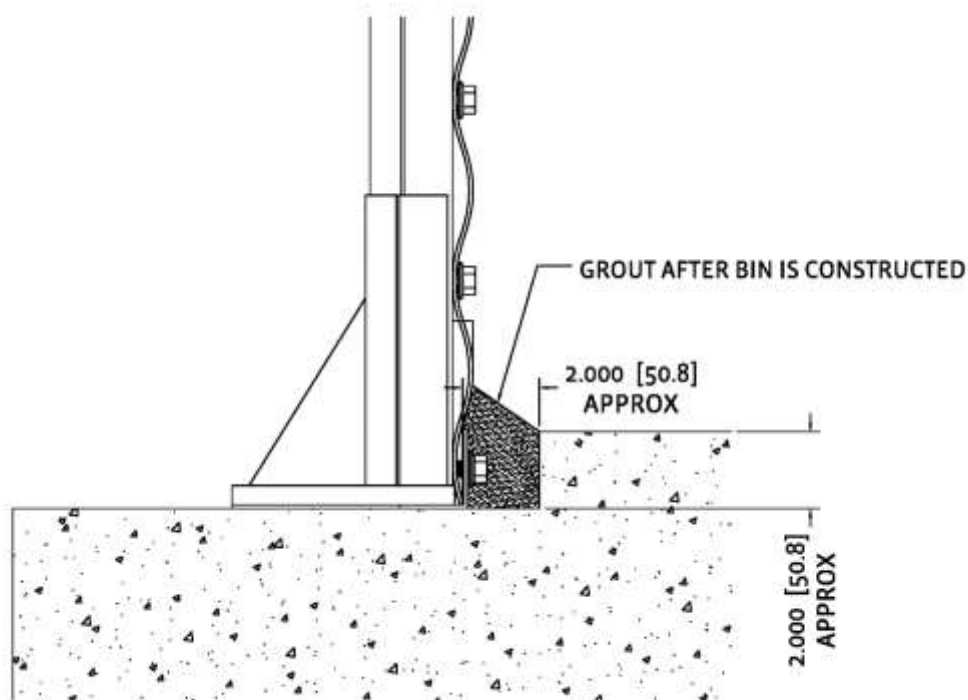
Choose a site that has good drainage away from the bin so that standing water will be prevented. The soil should be firm and preferably without fill. If fill is required, compact the fill material to avoid uneven settlement.

Foundation designs are based on the allowable soil bearing capacity of the undisturbed soil and should be certified by a licensed engineering firm. Using soil borings to determine the allowable soil bearing capacity, a professional engineer will need to be employed by the contractor to design the foundation and floor slab accordingly. Foundation designs must be approved by a licensed engineer in order to meet local governing building codes and local soil and weather conditions, including seismic and wind loading requirements. Wall loads and floor pressure for Chief grain bins are available from Chief upon request.

Non-uniform settlement of the foundation can cause severe structural damage to the storage structure and foundation. An improperly designed or constructed foundation will void all aspects of the warranty. It is the responsibility of the general contractor to verify that an adequate foundation is provided for the grain bin.

Important Note: The finished floor surface must be level at the sidewall sheet location. Low spots in the perimeter wall elevation without adequate shimming can cause structural damage to the bin sidewall. Faulty concrete construction or shim omission will void the warranty.

As an option for improved base sealing, a step (rebate) in the concrete floor just inside the bin wall may be used to prevent moisture migration at the base. Any deviations from a uniform flat concrete surface may result in additional complexity during installation and also with the functionality of grain bin accessories such as aeration floors or trenches, bobcat doors, ect.



NOTE: AERATION TRENCHES AND TRANSITIONS WILL NEED FIELD ADJUSTED FOR CONCRETE LIP.

Bin Installation

Chief does not assume any responsibility from parts damaged due to faulty or improper installation procedures.

Checking Shipment

For your convenience steel components will be color coded, individual items labeled with an appropriate part number and packages labeled. Hardware, including bolts, nuts, screws and other small clips or brackets may be divided into smaller packages for ease of use and identification.

Check your shipment at the time of delivery against the packing list provided with the shipment. If any items are missing or any damaged material is evident, note such shortage or damage on the freight bill before you sign the shipment paperwork.

Claims of shortages will not be honored after 30 days from receipt of shipment. Parts that are missing or damaged are the responsibility of the delivering carrier, not the manufacturer or dealer.

It is advisable to reorder damaged or missing parts immediately so that there will be no delay in the bin installation. After receiving the invoice for the reordered material, file a claim with the delivering carrier immediately.

Color Codes

Chief grain bin components are color coded based upon gauge thickness.

Gauge Thickness	Color Code
20	White
18	Orange
17	Light Blue
16	Green
14	Yellow
14 Transition	Yellow / Black
13	Brown
12	Dark Blue
11	Pink
10	Black
9	Light Green
8	Red

Suggested Equipment

Chief recommends the following equipment and tools needed for installation of the grain storage bin. Individual installations may vary.

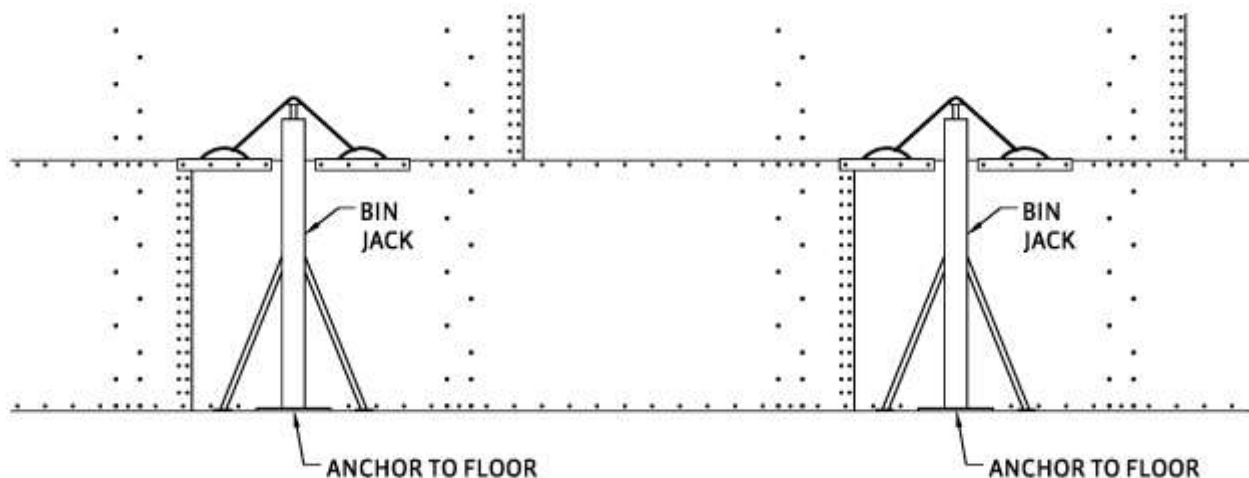
- Impact wrenches and sockets
- End wrenches
- Crescent wrenches
- Vise grip pliers
- Alignment punches
- Rubber mallets
- Level
- Drill and drill bits
- Screw Guns
- Metal Saw
- Extension cords
- Ladders
- Bin Jacks

Bin Jack Installation

Chief recommends that bin jacks be used for all bins taller than 8 rings and all bins larger than 30' (9.1m) in diameter. Chief recommends using a minimum of 1 bin jack per sidewall sheet to minimize sidewall distortion during installation. Failure to use the proper quantity of bin jacks may result in permanent distortion of the bin sidewall sheets.

During installation not all jacks may lift equally, therefore the allowable lifting capacity of the bin jacks must never be exceeded or serious injury could result. Always verify bin weight to ensure a safe and trouble free installation.

Attention: Securely anchor the bin jacks to the foundation during construction.



Installation Procedures

All sidewall sheet bolts are washer head bolts with sealing washers SAE grade 8, with whiz flange (serrated flange) nuts. Grade 8 bolts are marked with six radial lines on the bolt head as shown in the following illustration.

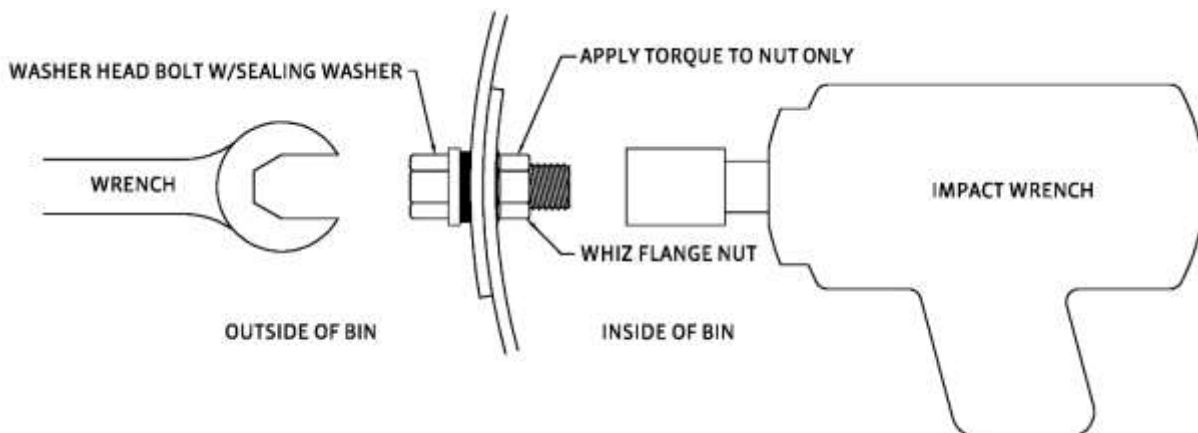


If these descriptions do not correspond with the bolts shipped with the bin, please contact Chief immediately. **Do not substitute any other bolts. Use only the bolts supplied by Chief. The substitution of bolts from other sources is not permitted.**

Bin bolts must be tight. The following table contains recommended minimum and maximum torque values for installation.

Bolt Diameter	Minimum Torque	Maximum Torque
5/16"	22 ft.-lbs.	28 ft.-lbs.
7/16"	60 ft.-lbs.	75 ft.-lbs.

Install all bin bolts as shown in the following illustration with the head and sealing washer on the exterior of the grain bin. Tighten all bin bolts from the interior of the bin to eliminate spin off of the sealing washer.



Please note the following wrench / socket size to be used on the corresponding hardware:

Bolt Size	Head Size	Nut Size
5/16"	1/2" wrench	1/2" wrench
7/16"	5/8" wrench	11/16" wrench
1/2"	3/4" wrench	3/4" wrench
5/8"	15/16" wrench	15/16" wrench

Important Note: Prior to starting the installation it is very important to plan ahead and by verifying the order and location of all bin components. This includes:

- Roof vents and manways
- Ladder, platform and spiral stair components
- Wind Rings
- Bin entry doors
- Side draw unloads
- Aeration components
- Upgraded stiffener locations for material handling support structures

For a jacking procedure initiated with the top 2 rings assembled, the general installation of the bin components will be in the following order:

1. Assemble Ring #2
2. Assemble Ring #1 (top ring) above ring #2.
3. Roof structure (refer to roof installation manual)
4. Roof sheeting, venting and fans
5. Install sidewall sheet lifting jacks
6. Assemble remaining rings in ascending order from the roof eave down (#3 then #4 then #5, etc.)

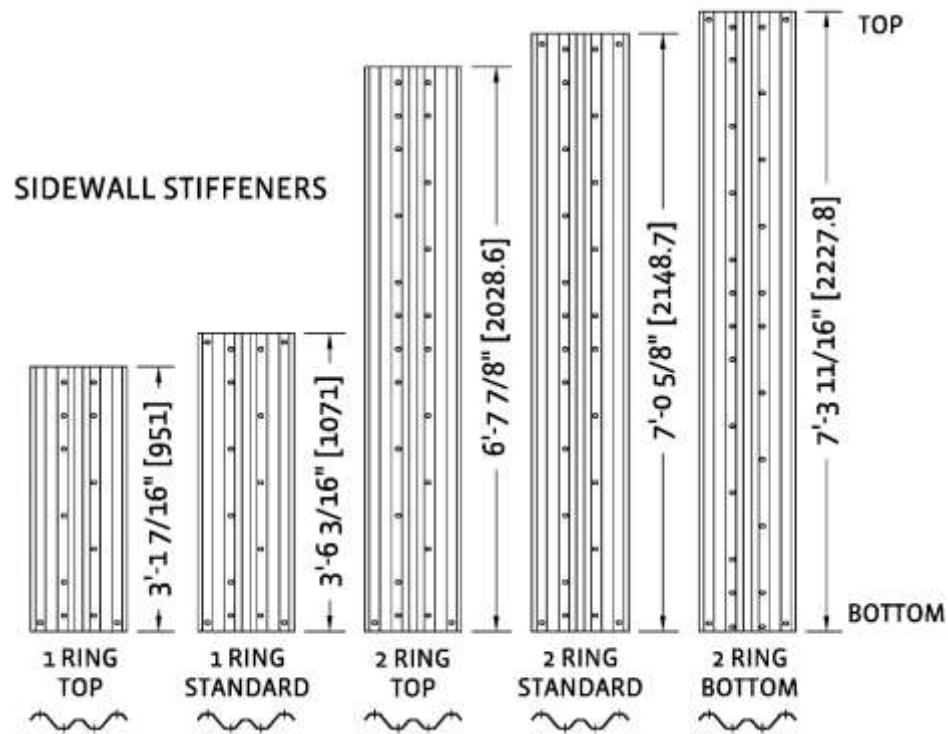
Assembly Bolting Sequence

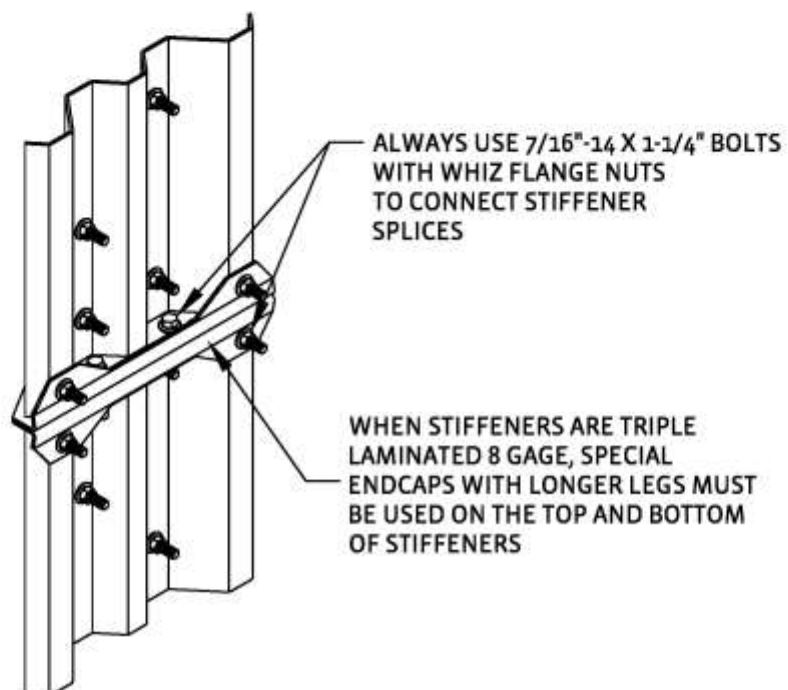
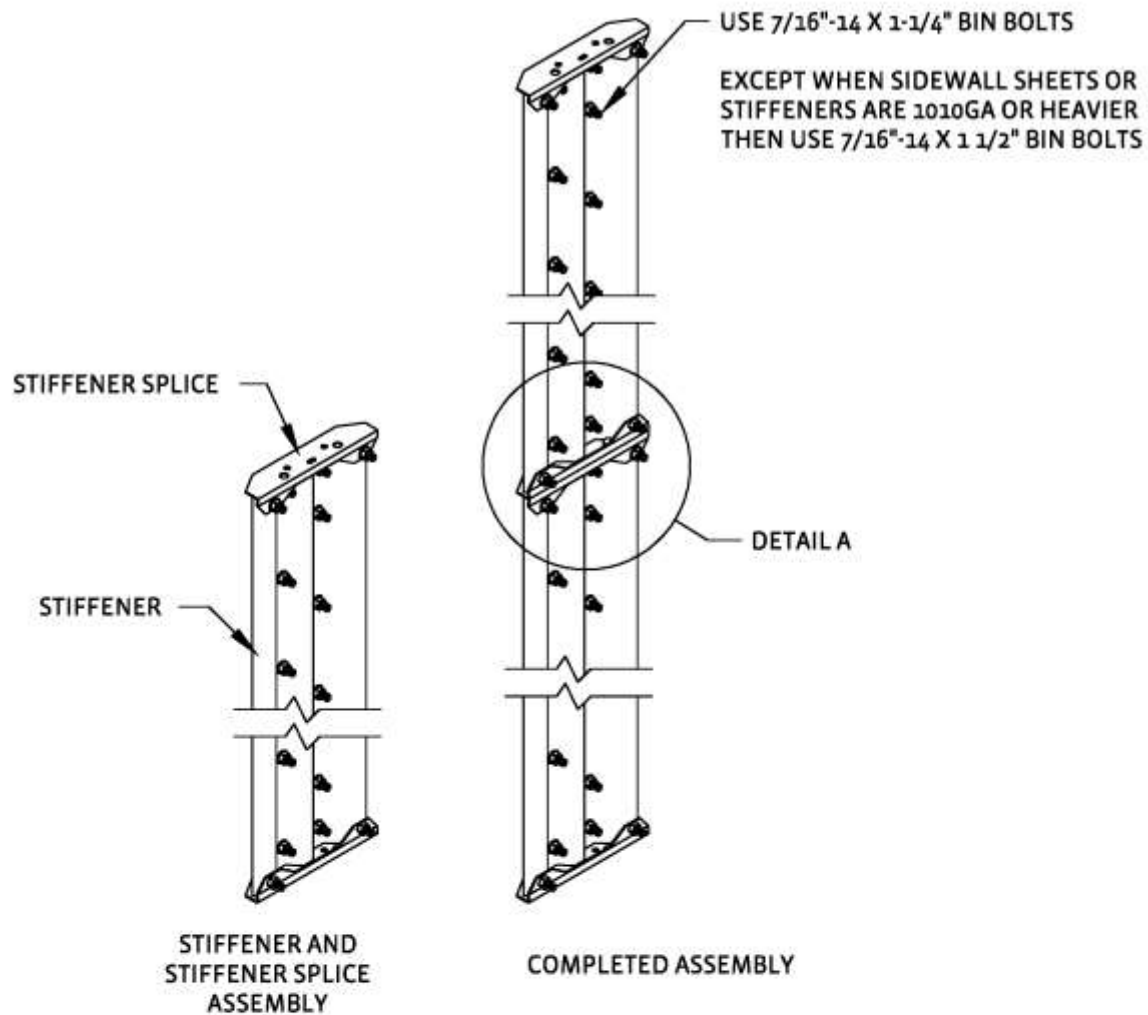
1. Assemble the top ring. Refer to the [gauge charts](#) for the correct gauge of material to use. Lap sheets and apply sealant as shown in the [sidewall and stiffener installation](#) instructions. Locate the top stiffeners and install on the top ring.

Important Note: Top sheets have special punching at the stiffener locations. Do not install bolts in the top 4 stiffener holes until after the roof eave brackets are attached.

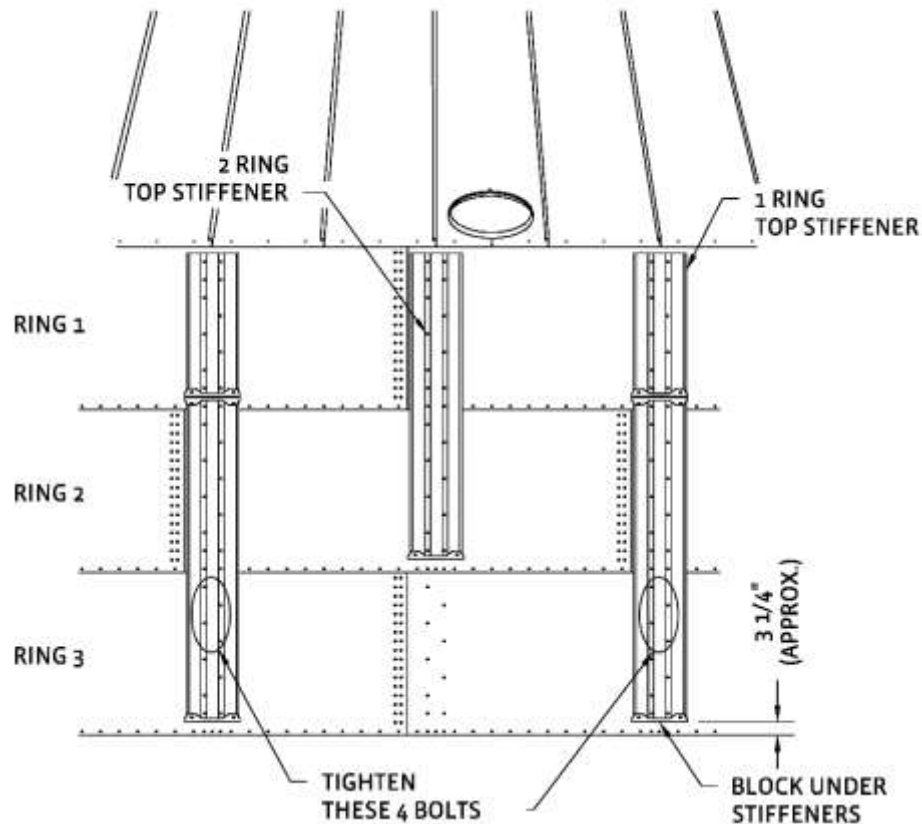
2. Install sidewall sheets and stiffeners for ring #2 following the [sidewall and stiffener installation instructions](#). Refer to the [gauge charts](#) for the correct gauge of material to use.
3. Tighten hardware on top 2 rings.
4. Install stiffener splice plates to both ends of stiffeners with (2) 7/16-14 x 1.25" bin bolts and whiz flange nuts before securing the stiffener to the bin.

Important Note: On the top ring stiffener a splice plate is only required on the bottom end of the stiffener.





5. Loosely assemble ring #3 following the [sidewall and stiffener installation instructions](#). Refer to the [gauge charts](#) for the correct gauge of material to use. Using a large alignment punch, force the stiffeners upward so the splices are tightly compressed (blocks may also be used to compress the stiffener splices). Tighten 4 bolts in ring #3 to keep the stiffeners compressed. Loosely install the stiffener splice plate hardware.



6. Lower the bin onto the foundation, placing blocks underneath the stiffener locations to keep the splice tightly compressed. This will force the 2 ring stiffeners in ring #2 and ring #3 upwards to the splices. Tighten the hardware connecting the stiffeners to the sidewall sheets and also tighten the hardware for the stiffener splice plates.
7. Tighten the vertical seam hardware in ring #3. Tighten the horizontal seam hardware between ring #2 and ring #3.

Important Note: The hardware on the horizontal seams should be tightened starting in the center of the sidewall sheet and working outwards both ways towards the ends of the sidewall sheets.

8. Add ladder sections as required according to the separate ladder manual supplied with your bin system.
9. Repeat the above steps for each additional ring. Proper bolting sequence must be followed at all times. Always refer to the [gauge charts](#) for the correct gauge of material to use.

Important Note: All bins have 2 ring stiffeners located at the base of the bin. In the 3rd ring up from the base of the bin, a 1 ring stiffener must be placed on alternating stiffener lines.

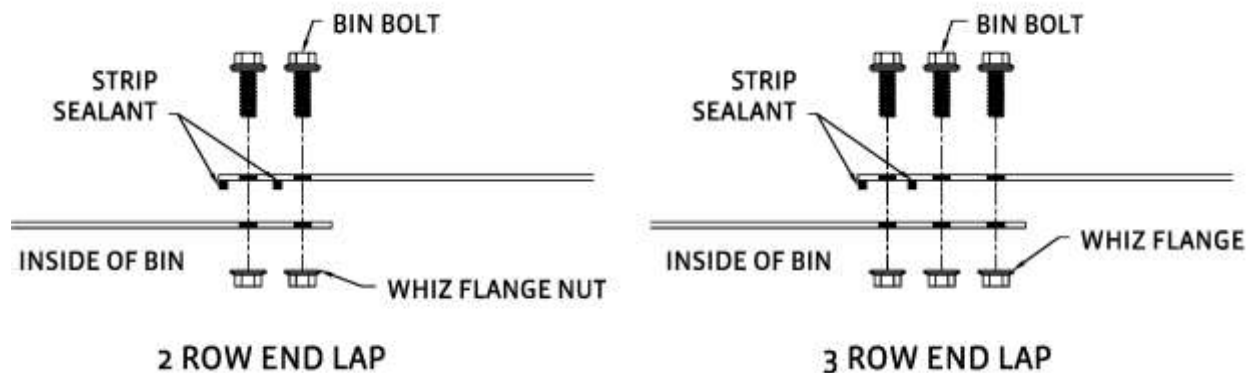
Sidewall Sheet and Stiffener Installation

All sidewall sheets must be installed with the [color code](#) facing down towards the foundation. The color code is always located on the bottom edge of the sidewall sheet.

Important Note: Sidewall sheets for the top ring also have a gold color code. Bottom stiffeners also have a gold color code.

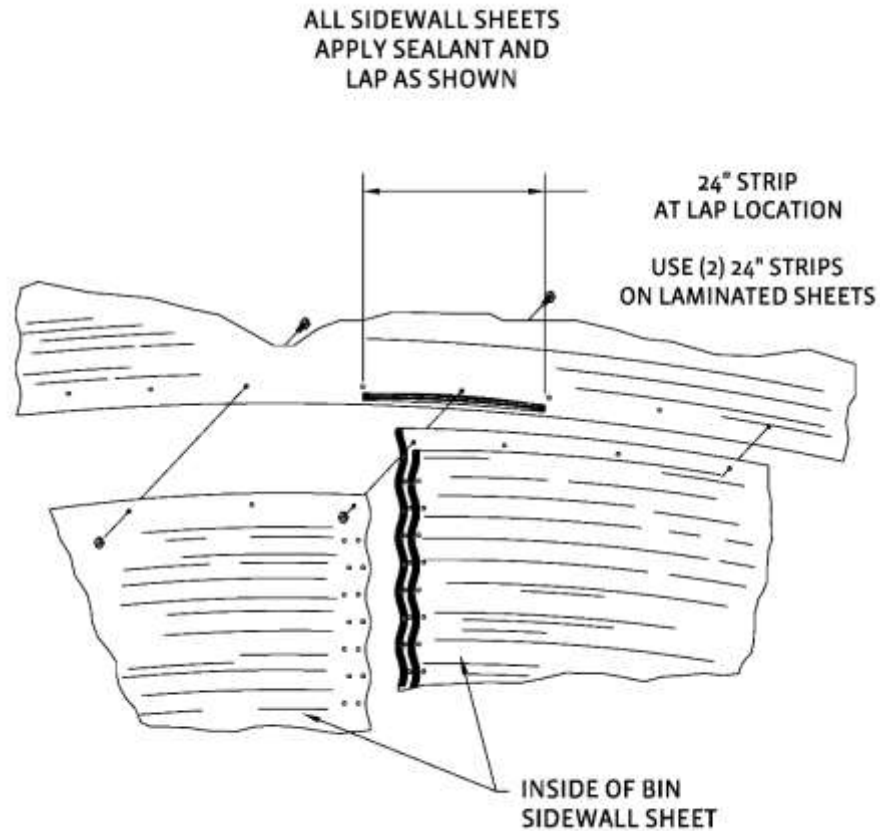
Assemble the sidewall sheets and stiffeners using the [sidewall and stiffener gauges](#) charts shown in this manual. These charts are for standard design grain bins. If a bin is designed for high loading or reclaim rates, installation over a concrete pit or special seismic or wind conditions, contact Chief for the engineered gauge chart needed.

As shown in the following illustration, lap the sheets so that when located outside the bin, facing toward of the bin, the right end of each sheet is always on the outside of the bin and the left end is always on the inside.



Sealant is required at specified seams for a watertight seal. Wipe off the outside ends of all the sidewall sheets to remove excess oil so that the sealant will adhere to the metal. Place the sealant as near as possible to the vertical inside edge of the sidewall sheet at every vertical seam.

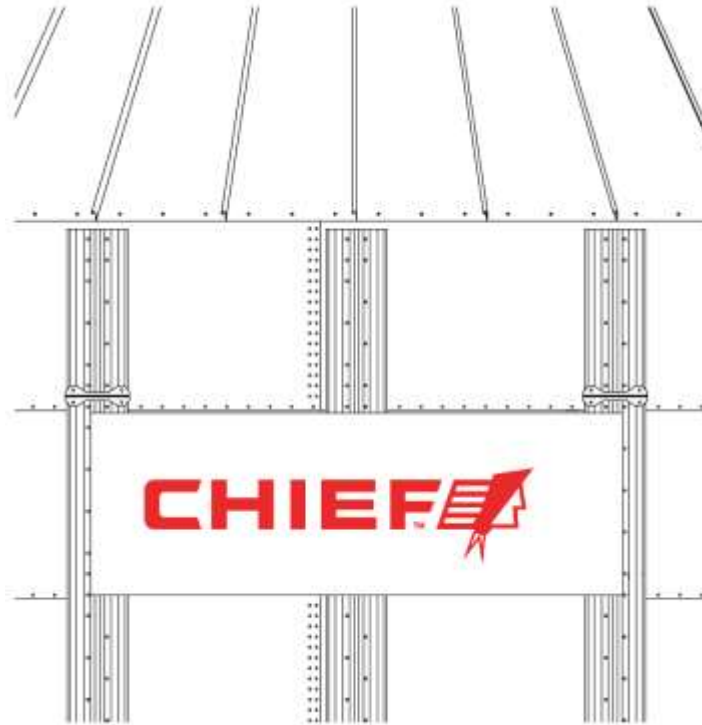
A horizontal strip of sealant is also needed on the inside of the sheets, located at the center bottom of the previous sidewall sheet located above. This strip of sealant should fit on the hill corrugation below the holes where the end lap of the next ring of sidewall sheets will be located.



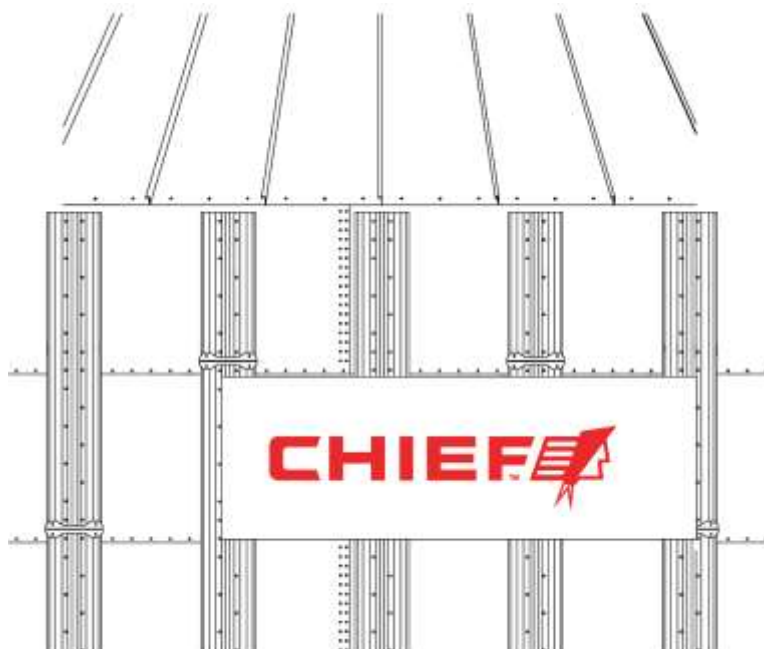
Sign Sheet Installation

The sign sheet must be installed in ring #2 as shown in the following illustrations. Field drill 6 holes 1/2" (1.27cm) in diameter in the sign sheet and sidewall stiffeners and fasten with 7/16" (1.11cm) hardware.

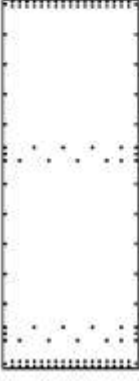

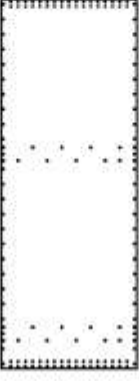

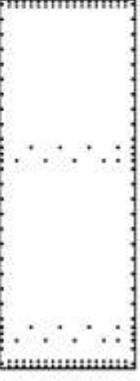
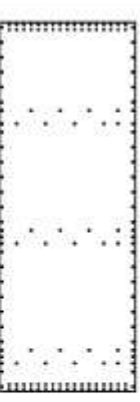

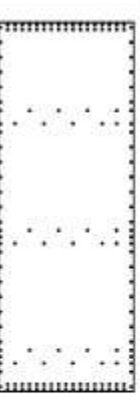
- 2 Stiffened

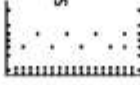


- 3 Stiffened

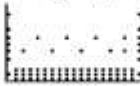


Sidewall End Lap Types

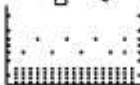
UN-STIFFENED SIDEWALL SHEETS	2 STIFFENED SIDEWALL SHEETS	3 STIFFENED SIDEWALL SHEETS
<p>16GA THRU 20GA SIDEWALL SHEET</p> <p>ALWAYS 5/16" X 3/4" BIN BOLTS</p>		
<p>14GA DOUBLE PUNCHED SIDEWALL SHEET</p> <p>ALWAYS 5/16" X 3/4" BIN BOLTS</p>		
<p>14GA TRANSITION SIDEWALL SHEET</p> <p>5/16" X 3/4" BIN BOLTS ON END LAPS AND TOP SIDE LAP</p> <p>7/16" X 1-1/4" BIN BOLTS ON BOTTOM SIDE LAP</p>		
<p>8GA THRU 13GA SIDEWALL SHEET</p> <p>ALWAYS 7/16" BIN BOLTS</p>		



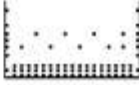
SINGLE 10GA THRU 10GA
2 PATTERN END LAP




DOUBLE LAMINATED
13GA AND 13GA
3 PATTERN END LAP




DOUBLE LAMINATED
10GA AND 11GA
4 PATTERN END LAP



SINGLE 8GA & 9GA
3 PATTERN END LAP



DOUBLE LAMINATED
8GA AND 9GA
5 PATTERN END LAP



TRIPLE LAMINATED
10GA AND 11GA
6 PATTERN END LAP

ALL SIDEWALL SHEETS 14GA THRU 20GA USE 5/16" X 3/4" BIN BOLTS

USE 7/16" X 1-1/4" BIN BOLTS ON ALL SIDEWALL SHEETS AND STIFFENERS UP TO EITHER LAMINATED 11GA SIDEWALL SHEETS OR 8GA STIFFENERS*

USE 7/16" X 1-1/2" BIN BOLTS ON ALL SIDEWALL SHEETS AND STIFFENERS WHEN EITHER IS LAMINATED 10GA OR HEAVIER**

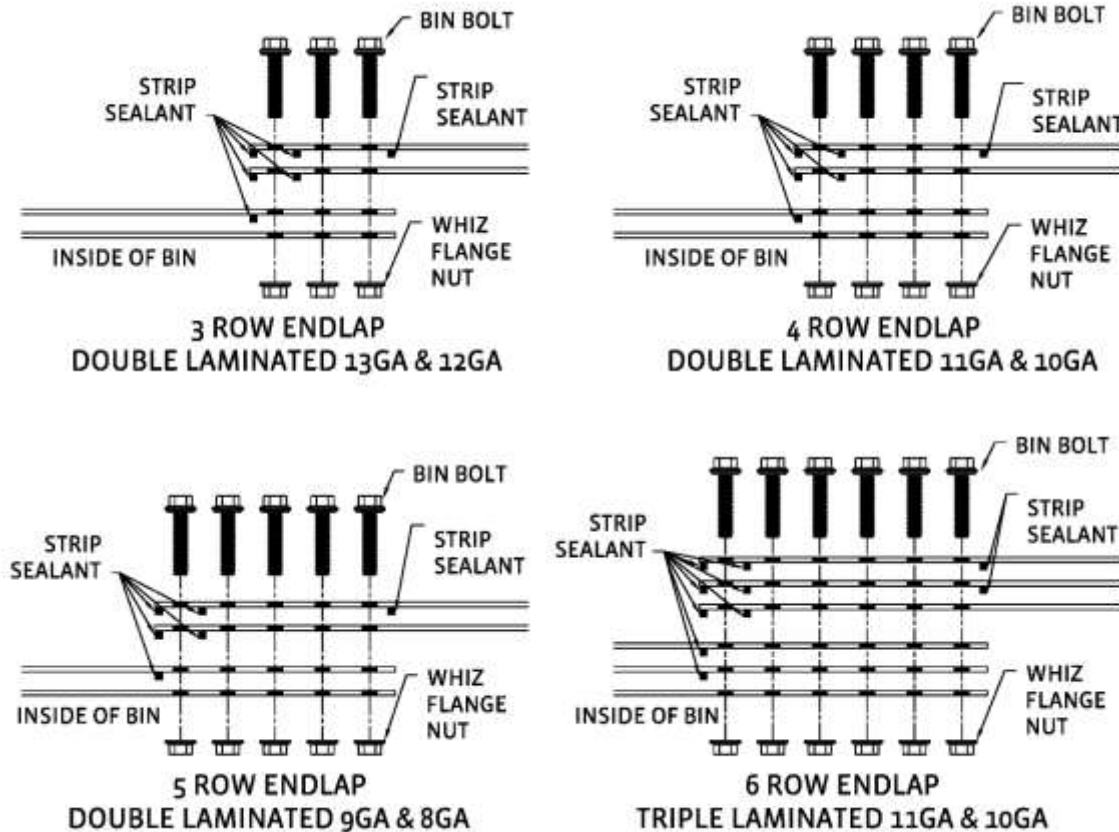
USE 7/16" X 2" BIN BOLTS AT BOTTOM SEAM OF BIN WHEN SIDEWALL SHEETS ARE DOUBLE LAMINATED 1111GA THRU 88GA

*WHEN EITHER STIFFENERS OR SIDEWALL SHEETS ARE DOUBLE LAMINATED 13GA OR 11GA EXTRA 7/16" X 1-1/2" BIN BOLTS (5 EXTRA PER SHEET ON 2 STIFFENED BINS, AND 7 EXTRA ON 3 STIFFENED BINS) ARE PROVIDED FOR THE CORNERS OF THE SIDEWALL SHEETS AND AT THE CONNECTION BETWEEN THE STIFFENERS AND SIDEWALL SHEETS AT THE HORIZONTAL SEAM

**WHEN EITHER STIFFENERS OR SIDEWALL SHEETS ARE DOUBLE LAMINATED 8GA OR 9GA EXTRA 7/16" X 2" BIN BOLTS (5 EXTRA PER SHEET ON 2 STIFFENED BINS, AND 7 EXTRA ON 3 STIFFENED BINS) ARE PROVIDED FOR THE CORNERS OF THE SIDEWALL SHEETS AND AT THE CONNECTION BETWEEN THE STIFFENERS AND SIDEWALL SHEETS AT THE HORIZONTAL SEAM

Laminated Sheet Assembly Sequence

All rings which require laminated sheets as indicated in the [stiffener and gauge charts](#) must be installed with the end laps lapped as shown in the end lap detail below.

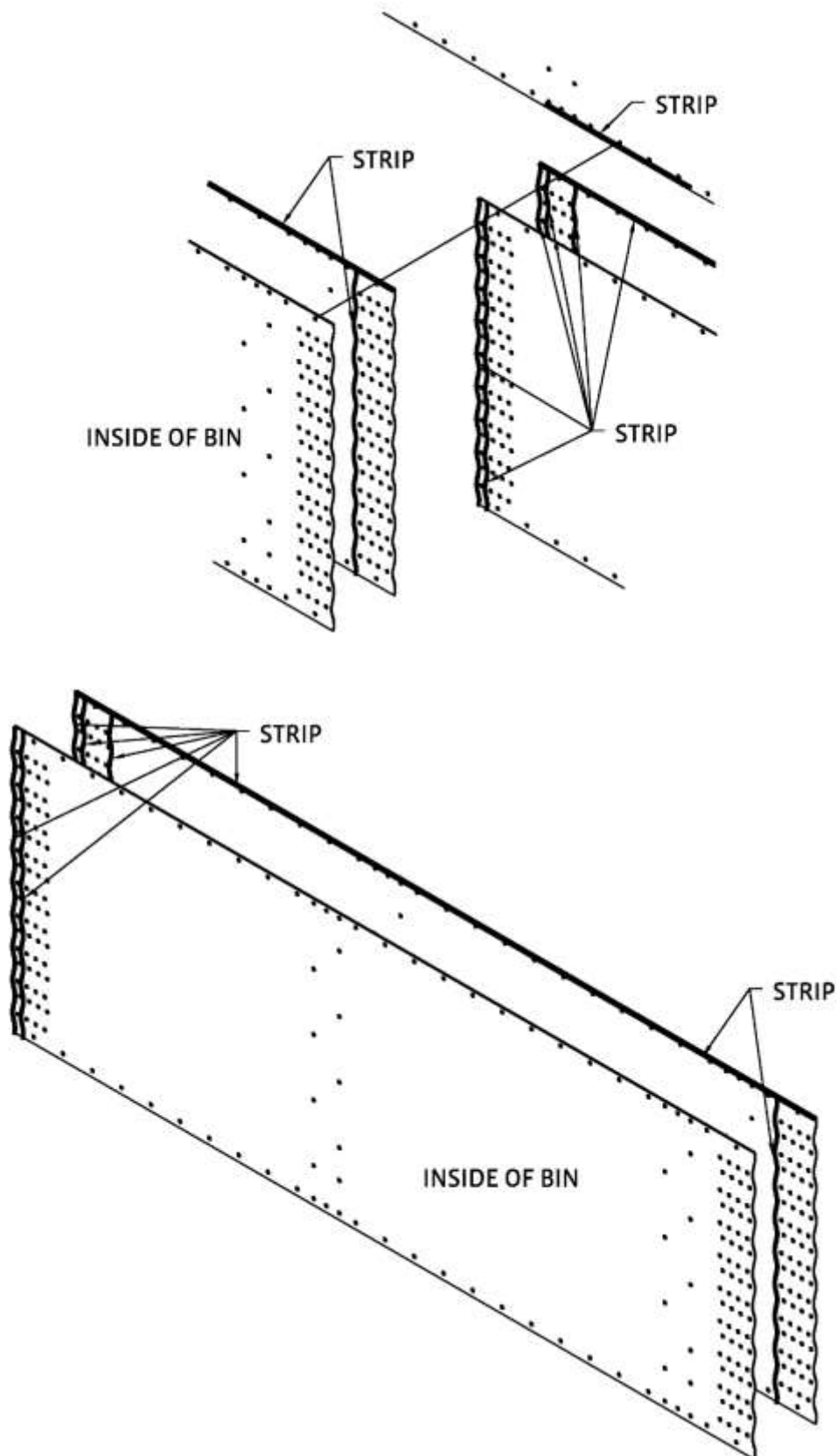


Lap the sheets so that when located outside the bin, facing toward the bin, the right end of each sheet is always on the outside of the bin and the left end is always on the inside.

Important Note: This sequence is the same as a single sheet lapping sequence.

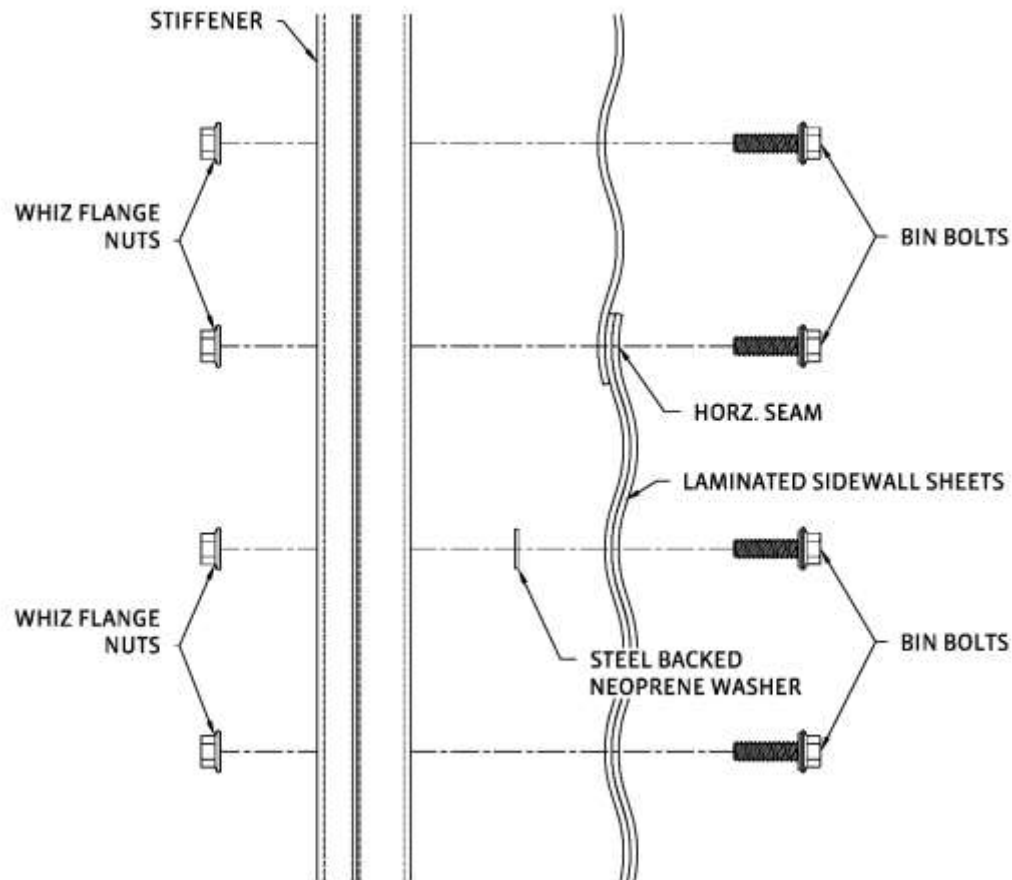
Lap the inner ring of the bin sidewall sheets so that they follow the same lapping sequence as the outer ring of sidewall sheets. Refer to the [sidewall installation](#) for additional bolting instructions of the end laps, side laps and stiffeners as outlined previously.

Apply sealant on all laminated sheets as shown in the following illustrations.

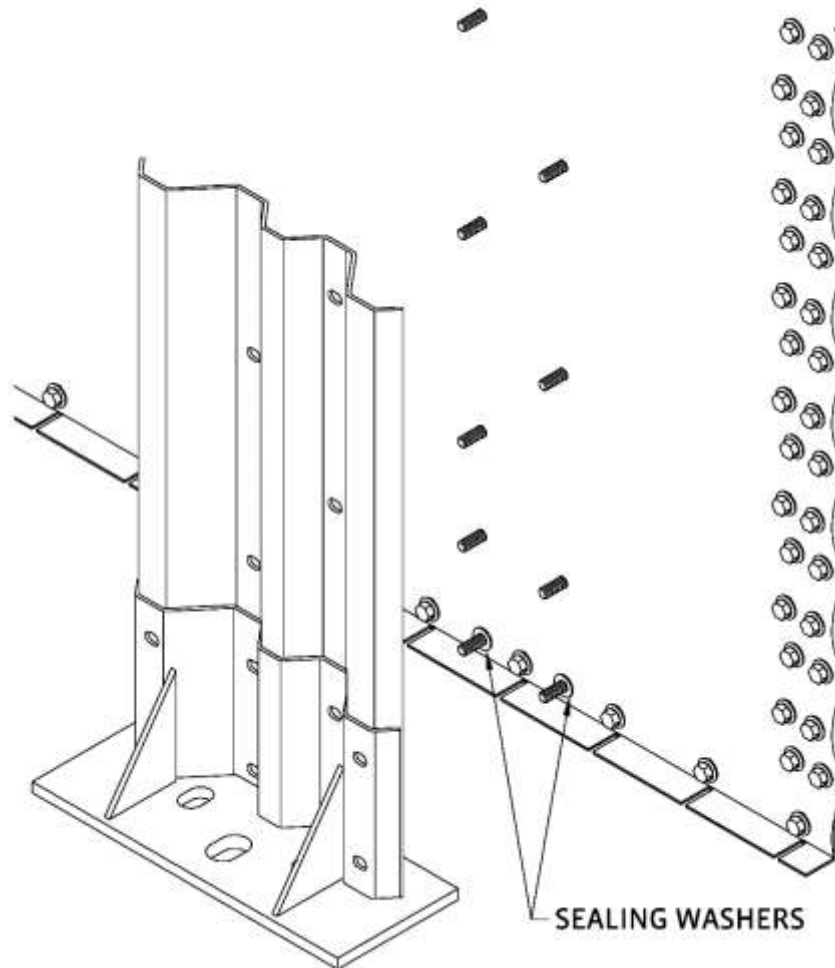


On all laminated sheets place a steel-backed neoprene washer on the pair of top stiffener holes below the horizontal seam as shown in the following illustration. This washer will be located between the laminated sheets and the stiffener. The neoprene rubber side of the washer should contact the sidewall sheet.

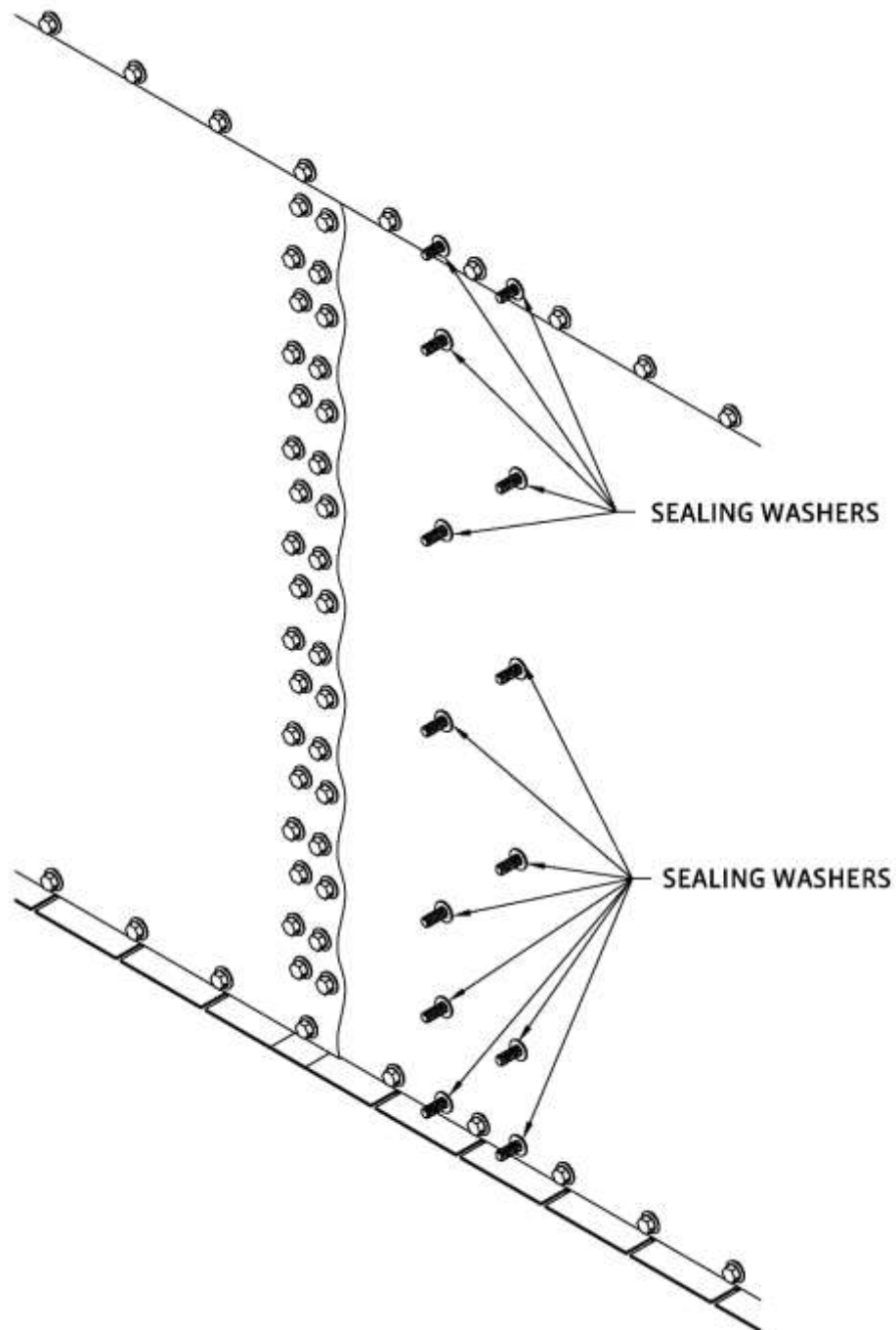
Important Note: Stiffener hardware is always assembled with the bolt heads on the interior of the bin. Sidewall hardware is always assembled with the bolt heads on the exterior of the bin.



On bins with single sidewall sheets on the bottom ring, install steel-backed neoprene washers between the bottom 2 ring stiffener and the sidewall sheets on the bottom 2 holes as shown in the following illustration. The neoprene rubber side of the washer should contact the sidewall sheet.



On bins with laminated sidewall sheets on the bottom ring, install steel-backed neoprene washers between the bottom 2 ring stiffener and the sidewall sheets on all holes as shown in the following illustration. The neoprene rubber side of the washer should contact the sidewall sheet.



Sidewall and Stiffener Gauge Charts – Standard Design

Important Note: All sidewall and stiffener gauges shown in the charts below are for standard design bins.

CB22-10 Seismic UBC Zone A				CB22-11 Seismic UBC Zone A			
2 Stiffeners Each Sidewall Sheet				2 Stiffeners Each Sidewall Sheet			
Ring	SWS	STF #1	STF #2	Ring	SWS	STF #1	STF #2
1	14	16		1	14	16	
2	14		16	2	14		16
3	14	18		3	14	18	
4	14		16	4	14		16
5	14	16		5	14	16	
6	13		14	6	13		14
7	13	14		7	13	14	
8	12	12	12	8	12		12
9	12			9	12	12	12
10	11	12	12	10	11		
				11	11	10	10

CB22-12 Seismic UBC Zone A				CB22-13 Seismic UBC Zone A			
2 Stiffeners Each Sidewall Sheet				2 Stiffeners Each Sidewall Sheet			
Ring	SWS	STF #1	STF #2	Ring	SWS	STF #1	STF #2
1	14	16		1	14	16	
2	14		16	2	14		16
3	14	18		3	14	18	
4	14		16	4	14		16
5	14	16		5	14	16	
6	13		14	6	13		14
7	13	14		7	13	14	
8	12		12	8	12		12
9	12	12		9	12	12	
10	11	12	12	10	11		12
11	11			11	11	10	10
12	10	10	10	12	10		
				13	10	8	8

CB22-14 Seismic UBC Zone A

2 Stiffeners Each Sidewall Sheet			
Ring	SWS	STF #1	STF #2
1	14	16	
2	14		16
3	14	18	
4	14		16
5	14	16	
6	13		14
7	13	14	
8	12		12
9	12	12	
10	11		12
11	11	10	
12	10	10	10
13	10		
14	10	8	8

CB22-15 Seismic UBC Zone A

2 Stiffeners Each Sidewall Sheet			
Ring	SWS	STF #1	STF #2
1	14	16	
2	14		16
3	14	18	
4	14		16
5	14	16	
6	13		14
7	13	14	
8	12		12
9	12	12	
10	11		12
11	11	10	
12	10		10
13	10	8	8
14	10		
15	9	8	8

CB22-16 Seismic UBC Zone A				CB22-17 Seismic UBC Zone A			
2 Stiffeners Each Sidewall Sheet				2 Stiffeners Each Sidewall Sheet			
Ring	SWS	STF #1	STF #2	Ring	SWS	STF #1	STF #2
1	14	16		1	14	16	
2	14		16	2	14		16
3	14	18		3	14	18	
4	14		16	4	14		16
5	14	16		5	14	16	
6	13		14	6	13		14
7	13	14		7	13	14	
8	12		12	8	12		12
9	12	12		9	12	12	
10	11		10	10	11		10
11	11	10		11	11	10	
12	10		10	12	10		10
13	10	8		13	10	8	
14	10	8	8	14	10		8
15	9			15	9	8	8
16	9	10/10	10/10	16	9		
				17	9	10/10	10/10

CB22-18 Seismic UBC Zone A

2 Stiffeners Each Sidewall Sheet			
Ring	SWS	STF #1	STF #2
1	14	16	
2	14		16
3	14	18	
4	14		16
5	14	16	
6	13		14
7	13	14	
8	12		12
9	12	12	
10	11		10
11	11	10	
12	10		10
13	10	8	
14	10		8
15	9	10/10	
16	9	10/10	10/10
17	9		
18	9	10/10	10/10

CB22-19 Seismic UBC Zone A

2 Stiffeners Each Sidewall Sheet			
Ring	SWS	STF #1	STF #2
1	14	16	
2	14		16
3	14	18	
4	14		16
5	14	16	
6	13		14
7	13	14	
8	12		12
9	12	12	
10	11		10
11	11	10	
12	10		10
13	10	8	
14	10		8
15	9	10/10	
16	9		10/10
17	9	10/10	10/10
18	9		
19	9	10/10	10/10

CB22-20 Seismic UBC Zone A

2 Stiffeners Each Sidewall Sheet			
Ring	SWS	STF #1	STF #2
1	14	16	
2	14		16
3	14	18	
4	14		16
5	14	16	
6	13		14
7	13	14	
8	12		12
9	12	12	
10	11		10
11	11	10	
12	10		10
13	10	8	
14	10		8
15	9	10/10	
16	9		10/10
17	9	10/10	
18	9	10/10	10/10
19	9		
20	8	8/8	8/8

CB22-21 Seismic UBC Zone A

2 Stiffeners Each Sidewall Sheet			
Ring	SWS	STF #1	STF #2
1	14	16	
2	14		16
3	14	18	
4	14		16
5	14	16	
6	13		14
7	13	14	
8	12		12
9	12	12	
10	11		10
11	11	10	
12	10		10
13	10	8	
14	10		8
15	9	10/10	
16	9		10/10
17	9	10/10	
18	9		10/10
19	9	10/10	10/10
20	8		
21	8	8/8	8/8

CB22-22 Seismic UBC Zone A

2 Stiffeners Each Sidewall Sheet			
Ring	SWS	STF #1	STF #2
1	14	16	
2	14		16
3	14	18	
4	14		16
5	14	16	
6	13		14
7	13	14	
8	12		12
9	12	12	
10	11		10
11	11	10	
12	10		10
13	10	8	
14	10		8
15	9	10/10	
16	9		10/10
17	9	10/10	
18	9		10/10
19	9	10/10	
20	8	8/8	8/8
21	8		
22	8	8/8	8/8

CB22-23 Seismic UBC Zone A

2 Stiffeners Each Sidewall Sheet			
Ring	SWS	STF #1	STF #2
1	14	16	
2	14		16
3	14	18	
4	14		16
5	14	16	
6	13		14
7	13	14	
8	12		12
9	12	12	
10	11		10
11	11	10	
12	10		10
13	10	8	
14	10		8
15	9	10/10	
16	9		10/10
17	9	10/10	
18	9		10/10
19	9	10/10	
20	8		8/8
21	8	8/8	8/8
22	8		
23	8	8/8	8/8

CB22-24 Seismic UBC Zone A				CB22-25 Seismic UBC Zone A			
2 Stiffeners Each Sidewall Sheet				2 Stiffeners Each Sidewall Sheet			
Ring	SWS	STF #1	STF #2	Ring	SWS	STF #1	STF #2
1	14	16		1	14	16	
2	14		16	2	14		16
3	14	18		3	14	18	
4	14		16	4	14		16
5	14	16		5	14	16	
6	13		14	6	13		14
7	13	14		7	13	14	
8	12		12	8	12		12
9	12	12		9	12	12	
10	11		10	10	11		10
11	11	10		11	11	10	
12	10		10	12	10		10
13	10	8		13	10	8	
14	10		8	14	10		8
15	9	10/10		15	9	10/10	
16	9		10/10	16	9		10/10
17	9	10/10		17	9	10/10	
18	9		10/10	18	9		10/10
19	9	10/10		19	9	10/10	
20	8		8/8	20	8		8/8
21	8	8/8		21	8	8/8	
22	8	8/8	8/8	22	8		8/8
23	8			23	8	10/10/10	10/10/10
24	13/13	10/10/10	10/10/10	24	13/13		
				25	13/13	10/10/10	10/10/10

CB22-26 Seismic UBC Zone A				CB22-27 Seismic UBC Zone A			
2 Stiffeners Each Sidewall Sheet				2 Stiffeners Each Sidewall Sheet			
Ring	SWS	STF #1	STF #2	Ring	SWS	STF #1	STF #2
1	14	16		1	14	16	
2	14		16	2	14		16
3	14	18		3	14	18	
4	14		16	4	14		16
5	14	16		5	14	16	
6	13		14	6	13		14
7	13	14		7	13	14	
8	12		12	8	12		12
9	12	12		9	12	12	
10	11		10	10	11		10
11	11	10		11	11	10	
12	10		10	12	10		10
13	10	8		13	10	8	
14	10		8	14	10		8
15	9	10/10		15	9	10/10	
16	9		10/10	16	9		10/10
17	9	10/10		17	9	10/10	
18	9		10/10	18	9		10/10
19	9	10/10		19	9	10/10	
20	8		8/8	20	8		8/8
21	8	8/8		21	8	8/8	
22	8		8/8	22	8		8/8
23	8	10/10/10		23	8	10/10/10	
24	13/13	10/10/10	10/10/10	24	13/13		10/10/10
25	13/13			25	13/13	8/8/8	8/8/8
26	12/12	8/8/8	8/8/8	26	12/12		
				27	12/12	8/8/8	8/8/8

CB22-28 Seismic UBC Zone A

2 Stiffeners Each Sidewall Sheet

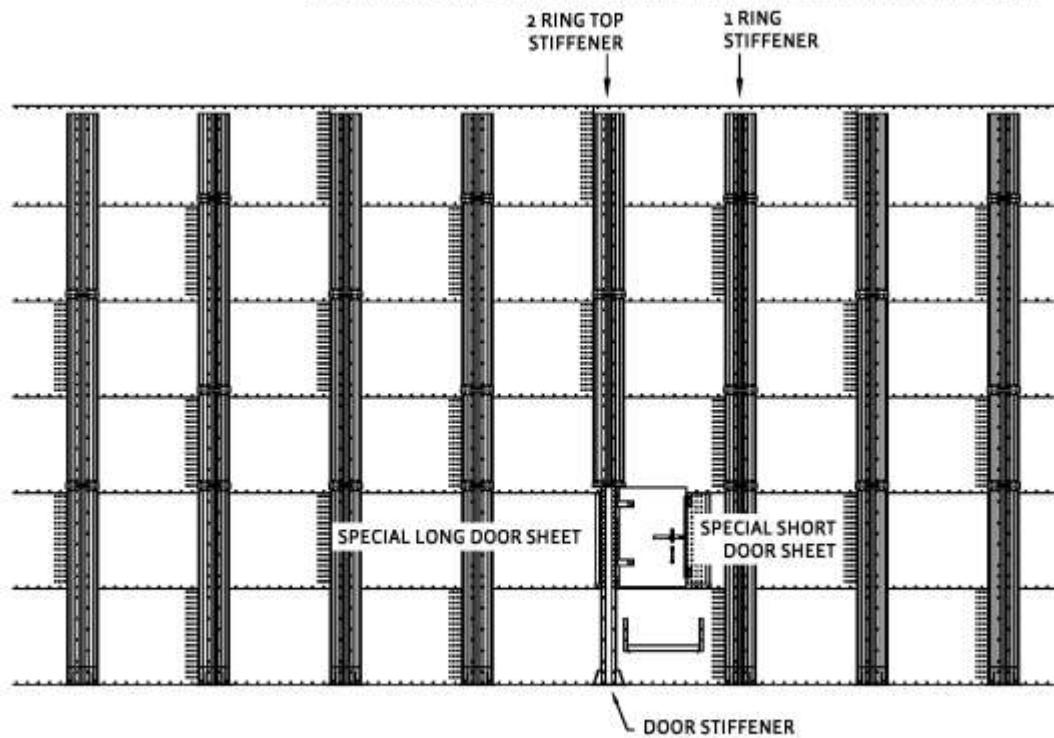
Ring	SWS	STF #1	STF #2
1	14	16	
2	14		16
3	14	18	
4	14		18
5	14	18	
6	13		16
7	13	16	
8	12		14
9	12	14	
10	11		12
11	11	12	
12	10		12
13	10	10	
14	10		10
15	9	10	
16	9		8
17	9	8	
18	9		8
19	9	10/10	
20	8		10/10
21	8	10/10	
22	8		10/10
23	8	10/10	
24	13/13		10/10
25	13/13	8/8	
26	12/12	8/8	8/8
27	12/12		
28	12/12	8/8	8/8

1 Ring Door Assembly

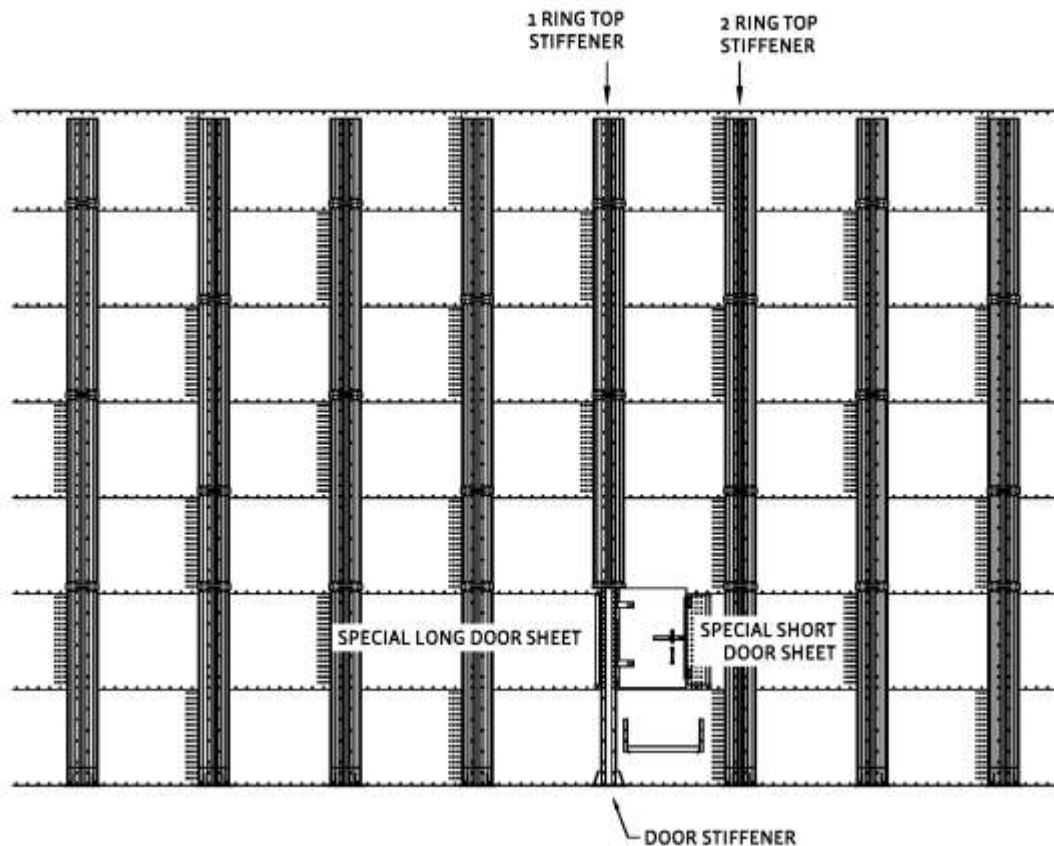
The 1 ring door is used to access the interior of the bin and is located in the 2nd ring up from the bin foundation. Verify the location of the special long and short door sheets and door sidewall stiffener.

The following illustrations are used to verify the placement of the top ring stiffeners in relation to the sidewall door and door sidewall sheets.

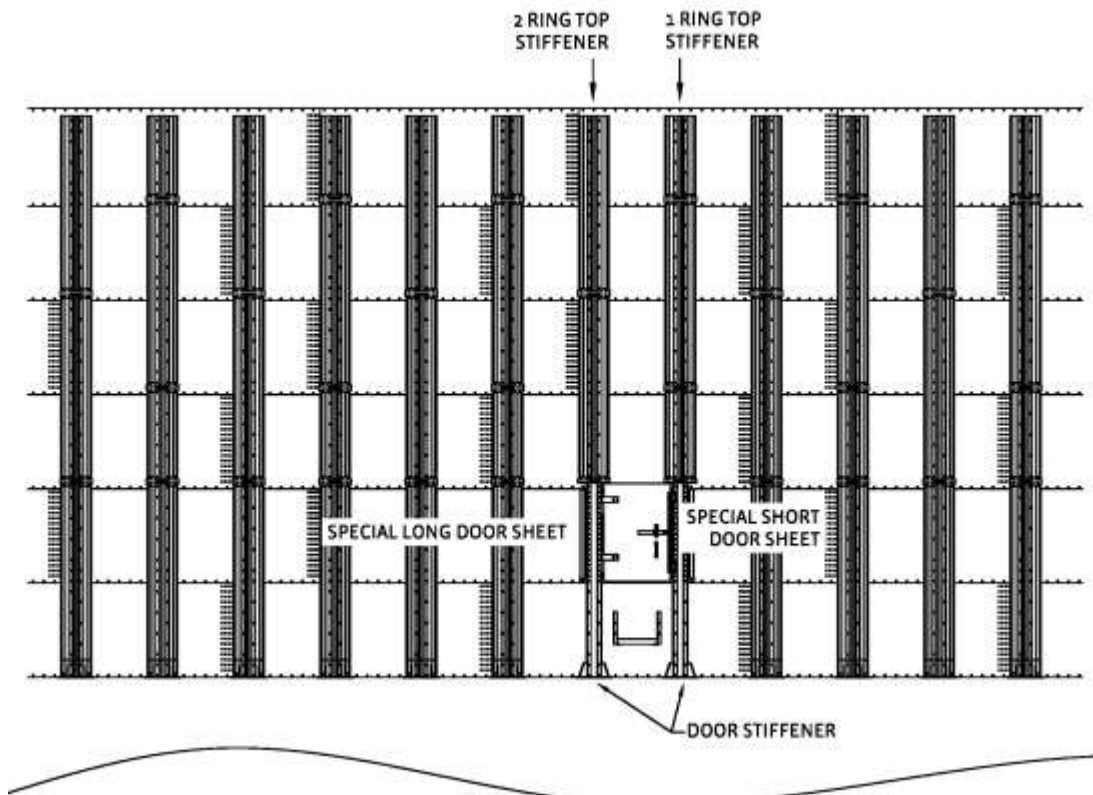
2 STIFFENERS PER SIDEWALL SHEET EVEN RING HEIGHT



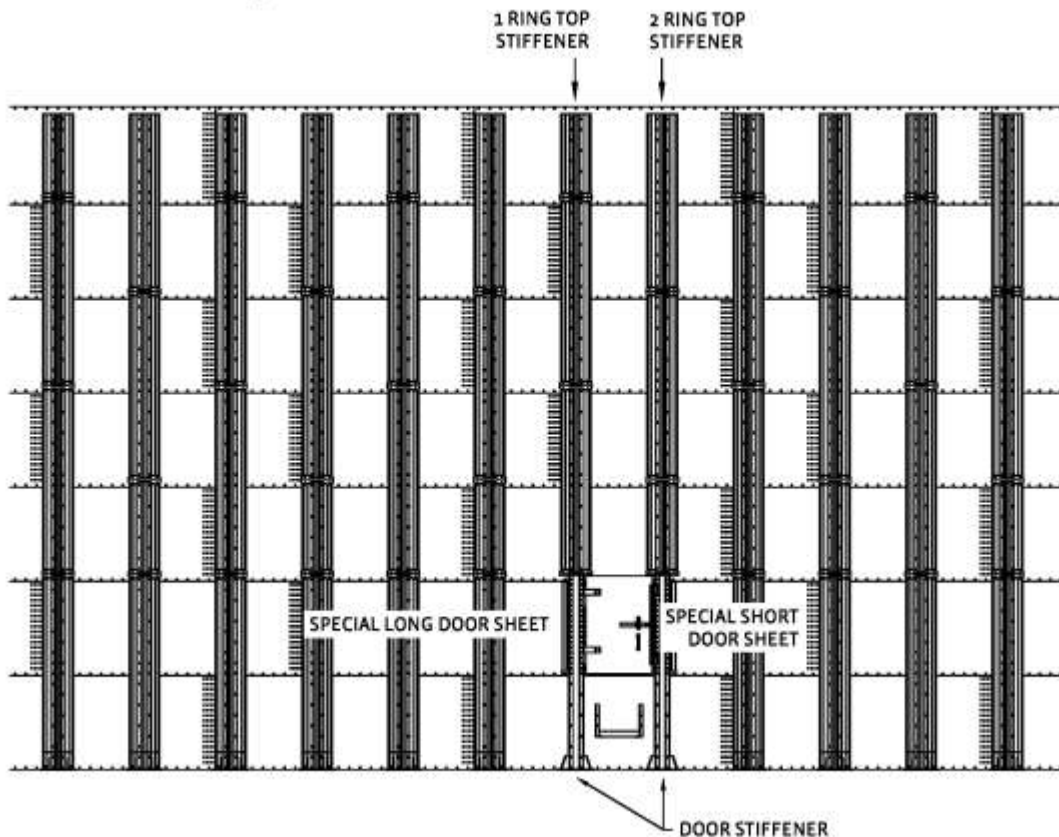
2 STIFFENERS PER SIDEWALL SHEET ODD RING HEIGHT



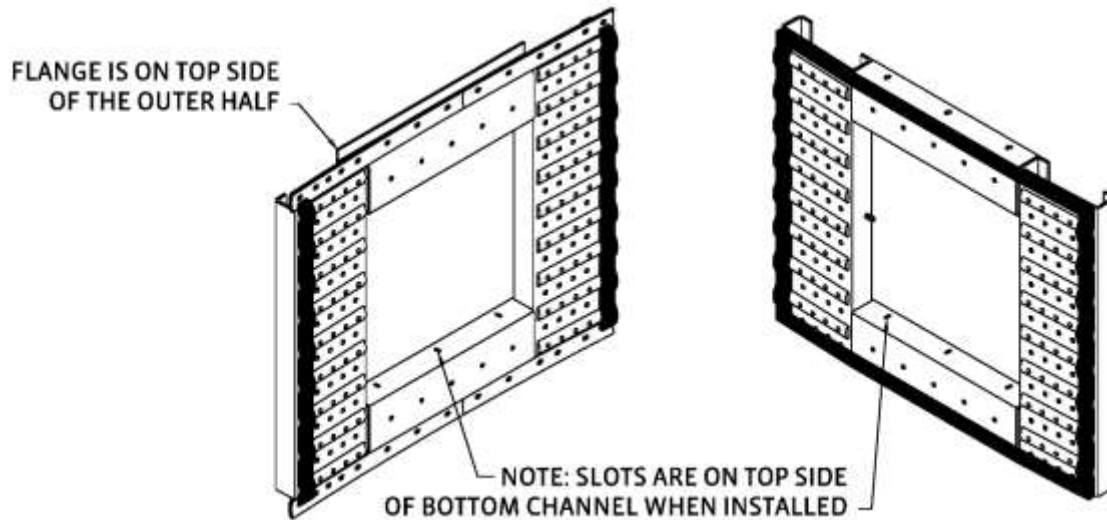
3 STIFFENERS PER SIDEWALL SHEET EVEN RING HEIGHT



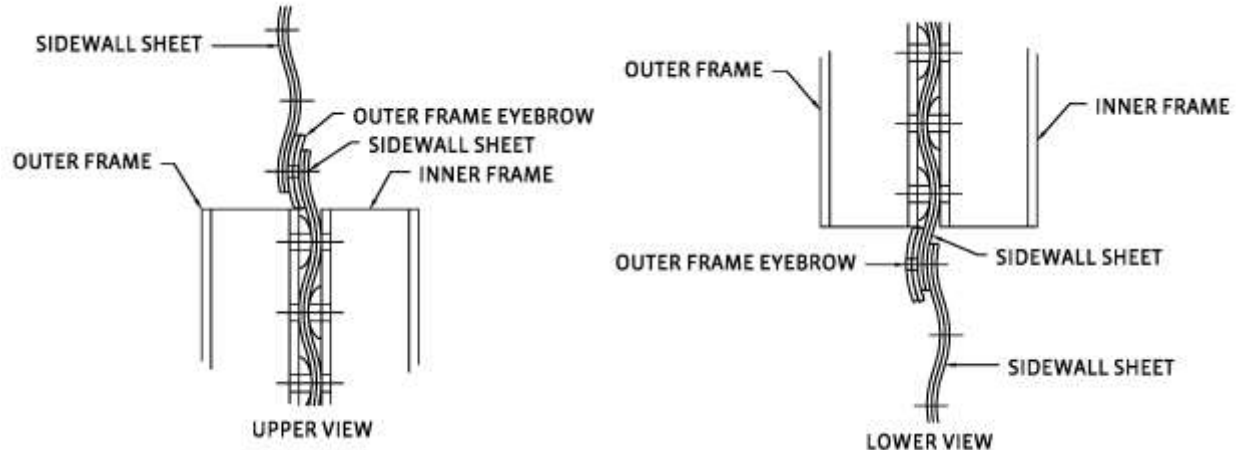
3 STIFFENERS PER SIDEWALL SHEET ODD RING HEIGHT



Start by placing foam tape around the edges of the door frames as shown in the following illustration.

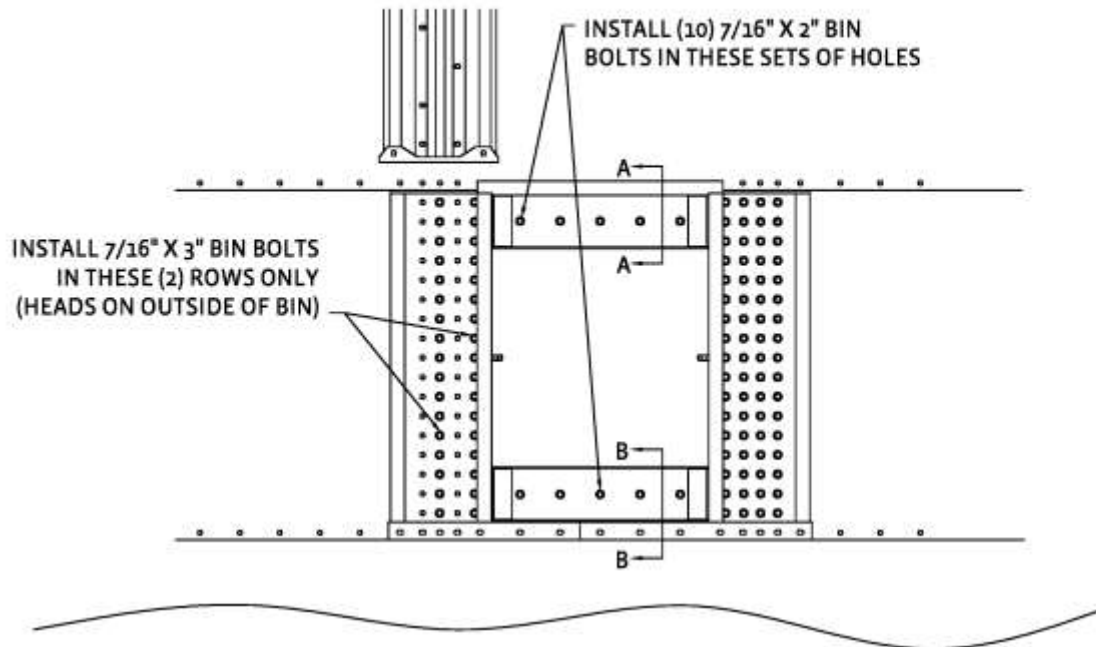


Bolt the inner and outer frame to the bin sidewall with 7/16-14 x 3.0" bin bolts, making sure to only place bolts in the holes shown in the following illustrations. The top eyebrow on the outer frame is to be placed behind the sheet above the door. The bottom eyebrow is to be placed on the outside of the sheet below the door. Bolt the upper and lower channel frame together with 7/16-14 x 2.0" bin bolts and whiz flange nuts.

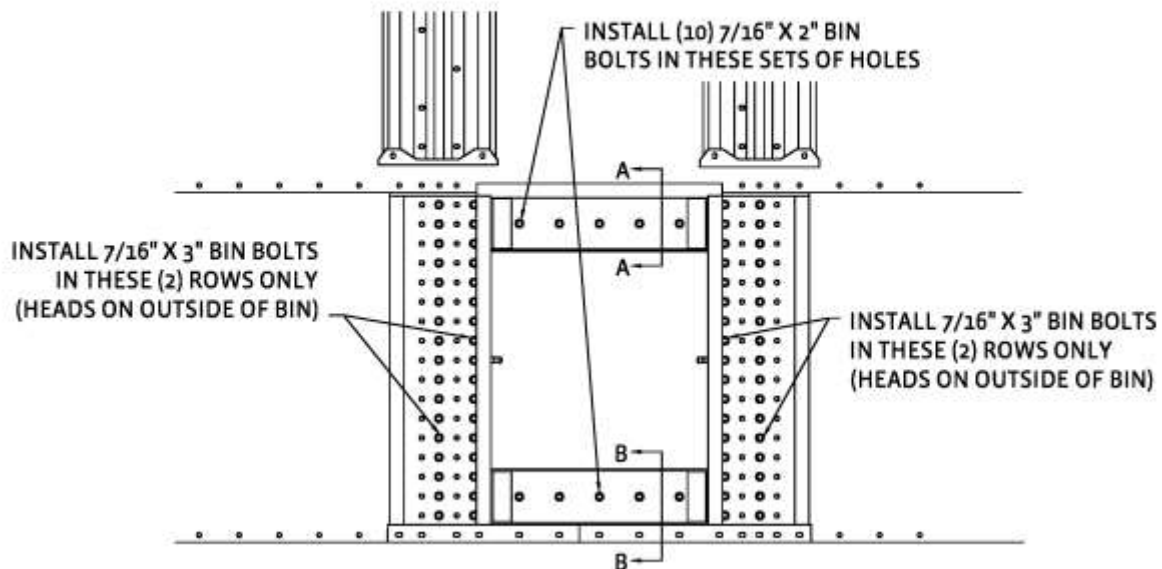


For 2 and 3 stiffened bin designs, 7/16-14 x 3.0" bolts with the heads located on the exterior of the bin will be used in the left and right channels at the locations shown below, and 7/16-14 x 2.0" bolts with the heads located on the exterior of the bin will be used in the top and bottom channels at the locations shown below.

SHOWN INSTALLED ON A 2 STIFFENED BIN

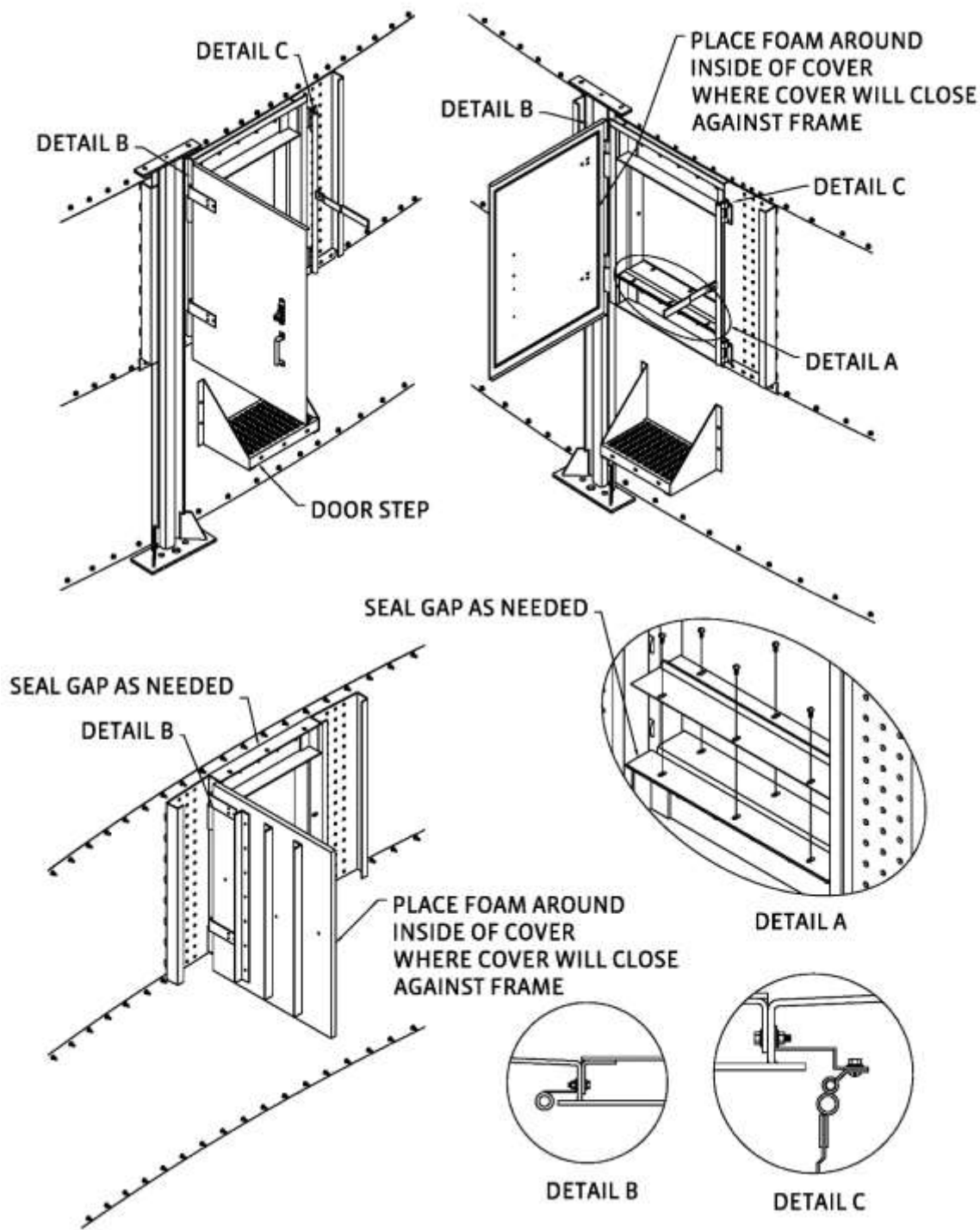


SHOWN INSTALLED ON A 3 STIFFENED BIN



Before installing the outer protective weather door cover, verify that the mounting hinges are installed as shown in the following illustrations. Install foam tape on interior of the door protective weather cover where the cover will close against the exterior door frame.

Before installing the inner protective door cover, verify that the mounting hinges are installed as shown in the following illustration. Install foam tape on interior of the door cover where the cover will close against the interior door frame. Install sealant as needed around the interior door frame and sidewall sheets.

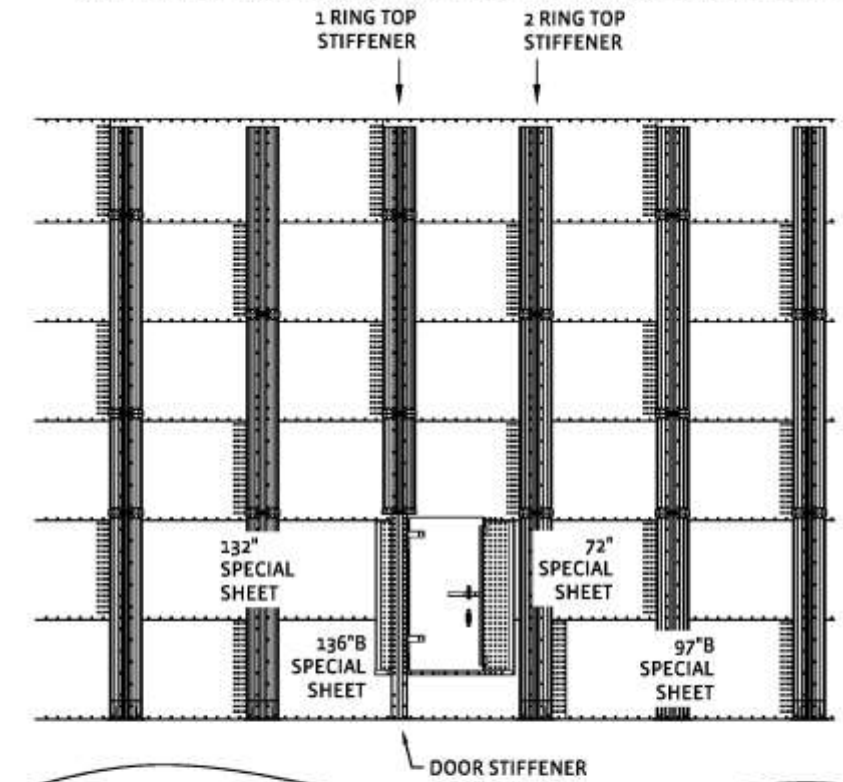


2 Ring Door Assembly (Optional)

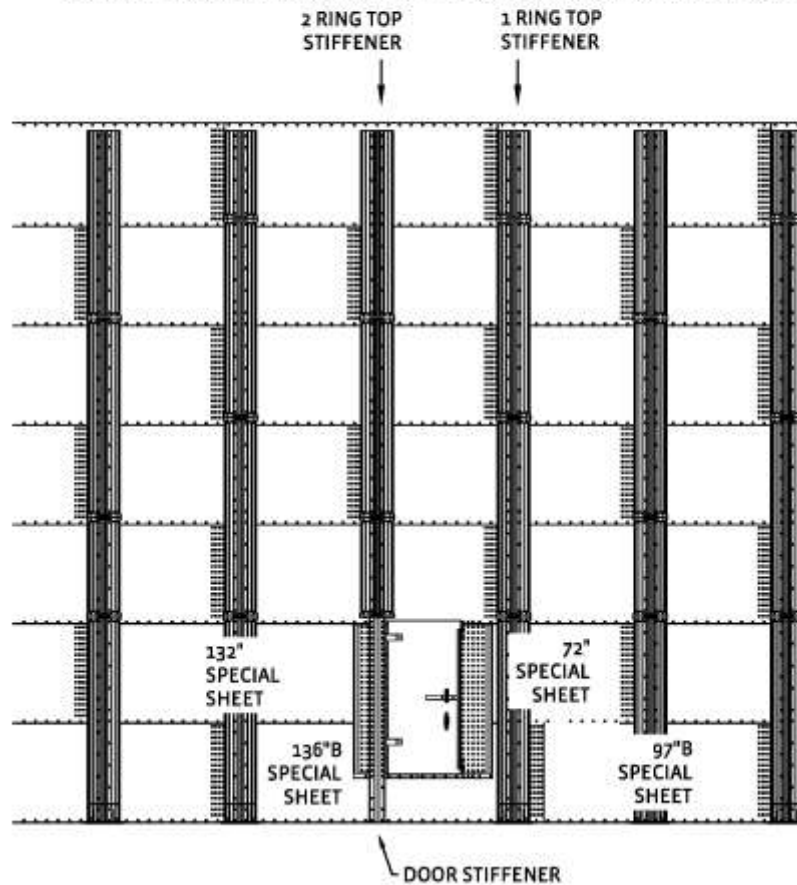
The 2 ring door is used to access the interior of the bin and is located in the 1st and 2nd ring up from the bin foundation. Verify the location of the special long and short door sheets and door sidewall stiffener.

The following illustrations are used to verify the placement of the top ring stiffeners in relation to the sidewall door and door sidewall sheets.

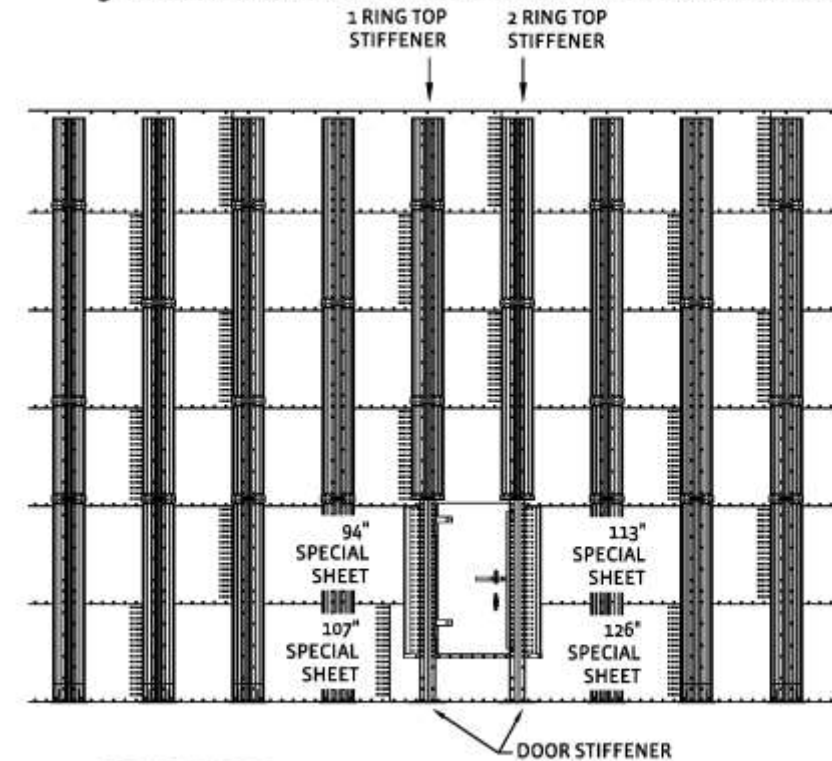
2 STIFFENERS PER SIDEWALL SHEET EVEN RING HEIGHT



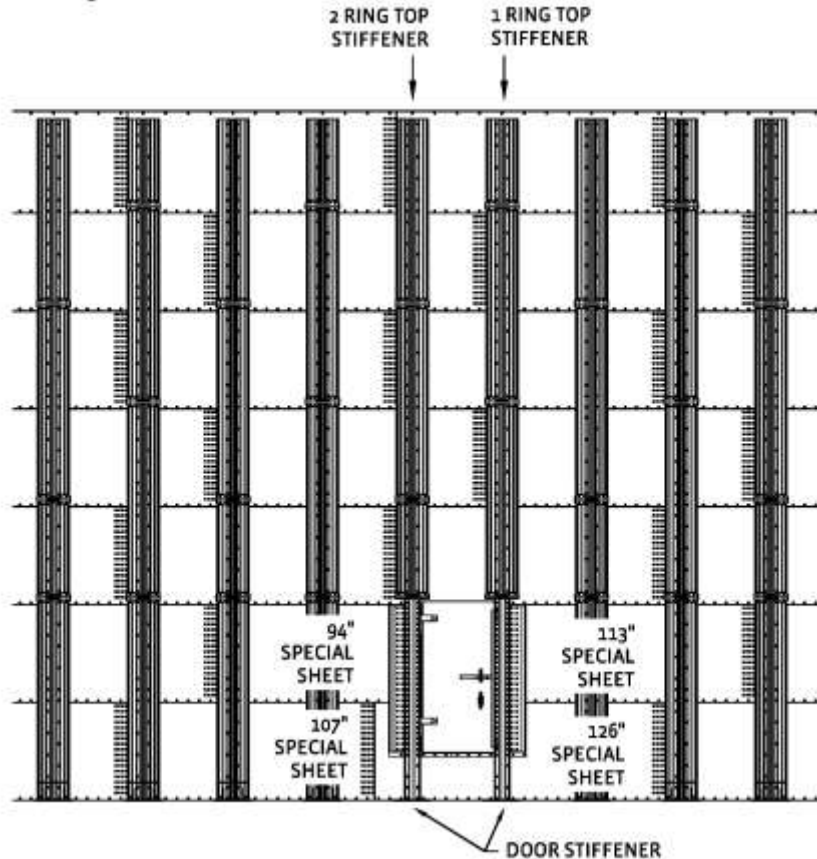
2 STIFFENERS PER SIDEWALL SHEET ODD RING HEIGHT



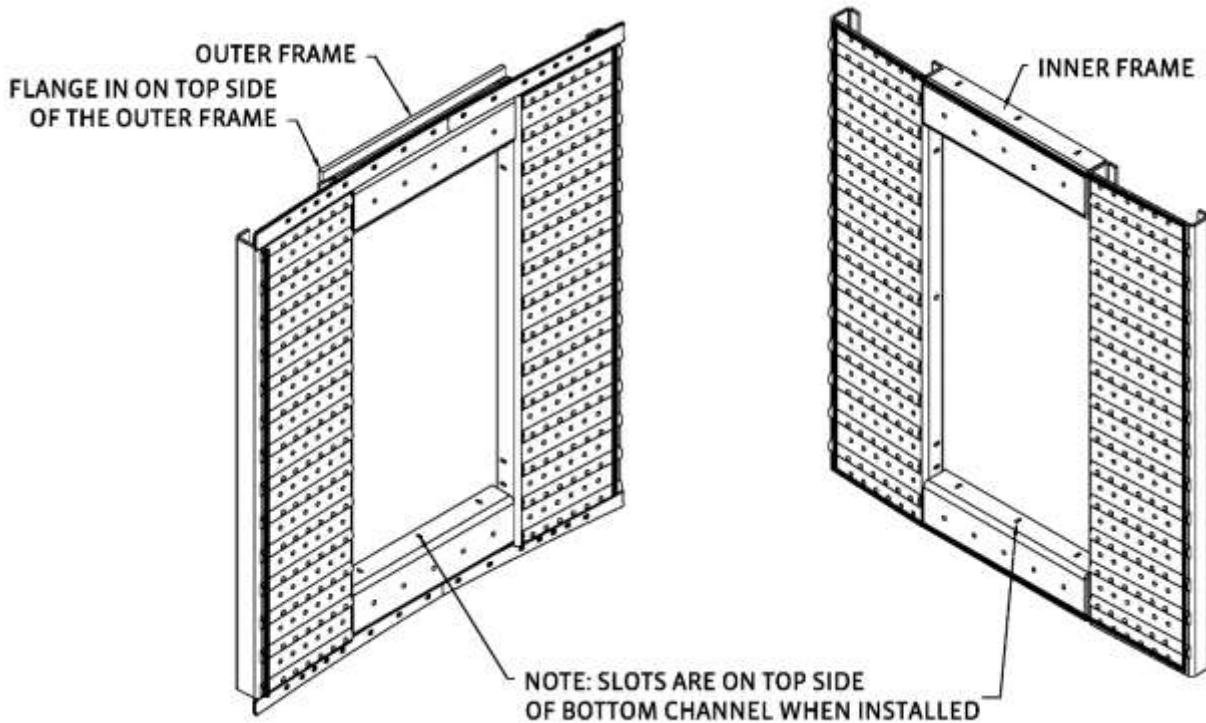
3 STIFFENERS PER SIDEWALL SHEET EVEN RING HEIGHT



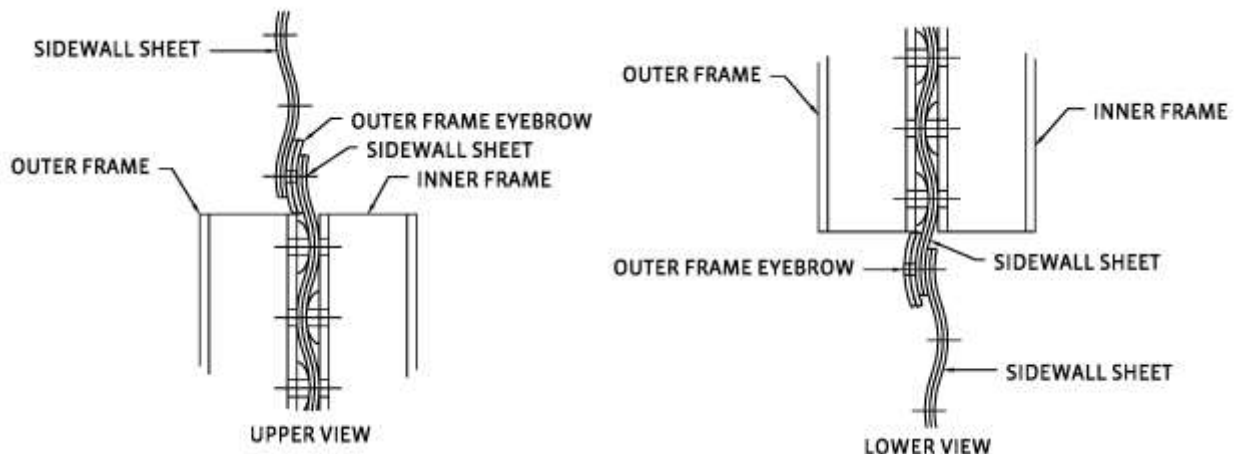
3 STIFFENERS PER SIDEWALL SHEET ODD RING HEIGHT



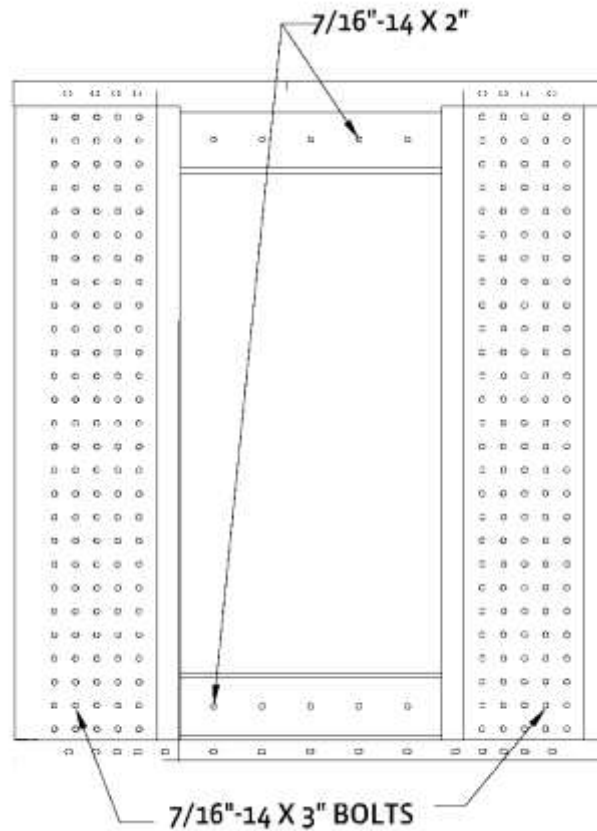
Start by placing foam tape around the edges of the door frames as shown in the following illustration.



Bolt the inner and outer frame to the bin sidewall with 7/16-14 x 3.0" bin bolts, making sure to only place bolts in the holes shown in the following illustrations. The top eyebrow on the outer frame is to be placed behind the sheet above the door. The bottom eyebrow is to be placed on the outside of the sheet below the door. Bolt the upper and lower channel frames together with 7/16-14 x 2.0" bin bolts and whiz flange nuts.

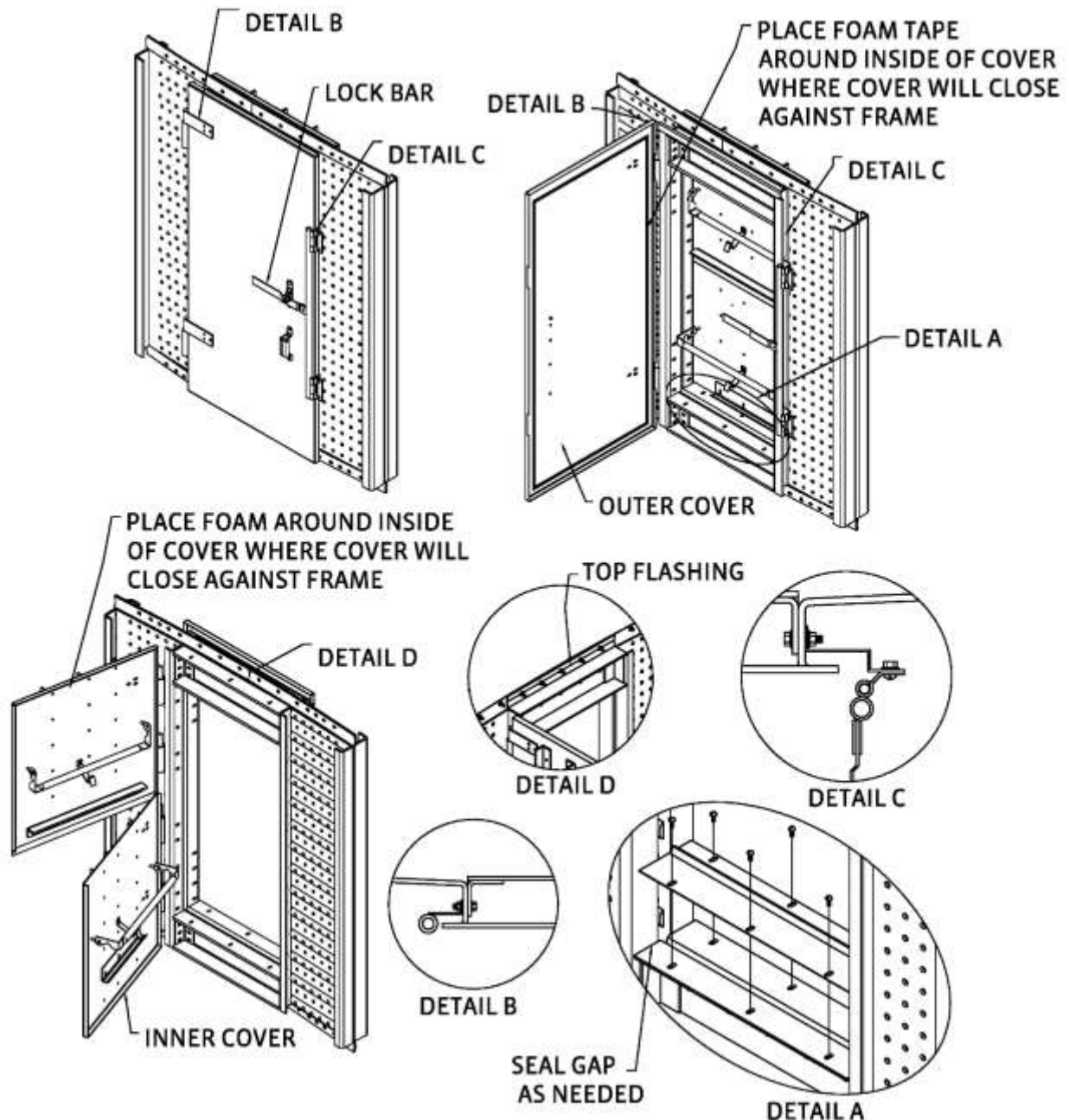


For 2 and 3 stiffened bin designs, 7/16"-14 x 3.0" bolts with the heads located on the exterior of the bin will be used in the left and right channels at the locations shown below, and 7/16"-14 x 2.0" bolts with the heads located on the exterior of the bin will be used in the top and bottom channels at the locations shown below.



Before installing the outer protective weather door cover, verify that the mounting hinges are installed as shown in the following illustrations. Install foam sealant on interior of the door protective weather cover where the cover will close against the exterior door frame.

Install foam sealant on interior of the door cover where the cover will close against the interior door frame. Install sealant as needed around the interior door frame and sidewall sheets.



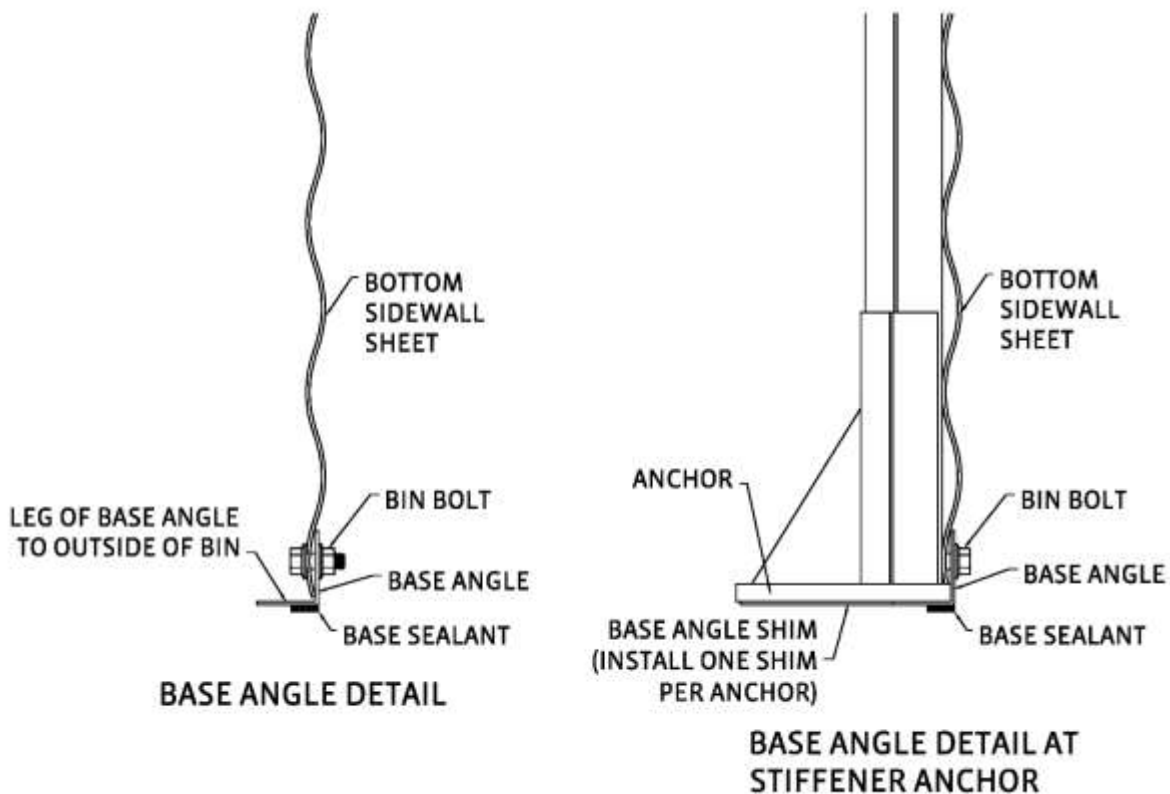
Base Angle Installation

After all rings of the bin have been installed, the base angle will be installed on the bottom sidewall sheet. A base angle shim must be installed under all anchor brackets. This shim must be equal to the thickness of the base angle and be placed under the entire width of the anchor bracket, with the edge of the shim flush against the base angle.

Important Note: Always use the minimum number of shims required to correct a deviation in the concrete and provide full bearing contact of the anchor bracket.

Important Note: Install base sealant to the bottom of the base angle prior to installing the base angle to the sidewall sheet. The sidewall sheets must be wiped clean of all oil and residue before applying the base sealant. Once installed, the sealant applied between the base angle and the concrete foundation provides a watertight seal.

Prior to setting bin down onto the foundation, verify that the base angle is tight to the bottom of the sidewall sheet and evenly spaced prior to tightening the base angle bolts. After hardware is tightened, verify paper backing is removed from the base sealant strips (if using paper backed sealant) and proceed to set bin down on the foundation.



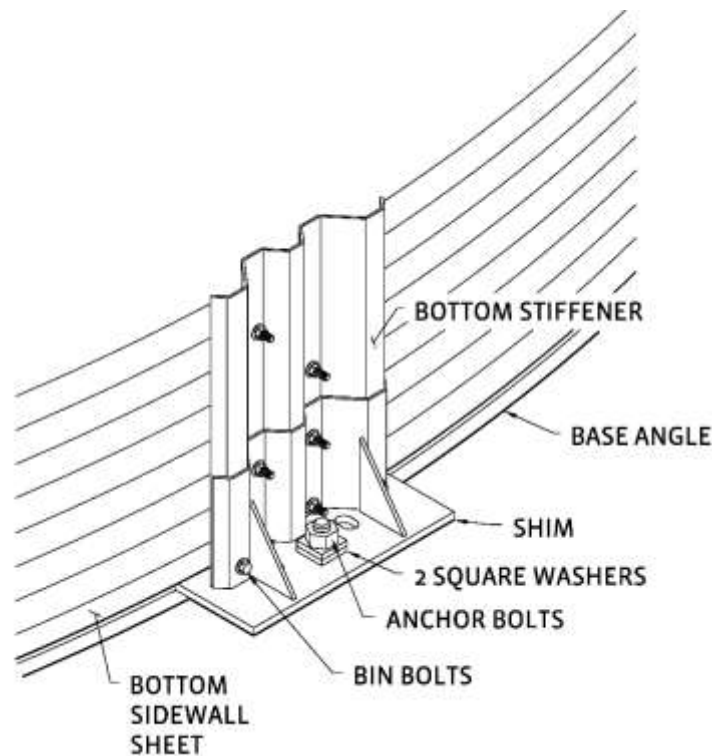
Bin Stiffener Anchor

All bin sizes incorporate a 2 ring stiffener for the bottom 2 rings located next to the foundation. Stiffened bins may have 2 or 3 stiffeners per sidewall sheet depending upon the required design specifications.

Bin Stiffener anchors allow up to 3 anchor bolts to be used at each anchor location. There are (2) 1" (2.54cm) diameter and (1) 1-1/2" (3.81cm) diameter holes in each bin stiffener anchor. There are several different combinations that Chief recommends to anchor the bin to the foundation.

- (1) 1-1/4" x 12" (3.17cm x 30.48cm) anchor bolt may be used in the 1-1/2" (3.81cm) diameter hole, if this is done the anchor bolt must be pre-formed in the concrete
- (2) 3/4" x 12" (1.90cm x 30.48cm) anchor bolts may be used in the two 1" (2.54cm) diameter holes. If this is done the anchor bolts must be pre-formed in the concrete.
- If larger anchor bolts or 3 anchor bolts are required due to seismic conditions or high wind loads, consult Chief for recommendations.

The bin stiffener anchor bracket utilizing (1) anchor bolt is shown in the following illustration.



If anchor bolts are not pre-formed as stated above, and the anchor bolt radius is not held, the bins warranty will be nullified. All anchor bolts must project a minimum of 2" (5.08cm) above the concrete floor. It is recommended to keep anchor bolt projection to a maximum of 3" (7.62cm) above the concrete.

All anchor bolts, nuts and washers shall conform to ASTM A307 unless otherwise noted.

Important Note: Anchor bolts, nuts and washers are not provided by Chief.

To install the anchor brackets to the bottom stiffener:

1. Start by hand tightening anchor brackets to the bottom 2 ring stiffener. After the bottom ring is attached, lower the bin carefully and place all anchor brackets over the anchor bolts.
2. When the full weight of the bin is on the concrete, shim the anchors as necessary by placing shim plates between the concrete and the anchor bracket.

Important Note: All anchors must be firmly bearing upon the concrete or shimmed to develop full bearing contact with the concrete foundation.

3. Anchors placed over aeration trenches must be supported from the bottom of the trench using Chief transition stiffeners.
4. After all anchor brackets are shimmed correctly to provide full bearing contact, place 2 square washers over each anchor bolt and tighten to the required specifications.

Important Note: All anchor bolts must be retightened after the bin has been filled to capacity for the first time.

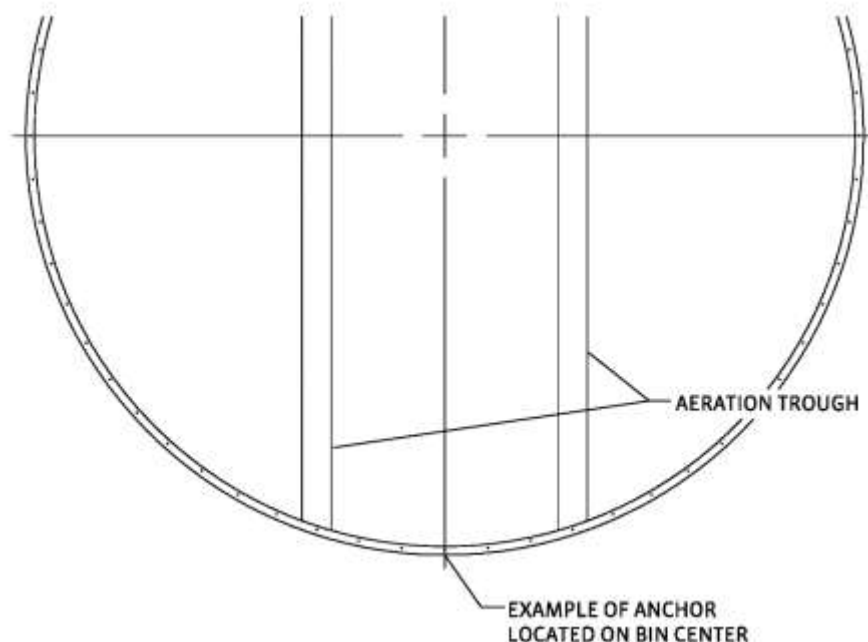
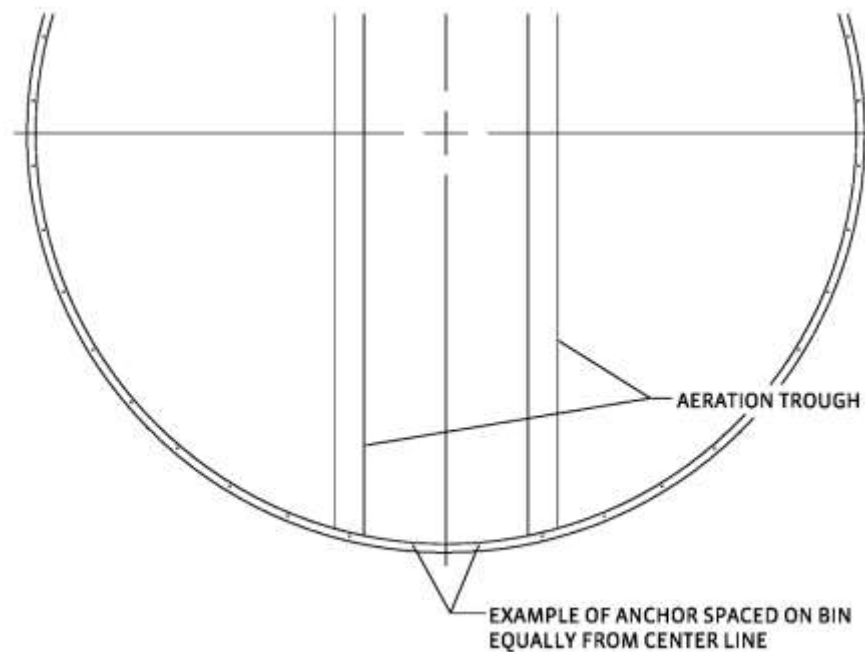
If wedge type anchor bolts are used to replace damaged anchor bolts, the bolt radius circle must be checked at replacement locations so that the bin is round when anchored. Chief recommends using wedge anchors that meet 10,000 LB Pull-Out and 7,500 LB shear criteria.

The following dimensions are for standard design bins and the lengths shown are from center of anchor bolt to center of anchor bolt.

Bin Size	Anchor Bolt Radius	Chord Length (2STF)	Chord Length (3STF)
CB22	34-4 1/2" (1047.75cm)	58.8750" (149.54cm)	39.2500" (99.69cm)

Aeration Transition Stiffeners

Trough transition stiffeners are used when a flush floor aeration system is incorporated into the bin floor. The formed concrete dimensions and the anchor bolt placement are important for the correct installation of the transition stiffeners. When forming the concrete, the aeration troughs should be located as specified in Chief's aeration layout. The anchor bolt locations for the bin need to be oriented to make sure that the number of anchors over the aeration trough is minimized. When installing the anchor bolts, the bolt radius and bolt chord must be correct and must also be placed according to the following details.



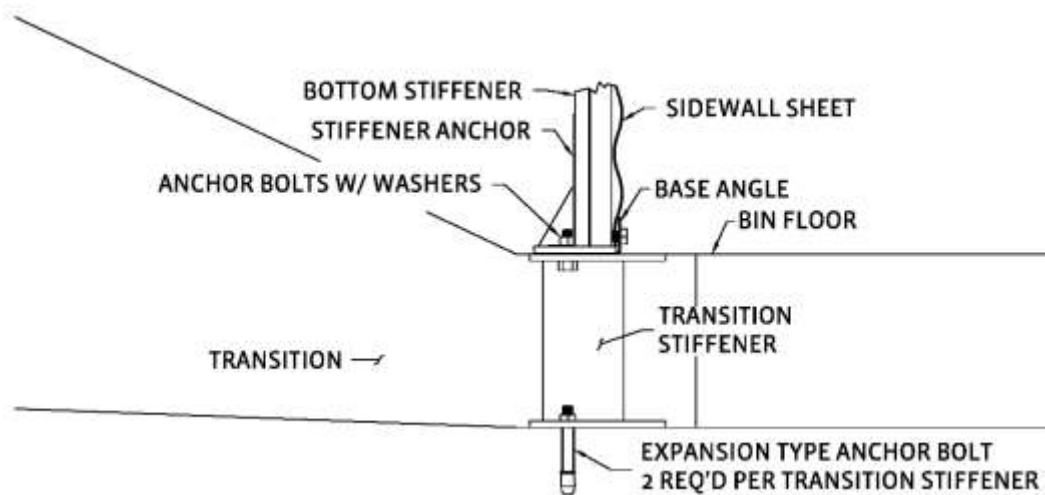
Important Note: Do not install the expansion type anchor bolts inside the aeration trench at this time.

1. When the bin and anchor brackets are installed and located correctly as described previously, insert the transition in the aeration trough. Using 1 of the 2 holes that are 1.0" diameter (2.54cm) in the anchor bracket as a guide, drill a 3/4" (1.90cm) hole through the top of the transition. Slide the transition stiffener inside the transition and line it up with the previously drilled hole. Loosely install the 5/8" x 1-1/2" (1.58cm x 3.81cm) A325 bolts to fasten the stiffener anchor to the top of the transition and transition stiffener. Rotate the transition stiffener body so that it is centered under the bin wall anchor bracket. Drill the second 3/4" (1.90cm) hole through the top of the transition and install the second 5/8" x 1-1/2" (1.58cm x 3.81cm) A325 bolt to fasten the stiffener anchor bracket to the top of the transition and transition stiffener.
2. **The transition stiffener must be anchored to the foundation** with two (2) 5/8" x 6" (1.58cm x 15.24cm) wedge type anchor bolts. The holes for these anchor bolts should now be located. With a punch, mark two holes in the bottom of the transition using the holes in the transition stiffener base plate as guides.
3. Remove the transition stiffener and the aeration transition. Locate the two anchor bolt locations previously marked with the punch in the bottom of the transition. Drill two (2) 3/4" (1.90cm) in these locations. Re-insert the transition in the aeration trough and verify that the transition stiffener is directly under and in line with the anchor. Make adjustments if necessary. Mark the location of these holes on the concrete. Remove the transition and drill (2) holes for the 5/8" x 6" (1.58cm x 15.24cm) anchor bolts.

Important Note: Do not install the anchor bolts at this time.

4. Reinstall the transition and slide the transition stiffener into position. Loosely install the 5/8" x 1-1/2" (1.58cm x 3.81cm) A325 bolts and rectangular washers at the anchor bracket location. The (2) 5/8" x 6" (1.58cm x 15.24cm) wedge-type anchor bolts should now be installed. Securely tighten the 5/8" (1.58cm) bolts at the anchor bracket. Sealant should be applied to the transition opening.

Important Note: Transition stiffeners support the bin anchors. The transition must also be supported inside the bin. Refer to the supplied Chief aeration layout for instructions on supporting the transition.



Grain Handling Support Structures

For standard bin models independent support towers located between the bins should support overhead equipment such as conveyors, augers, and catwalks. The bin walls or roof should not support the load from these items. When an alternate site design is required, the grain bin can be specifically designed to support concentrated loads at the bin roof eave with upgraded design stiffeners to support the overhead load.

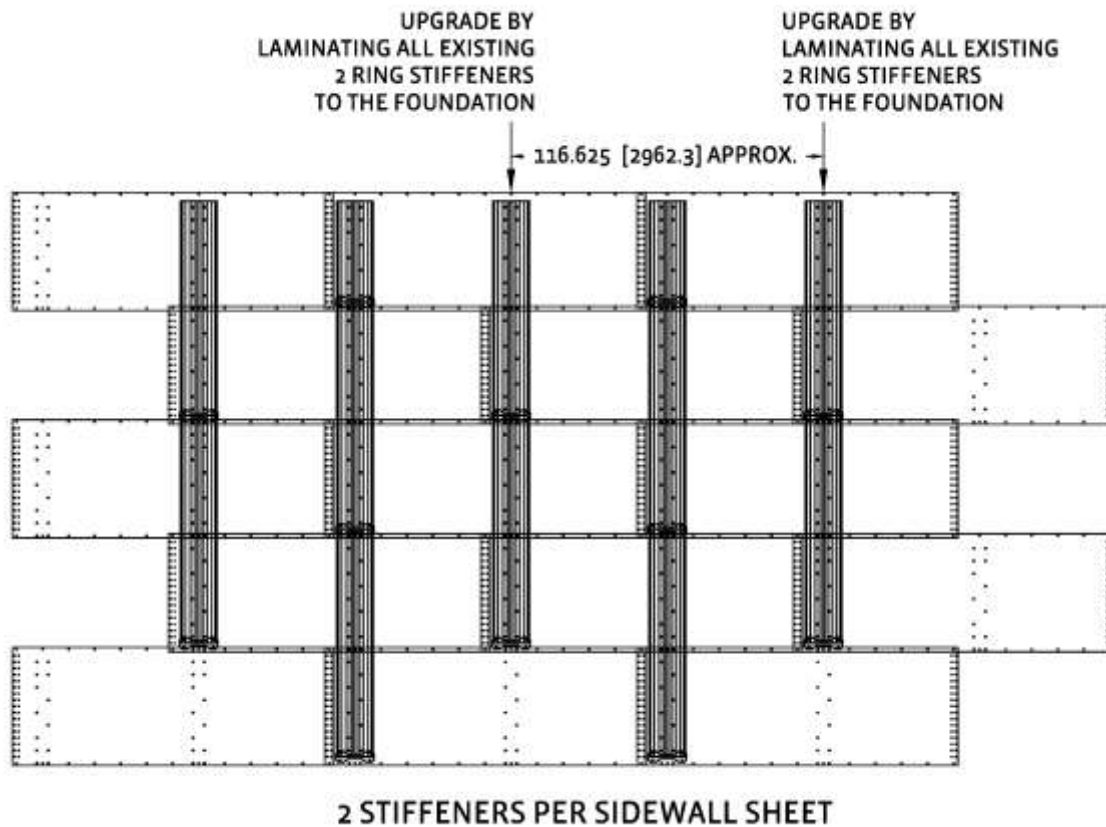
Important Note: Fill conveyors and catwalks must not be supported by a standard design bin wall.

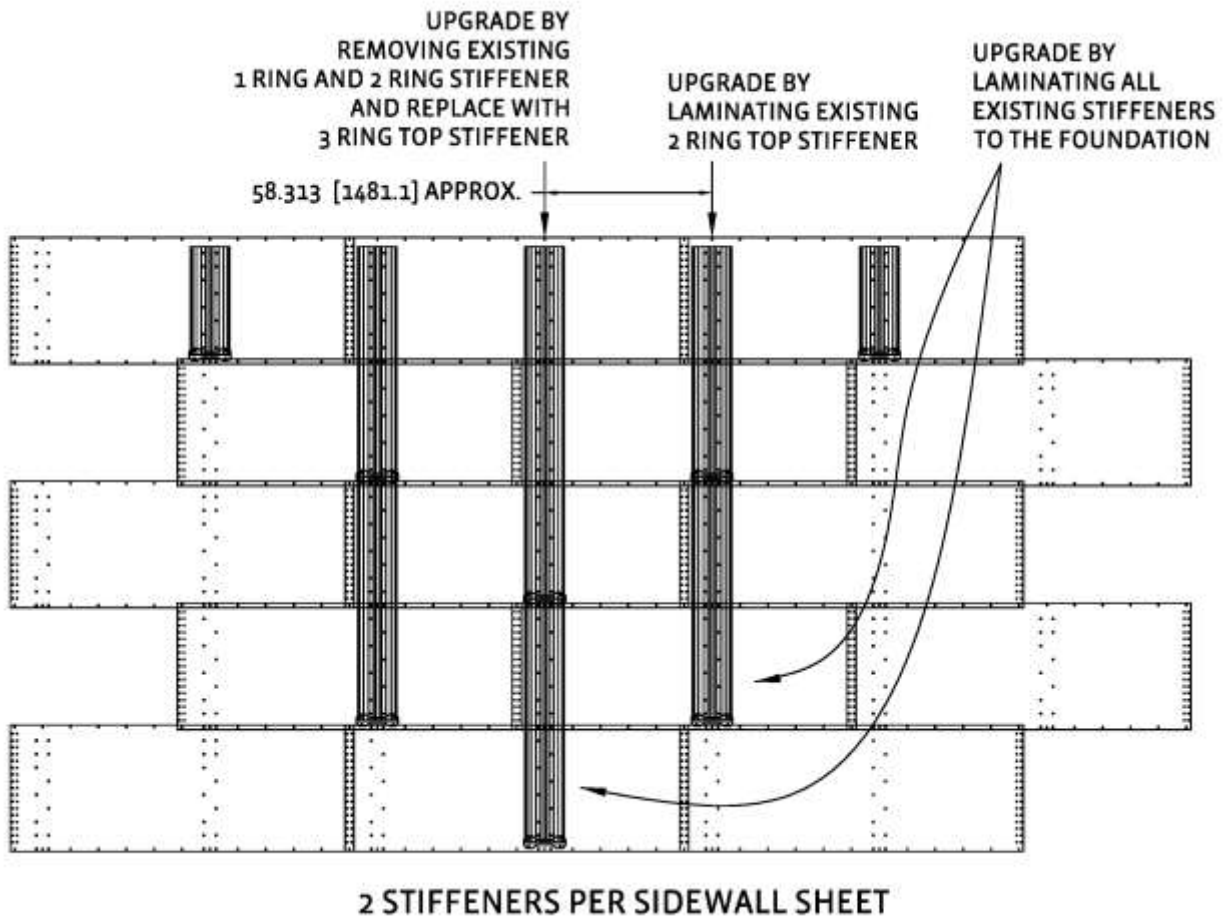
Eave Support Stiffener Upgrades (Method “P”)

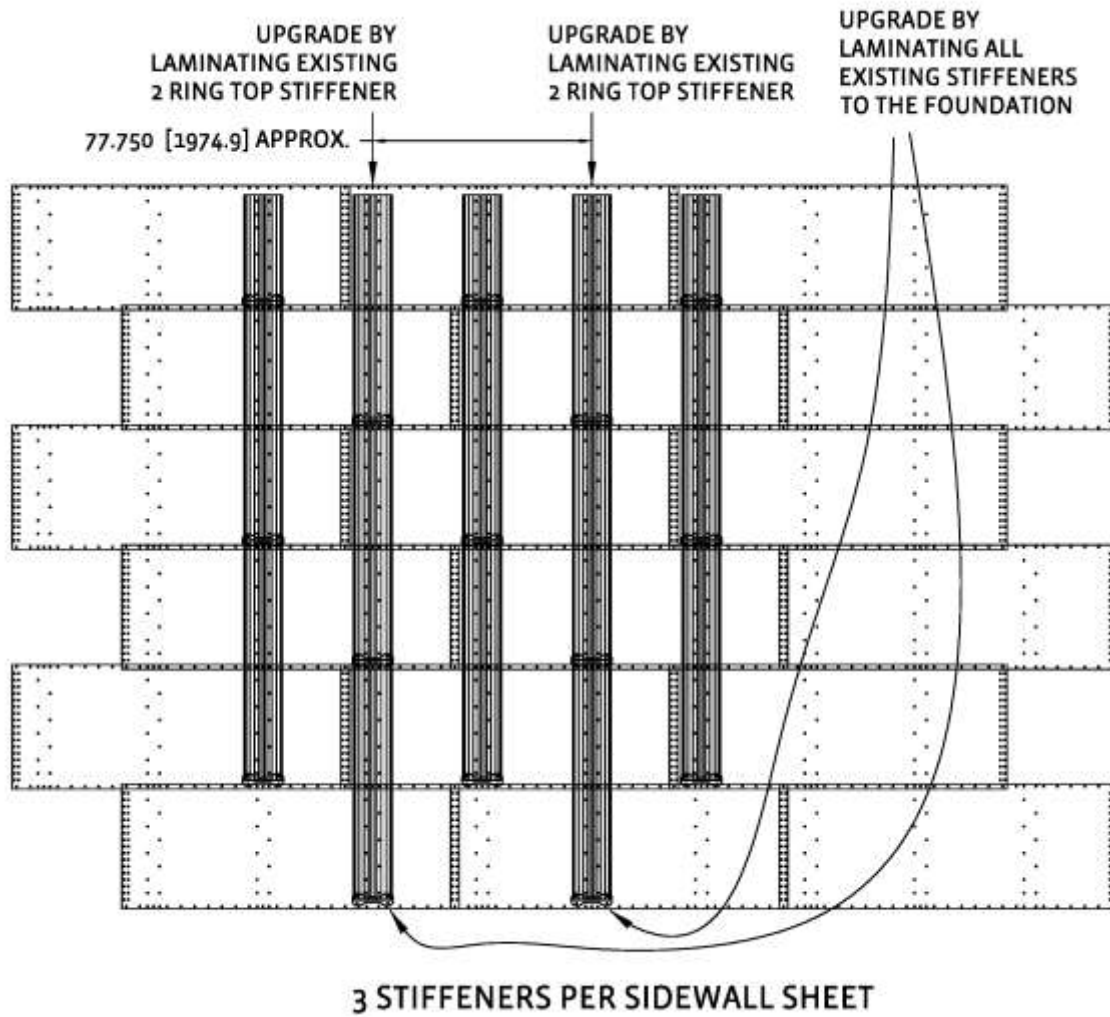
When an eave support is being attached to bin, additional stiffeners are laminated over standard stiffeners at the eave support location. These laminated stiffeners are laminated the entire length from the bin eave to the foundation during the grain bin installation.

Listed below are the maximum loads that can be applied to upgraded stiffener columns:

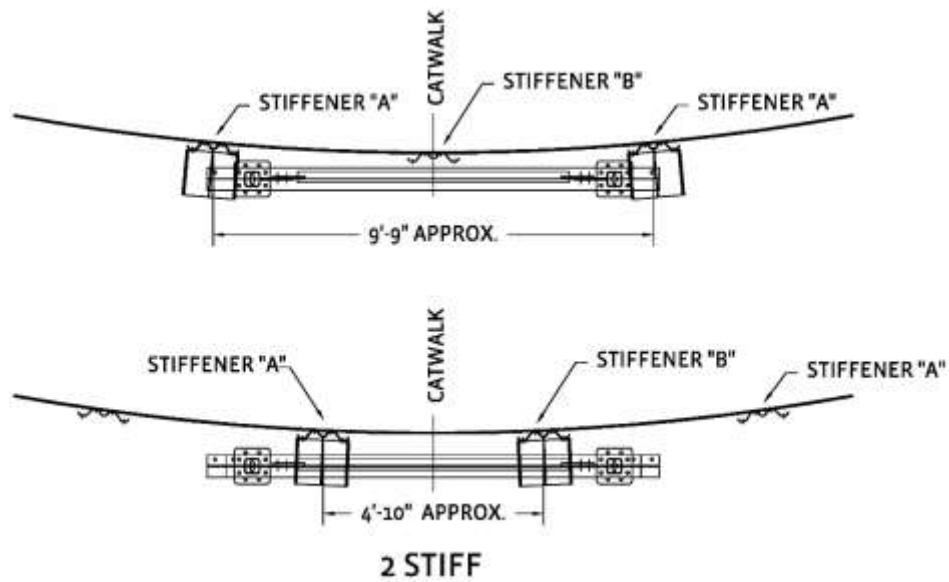
- 16 gauge stiffener upgrade will support 5,000 lbs. (2,267 kg) per column
- 14 gauge stiffener upgrade will support 6,000 lbs. (2,721 kg) per column



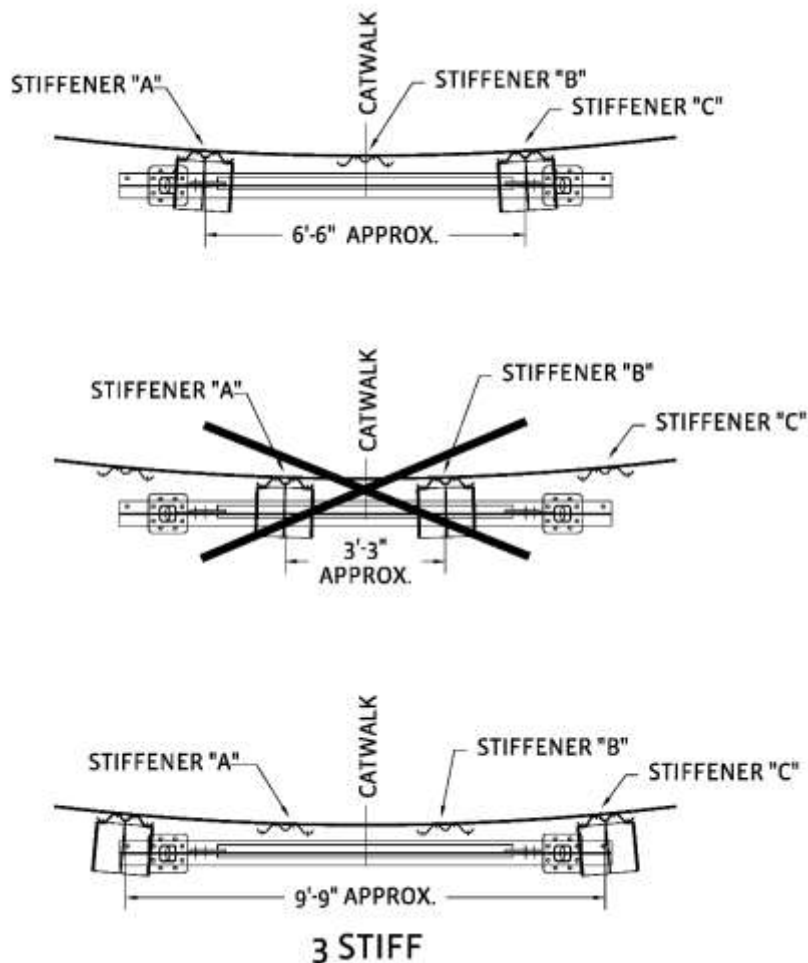
Eave Support Stiffener Upgrades (Optional Method “Q”)

Eave Support Stiffener Upgrades (Optional Method “Q”)

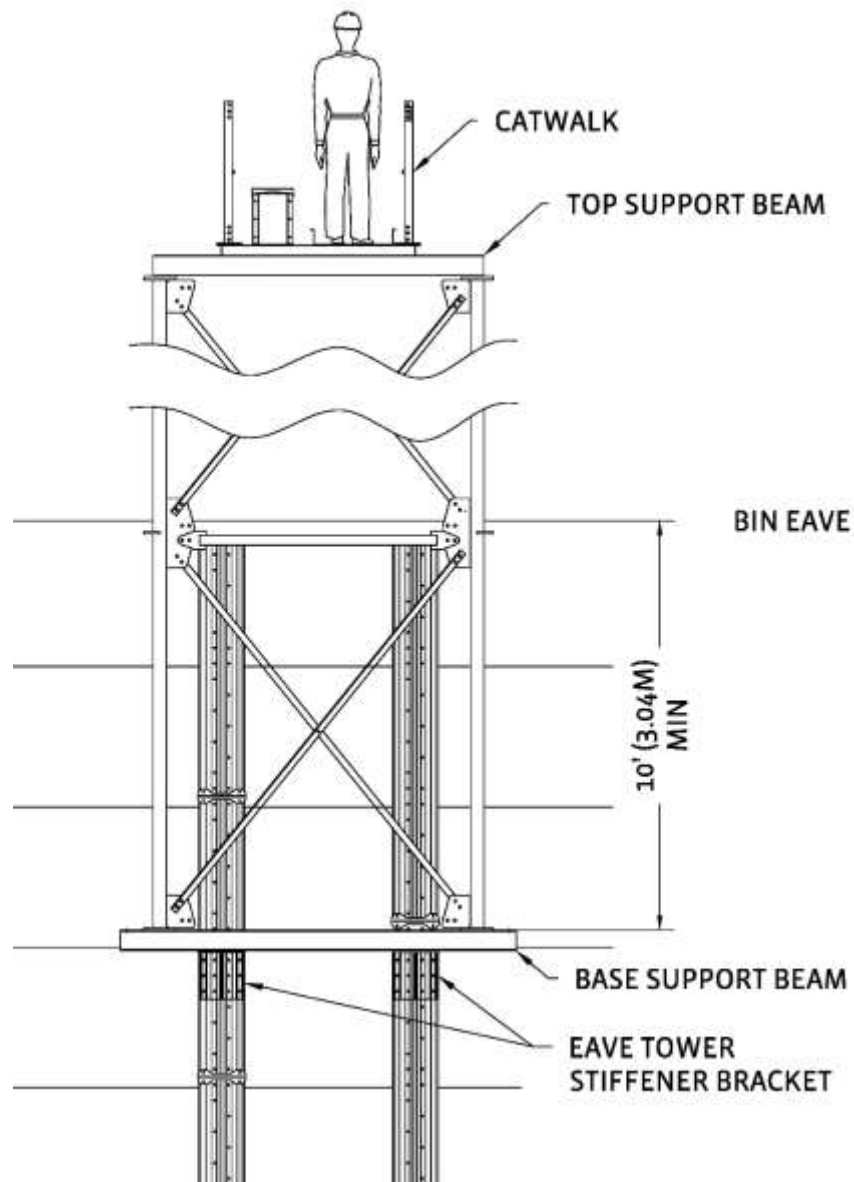
Eave Support Beam Placement (2 Stiffened)



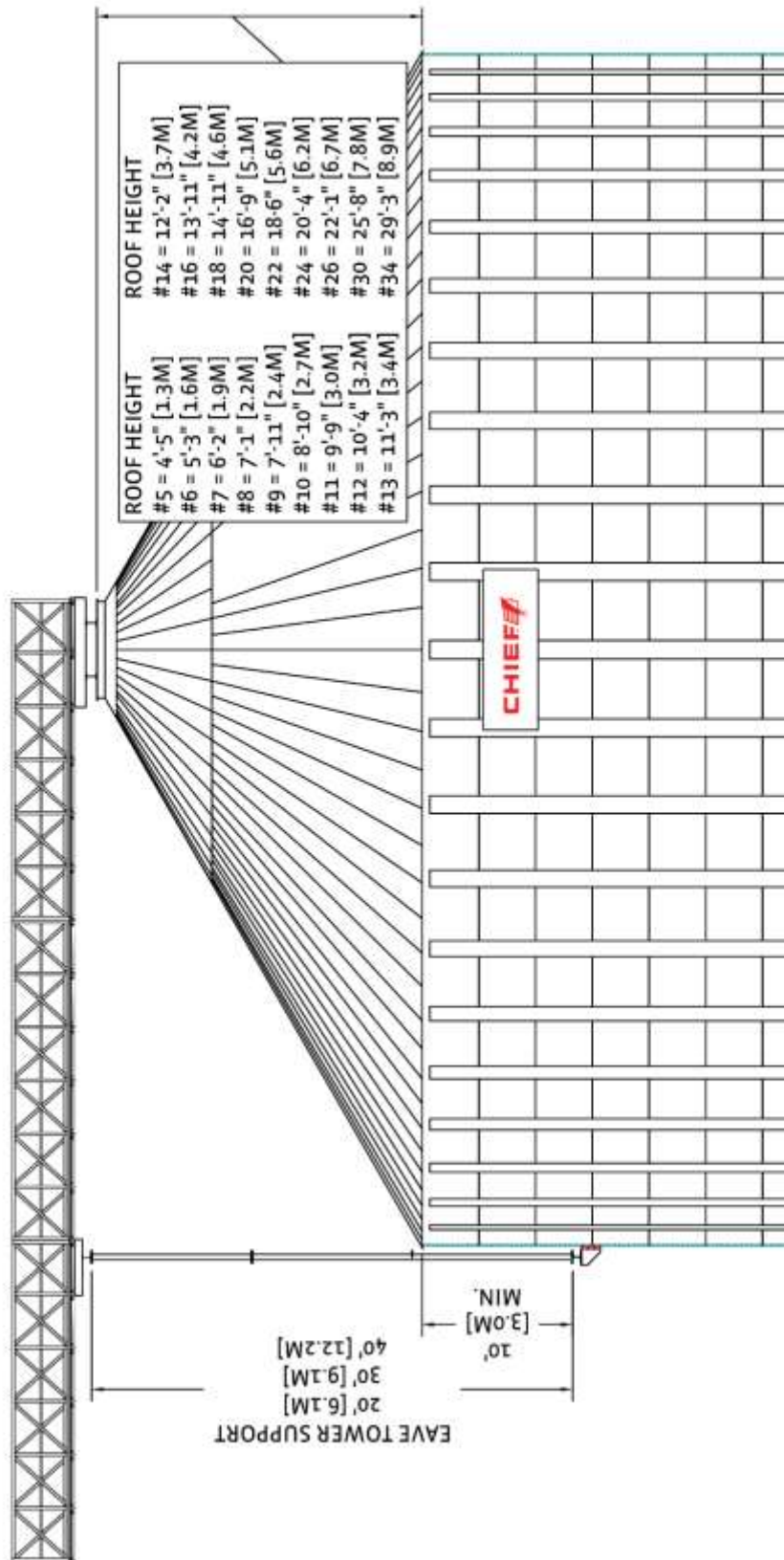
Eave Support Beam Placement (3 Stiffened)



Important Note: All eave support towers must be located a minimum distance of 10' (3.04m) below the roof eave.

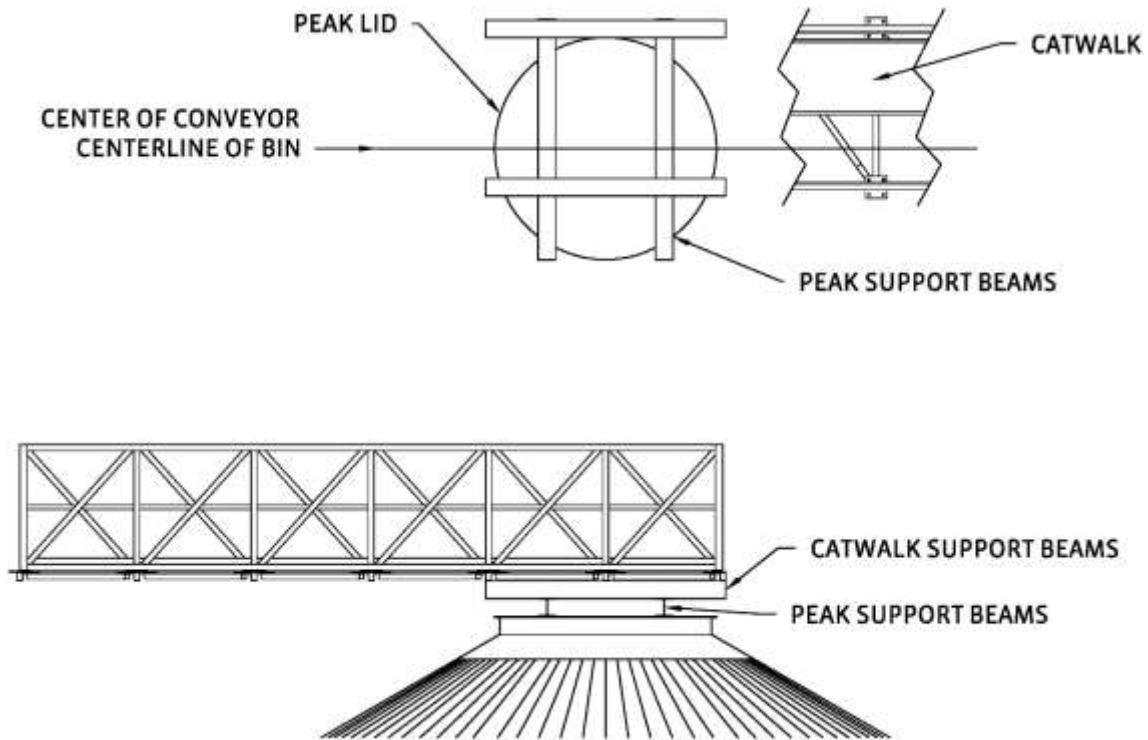


The following illustrates the roof height of various models to assist in selecting the correct height of eave tower support.



Catwalk Peak Support Installation

Installation of a catwalk and material handling equipment on the roof peak requires support beams to be orientated correctly according to the following illustration.



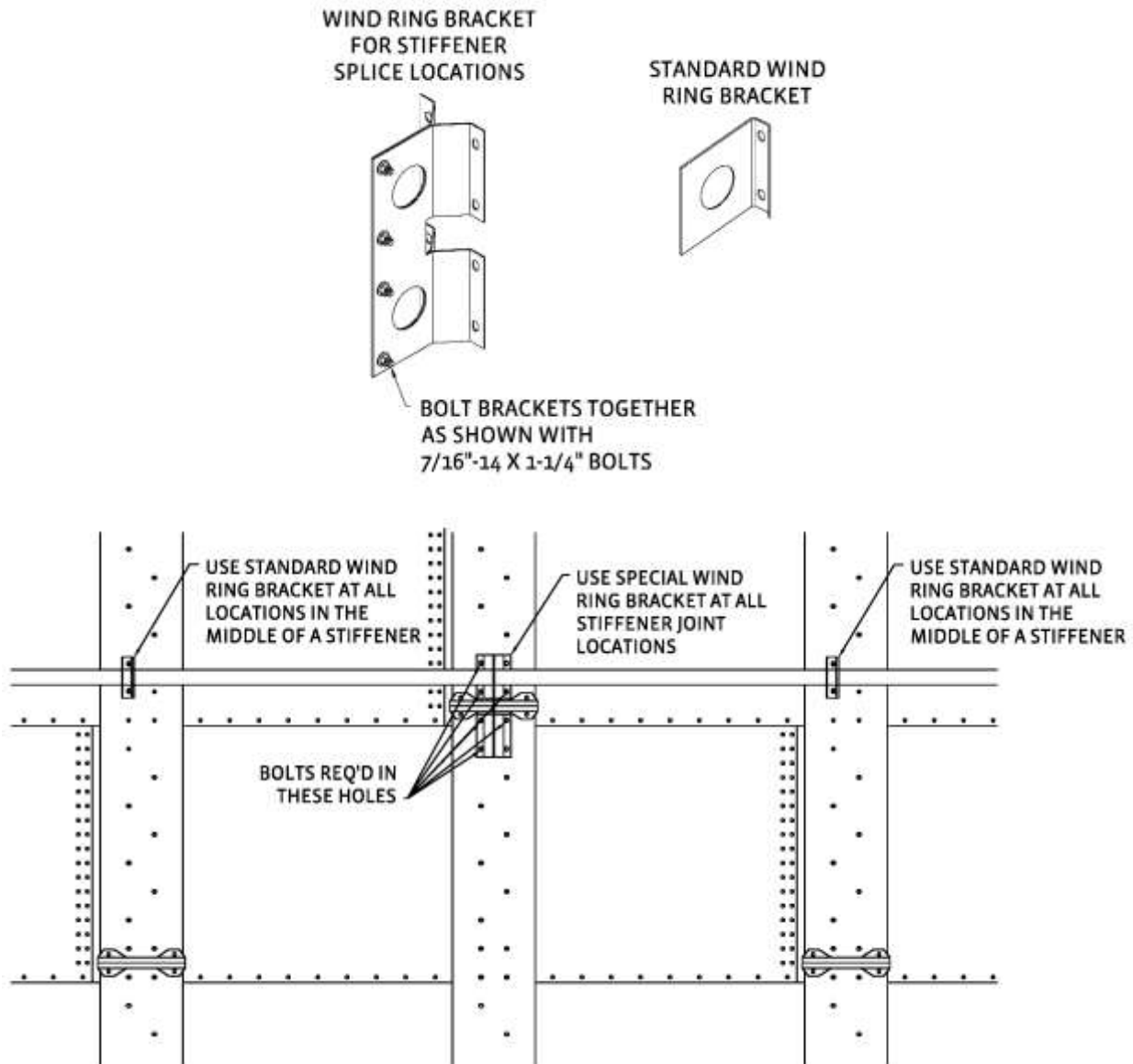
Wind Ring Installation

Wind rings are used to provide additional reinforcement to the bin sidewall. The quantity of wind rings are application specific and may vary depending upon on the size of the bin, and any accessories provided (ex. a side draw system). For quantities and placement of wind rings required, refer to the charts below.

Note: Wind rings are located at the bottom of each ring specified.

Bin Size CB22	Ring Height	Without Side Draw	With Side Draw	Wind Ring Locations	Total Wind Rings
	0-9	*			0
	10-15	*		2	1
	16-21	*		2 / 4	2
	22-25	*		2 / 4 / 6	3
	26-28	*		2 / 4 / 6 / 8	4
	0-9		*		0
	10-15		*	1 / 3	2
	16-21		*	1 / 3 / 5	3
	22-25		*	1 / 3 / 5 / 7	4
	26-28		*	1 / 3 / 5 / 7 / 9	5

The wind rings will be attached to the sidewall using brackets specifically formed to bolt directly to the sidewall vertical stiffener holes. These brackets will be located on each vertical stiffener. The wind ring segments are joined together using a bolted coupler.



Important Note: All wind ring segments are 248" (629.92cm) long, and may require a field cut to keep couplers in between the wind ring brackets.

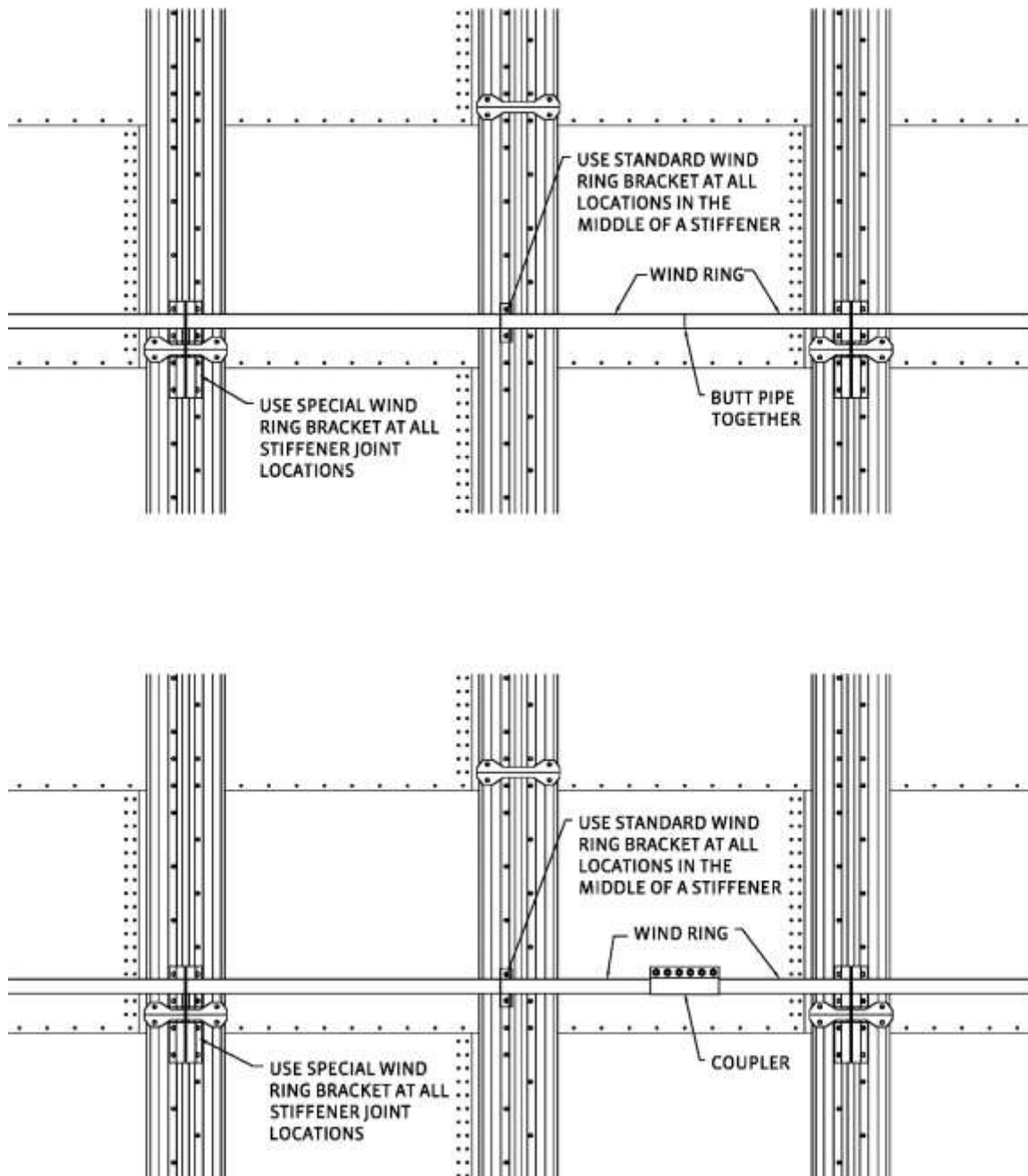
To install a wind ring package:

1. Determine the proper location for the first or top wind ring. Install wind rings in a counter clockwise direction, working from the exterior of the bin.
2. Bolt the appropriate wind ring bracket to the sidewall stiffener holes as shown in the previous illustration. Use the stiffener attachment bolts and whiz flange nuts.

Important Note: Brackets may be installed below stiffener endcaps to provide additional clearance between ladders and platforms if required. Install brackets in a counter clockwise sequence.

3. When 4 wind ring brackets have been installed, slide the 1st wind ring segment through the hole in the 4 brackets, leaving a 29" (73.66cm) portion of the wind ring tube extending past the last bracket.
4. Bolt 4 more additional brackets in place and slide the next wind ring tube through the brackets. Position the end of this tube segment against the end of the previous tube segment.
5. After verifying that the ends of the pipe are flush to each other, connect the wind ring tube segments together using a pipe coupler. Fully tighten the hardware in the pipe coupler.
6. Repeat the previous steps until all wind ring segments have been installed. The last wind ring tube segment will need to be field cut to length prior to mounting. Verify that all hardware is securely fastened on all pipe couplers.

Important Note: Some wind ring tube segments may require field cutting to allow the coupler to be positioned correctly between sidewall stiffeners.



Maintenance Instructions

- Roof
 - An annual inspection of the roof structure should be made to verify there are no holes in the roof panels and that all connections are completely sealed. If leaks should occur, apply weatherproof sealant in the area of concern.
- Sidewall
 - An annual inspection of the sidewall should be made. If leaks should occur, apply weatherproof sealant in the area of concern. If spoilage has occurred, thoroughly clean all surfaces. If oxidation is present, remove the oxidation and apply corrosion resistant paint.
 - An annual inspection of the sidewall structure should be made to verify bolts are tight and torque recommendation maintained, and that washer heads have maintained a proper seal. Re-tighten hardware as required.
- Base
 - Inspect the base as often as possible for spoilage, as this is a direct indication of excess moisture. If spoilage has occurred, thoroughly clean all surfaces. If oxidation is present, remove the oxidation and apply corrosion resistant paint. After the paint has dried, apply base sealant to the affected area.
- Doors
 - Inspect the door and manholes as often as possible to verify a proper seal is maintained.
- Decals
 - Verify all warning decals are installed in the proper locations. Replace all damaged or unreadable warning decals.

Important Note: All anchor bolts must be re-tightened after the bin has been filled to capacity for the first time.



Should you have any questions concerning assembly instructions, parts or drawings, please feel free to contact us at any of the following.

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