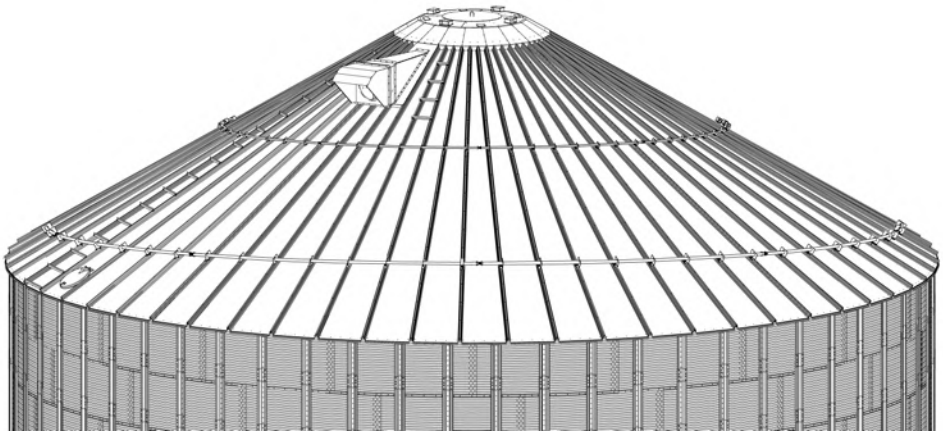


60' Diameter

Models:

EVO-50 4" Z-TEK ROOF BINS - 11 RINGS AND TALLER

Construction Manual

PNEG-5460

Version 3.0

Date: 04-06-23

PNEG-5460

All information, illustrations, photos, and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

Contents

NOTES

1 Safety Precautions

Topics Covered in this Chapter

- Safety Guidelines
- Cautionary Symbol Definitions
- Safety Cautions
- Safety Decals
- Safety Sign-Off Sheet

Safety Guidelines

Safety guidelines are general-to-specific safety rules that must be followed at all times. This manual is written to help you understand safe operating procedures and problems that can be encountered by the operator and other personnel when using this equipment. Read and save these instructions.

As owner or operator, you are responsible for understanding the requirements, hazards, and precautions that exist and to inform others as required. Unqualified persons must stay out of the work area at all times.

Alterations must not be made to the equipment. Alterations can produce dangerous situations resulting in SERIOUS INJURY or DEATH.

This equipment must be installed in accordance with the current installation codes and applicable regulations, which must be carefully followed in all cases. Authorities having jurisdiction must be consulted before installations are made.

When necessary, you must consider the installation location relative to electrical, fuel and water utilities.

Personnel operating or working around equipment must read this manual. This manual must be delivered with equipment to its owner. Failure to read this manual and its safety instructions is a misuse of the equipment.

ST-0001–4

Cautionary Symbol Definitions

Cautionary symbols appear in this manual and on product decals. The symbols alert the user of potential safety hazards, prohibited activities and mandatory actions. To help you recognize this information, we use the symbols that are defined below.

Table 1-1 *Description of the different cautionary symbols*

Symbol	Description
	This symbol indicates an imminently hazardous situation which, if not avoided, **will result in serious injury or death.**
	This symbol indicates a potentially hazardous situation which, if not avoided, **can result in serious injury or death.**
	This symbol indicates a potentially hazardous situation which, if not avoided, **can result in minor or moderate injury.**
	This symbol is used to address practices not related to personal injury.
	This symbol indicates a general hazard.
	This symbol indicates a prohibited activity.
	This symbol indicates a mandatory action.

ST-0005–2

Safety Cautions

Use Personal Protective Equipment

- Use appropriate personal protective equipment:

Eye Protection

Respiratory Protection

Foot Protection

Hearing Protection

Head Protection

Fall Protection

Hand Protection

- Wear clothing appropriate to the job.
- Remove all jewelry.
- Tie long hair up and back.

ST-0004–1

Follow Safety Instructions

- Carefully read all safety messages in this manual and safety signs on your machine. Keep signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from the manufacturer.
- Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.
- If you do not understand any part of this manual or need assistance, contact your dealer.

ST-0002–1

Maintain Equipment and Work Area

- Understand service procedures before doing work. Keep area clean and dry.
- Never service equipment while it is operating. Keep hands, feet, and clothing away from moving parts.
- Keep your equipment in proper working condition. Replace worn or broken parts immediately.

ST-0003–1

Do Not Enter Bin

- Rotating flighting will kill or dismember.
- Flowing material will trap and suffocate.
- Crusted material will collapse and suffocate.

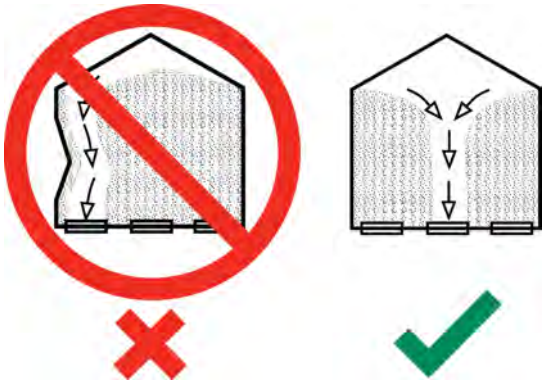
— If you must enter the bin:

1. Shut off and lock out all power sources.
2. Use a safety harness and safety line.
3. Station another person outside the bin.
4. Avoid the center of the bin.
5. Wear proper breathing equipment or respirator.

ST-0061–1

Unload the Bin Correctly

- Use CENTER FLOOR OUTLET ONLY until NO grain remains above this outlet.
- Side floor outlets to be used ONLY when above condition is satisfied.
- Lock all side floor outlets to avoid accidental premature use.
- See manufacturers instructions for proper use of factory supplied sidedraw (wall) discharge systems.



ST-0060–1

Prevent Roof Damage Due to Vacuum Pressure

- Roof damage can result from excessive vacuum or internal pressure from fans or other air moving systems. The manufacturer does not warrant this type of roof damage.
- Adequate ventilation or “makeup air” devices must be provided for all powered air handling systems.
- The manufacturer does not recommend the use of downward flow systems (suction).
- Severe roof damage can result from any blockage of air passages.
- Operating fans during high humidity or cold weather conditions can cause air exhaust or intake ports to freeze.

ST-0028–2

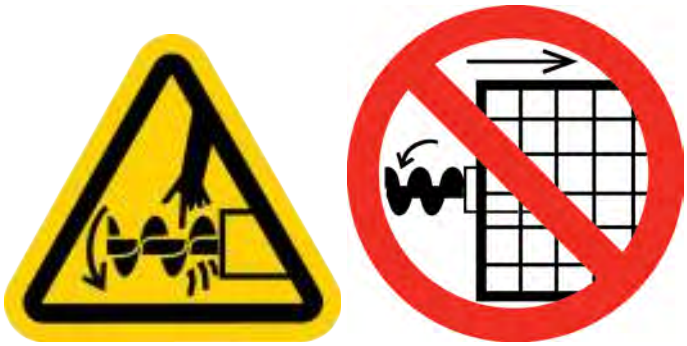
Sharp Edge Hazard

- This product has sharp edges, which can cause serious injury.
- To avoid injury, handle sharp edges with caution and always use proper protective clothing and equipment.

ST-0036–2

Rotating Auger Hazard

- Keep clear of rotating augers and moving parts.
- Do not remove or modify guards or covers.
- Lock-out power source before making adjustments, cleaning, or maintaining equipment.
- Failure to follow these precautions will result in serious injury or death.



ST-0037–1

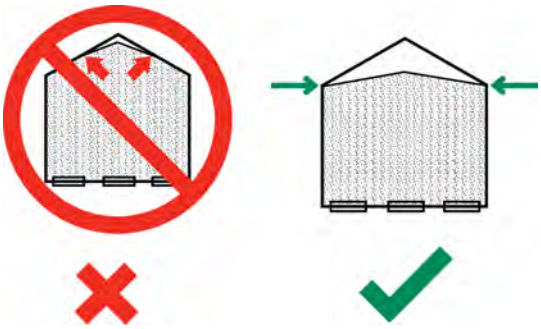
Stay Clear of Hoisted Equipment

- Always use proper lifting or hoisting equipment when assembling or disassembling equipment.
- Do not walk or stand under hoisted equipment.
- Always use sturdy and stable supports when needed for installation. Not following these safety precautions creates the risk of falling equipment, which can crush personnel and cause serious injury or death.

ST-0047–1

Do Not Overfill the Bin

- Do not overfill bin. Stored grain must be no higher than the roof eaves at the outer edge.
- Filling the bin above this point creates excessive internal pressure and can cause swelling and eventual roof failure. The over filling of a bin can also cause the blockage of roof vents and eaves, which will lead to a build-up of air pressure causing roof damage.



ST-0050–1

Install and Operate Equipment Properly

- This product is intended for the use of grain storage only. Any other use is a misuse of the product.

ST-0057–1

Store Bin Sheets Properly

- Sidewall bundles or sheets must be stored in a safe manner. The safest method of storing sidewall bundles is by laying them horizontally with the arch of the sheet upward, like a dome.
- Sidewall sheets stored on edge must be secured so that they cannot fall over and cause injury.
- Use care when handling and moving sidewall bundles.

ST-0058–2

Confined Space Hazards and Entry Procedures

- Note that the interior of this equipment is considered a confined space. Maintenance of this equipment can require access to the confined space.
- Access doors must be shut and locked except when access is required.
- Doors giving access to dangerous equipment must be safety interlocked.
- The following entry procedures must be followed:
  - — Be aware of all possible hazards present inside the confined space and wear personal protective equipment (PPE) as needed.
  - — Complete a permit to work and follow all permit required confined space entry procedures defined by the site manager.
  - — Make sure that the area has been purged of any hazardous products or gases.Check the atmosphere for harmful gases or vapors with a suitable gas analyzer and make sure levels are safe before entering.
  - — Do not smoke or use naked flames.
  - — Lock out and tag out power supplies and fuel supplies to all equipment.
  - — Do not work alone.Work in teams of at least three so that help is immediately available in the event of an emergency.
  - — Confirm that all personnel have safely exited the equipment and tools have been recovered once work is complete.

ST-0055–1

Safety Decals

The safety decals on your equipment are safety indicators which must be carefully read and understood by all personnel involved in the installation, operation, service and maintenance of the equipment.

To replace a damaged or missing decal, contact us to receive a free replacement.

GSI Decals

1004 E. Illinois Street
Assumption, IL 62510
Phone: 1–217–226–4421

Location	Decal No.	Decal	Description
Located next to aeration system.	DC-969		Caution Vacuum Pressure
On bin doors and roof hatch covers	DC-2483		Warning Entrapment Hazard

Location	Decal No.	Decal	Description
On bin door covers	DC-GBC-1A		Warning Keep Clear of Augers
On bin door covers	DC-GBC-2A		Warning Unload Instructions

Safety Sign-Off Sheet

Below is a sign-off sheet that can be used to verify that all personnel have read and understood the safety instructions. This sign-off sheet is provided for your convenience and personal record keeping.

Date	Employee Name	Supervisor Name

ST-0007

2 General Overview

Topics Covered in this Chapter

- General Information
- Tools Required for Construction
- Guidelines for Proper Storage of Grain Bin Materials Prior to Construction
- Overview for a Typical Bin Installation
- Guidelines for Construction Procedures and Lifting Jack Usage
- Anchor Bolt Detail
- Anchor Bolt Charts

General Information

General information, overview and instructions needed before performing work.

Read this manual carefully. This manual will provide instructions on building the sidewall and stiffeners. You will also need to refer other instructions in building the bin.

These include, but may not be limited to:

- A stiffener and sidewall gauge layout chart is required. If such a chart is not included with this manual, contact GSI.
- Roof instructions must be followed. Roof instructions are included in this manual.
- Ladders, roof stairs, roof handrails and other products are covered by separate instruction manuals. Refer to the appropriate accessory manual. Inside ladder instructions are included in this manual.
- Aeration systems and transitions are to be installed according to the instructions provided with the system or transition.
- It is critical that the anchor bolts are installed and spaced correctly.

Tools Required for Construction

General tools needed to perform this construction:

- Combination wrench set 7/16" to 1"
- Combination wrenches for 17 mm and 19 mm
- Alignment punches 12" long
- 1/2" Drive socket set and ratchet
- Nail aprons or tool pouches to hold supplies
- Gloves for hand protection
- Tape measure
- 1/2" Drive electric or pneumatic torque gun with variable impact capabilities

- 1/2" Drive impact socket set
- Lifting jacks
- Center pole roof support
- Step ladders
- Large C-clamp or welding V-grip for clamping

NOTE: *Quantities required will depend on the number of workers and size of the bin.*

Guidelines for Proper Storage of Grain Bin Materials Prior to Construction

Storage of the build materials prior to construction is important. Do not to allow moisture to remain between sheets or panels.

- Wet storage stain (rust) will develop when closely packed bundles of galvanized material, such as sidewall and roof sheets, have moisture present. Inspect roof and sidewall bundles on arrival for any moisture. If moisture is present, it must not be allowed to remain between the sheets. Separate the sheets or panels immediately and wipe them down. Spray with a light oil or diesel fuel.
- If possible, sidewall bundles, roof sheets and other closely packed galvanized materials should be stored in a dry, climate controlled building. If outdoor storage is unavoidable, the materials should be stored so that they are raised above the ground and vegetation. Any stacking and spacing materials should not be corrosive or wet. Be sure to protect materials from the weather, but permit air movement around the bundles if possible.
- Storing roof bundles and sidewall sheets at a slight incline can also help minimize the presence of moisture. Storing the bundles with the center of the dome up (like an arch) is one option for minimizing moisture during storage. Sidewall bundles can also be stored on edge but must be secured so that they do not fall over and cause injury.
- If “white rust” or “wet storage stain” occurs, contact the manufacturer immediately about ways to minimize the adverse effect upon the galvanized coating.

Overview for a Typical Bin Installation

These are the typical steps one would perform when constructing a grain bin. Procedures may vary depending on the site requirements.

Pre-Assembly Activities

- Sorting and grouping parts.
- Install the wind ring bracket to the stiffeners.
- Assemble the rafter clips to rafters on the ground.
- Assemble the A-frames.
- Assemble the center collar.
- Install the vent to the roof panels.

Assembly

- Build one ring of sidewall and make sure to caulk all seams.
- Add top outside stiffeners and inside stiffeners at the same time to the rings of the sidewall sheets

  NOTE: *These top stiffeners are the lightest gauge stiffeners and will get heavier as the bin is raised. Therefore, the heaviest stiffeners are located at the bottom of the bin and are installed last.*
- Install the wind ring to help support the rings.
- Install the center collar tower support in the center of the bin.
- Install the eave brackets to the inside stiffeners.
- Install the eave angles to the sidewall sheets. (Note how these are aligned.)
- Install the tension member and/or compression channels to the eave brackets.
- Lift the pre-assembled A-frames, installing them in “opposite pairs” (across from one another) to balance out the load as you install.
- Install the roof panels.
- Cut roof exhauster holes evenly spaced in roof panels.
- Install the roof flashing and peak cap.

Guidelines for Construction Procedures and Lifting Jack Usage

The following procedure is a guideline when using a lifting jack. Follow this general guideline when lifting the bin as sidewall sheets are being installed.

NOTE: *The roof and the top ring for odd ringed bins or the roof and 2 rings for even ringed bins, will be installed prior to the beginning of bin lifting procedures. Refer to all other procedures on sidewall and stiffener installation prior to the start of construction.*

IMPORTANT: *Begin building with the bin oriented for doors and material handling equipment to be in the correct position when bin construction is complete.*

1. Consider the starting location of the bin, relative to the location of the doors and other accessories. Proper placement of lifting jacks in relationship to anchor bolts could make a difference in final locations. Note that the sidewall sheets will be staggered.
2. The bin is lifted by the use of lifting jacks. Lifting jacks are used to slowly and evenly lift the bin during construction. Lifting jacks must be properly sized and designed to carry all loads and job site conditions associated with the construction of the bin.
   - The number of lifting jacks required is best determined by personal experience and expertise. Factors such as bin size, jack design, construction conditions, support surface, etc., are all to be considered when deciding how many to use. If in doubt, use one jack on every sheet.
   - The lifting jack must be adequate to carry all loads. Heavy duty jacks, generally hydraulic or electric powered in the case of large bins, should be used for commercial installation. All jacks should be secured with braces or otherwise maintained in a stable condition.
   - Lifting of the bins should not be done under windy conditions.
   - Follow the jack manufacturers recommendations on capacity and operations.

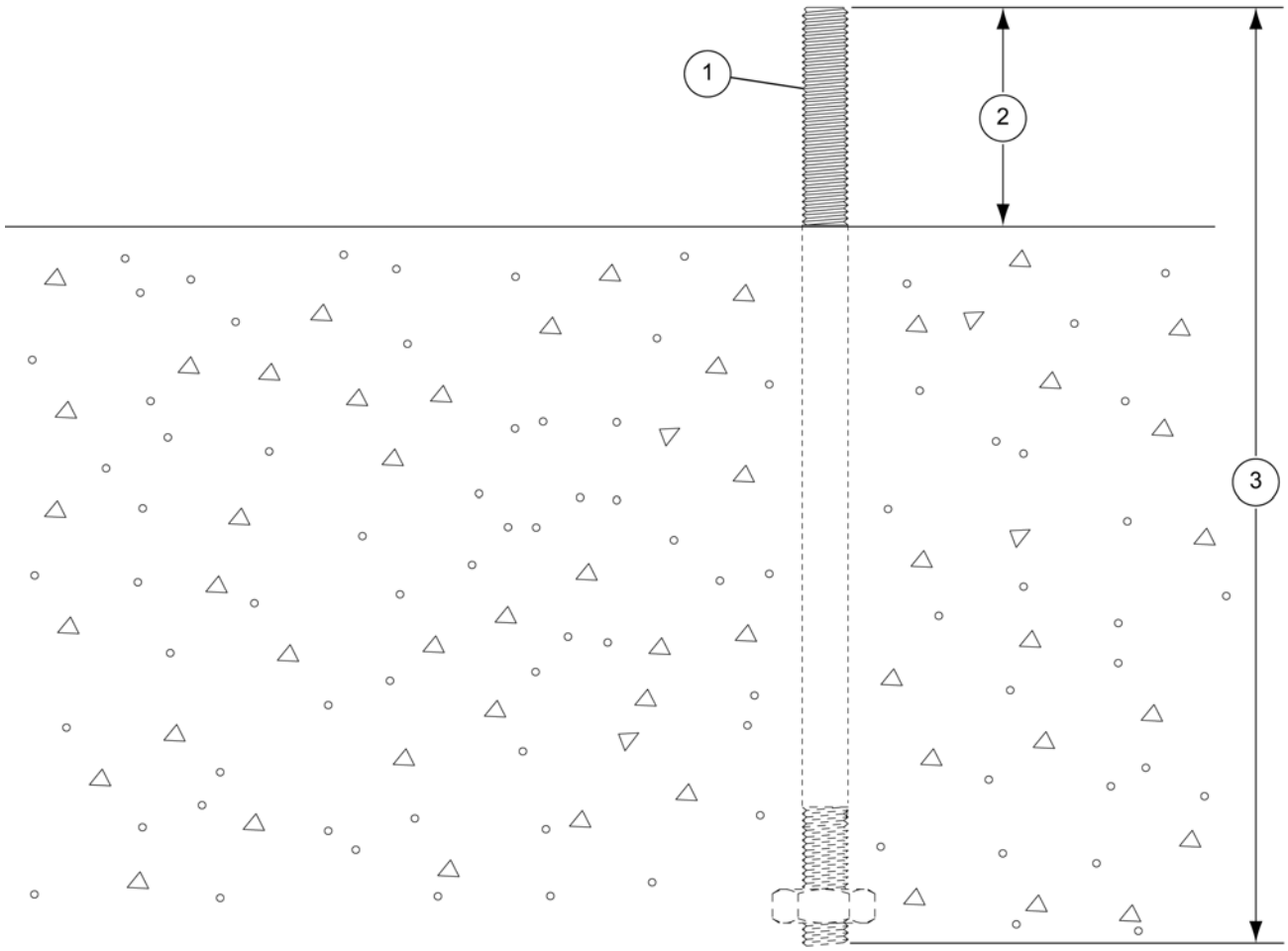
3. Lifting brackets should be attached through the stiffener bolt holes. Normally you will need to attach at least four bolts per stiffener.
4. Raise the bin just high enough to assemble the next ring. When lifting the bin, **all jacks must lift at an equal rate**. Monitor the lift to ensure even lifting is occurring.
5. To the **inside** of the first ring, bolt the next ring. Be sure to **stagger** the sheets and select the proper gauge material.
6. Lower the bin onto the foundation after assembling and tightening bolts on the new ring or rings.
7. Attach stiffeners to the body sheets every two tiers (on the external surface of the bin). You may want to leave sheets loose to make the attachment of the stiffeners easier.
8. Now re-bolt the lifting brackets to the lowest ring in place thus far. Continue ring additions by repeating step *5, page 20* and step *6, page 20*.
9. Add inside and outside ladders as you continue to raise the bin. (Refer to the manual supplied with the ladders and platforms.)
10. Add platforms as you raise the bin. (Refer to the manual supplied with the ladders and platforms.)
11. Lower the tank and secure to the foundation before leaving the job site.
12. At the completion of the tank, set stiffeners over the anchor bolts and measure the tank to ensure it is in a round condition. Consult with GSI for questions on tolerances.

Anchor Bolt Detail

The following is the minimum requirement for anchoring of standard tanks.

- 3/4" diameter anchor bolt (1) is the minimum allowed, 1" diameter anchor bolt (1) is the minimum with sidedraw flume system.
- Exposed anchor bolt thread height (2) is 5" (12.7 cm).
- Overall anchor bolt length (3) for 3/4" and 1" diameter anchor bolt is 18" (45.72 cm).

Figure 2-1 *Anchor bolt example (3/4" diameter anchor bolt shown)*



1	Anchor bolt	3	Anchor bolt length
2	Anchor bolt thread height		

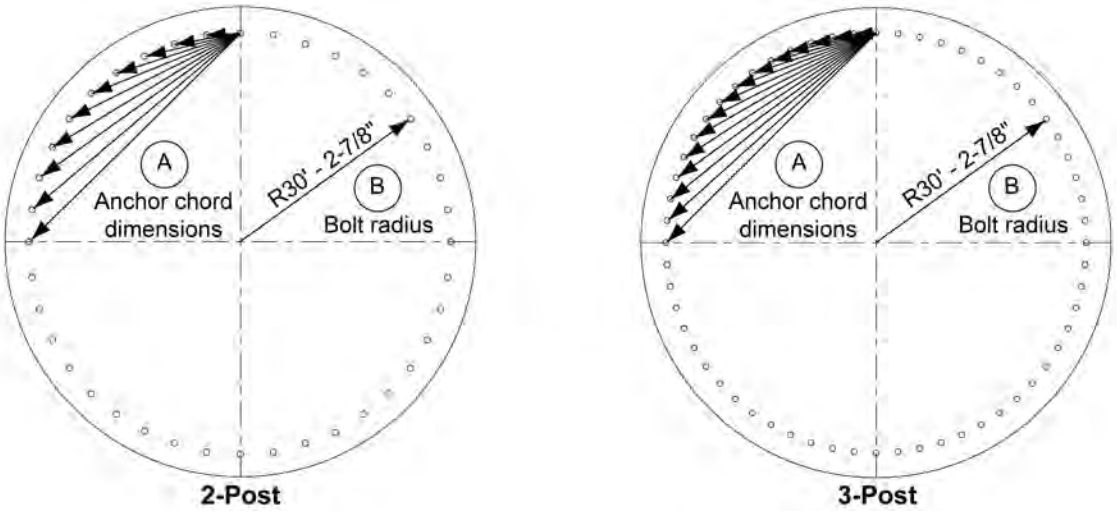
Anchor Bolt Charts

Prior to setting any anchor bolts, you must be sure to have the correct anchor bolt placement. This is very critical for stiffener alignment during bin erection.

NOTE: *Refer to proper chart to find the anchor chord dimensions that correspond to the bin that is being built.*

Scribe the radius location of the anchor bolts by using a center stake and a straight 2 x 4. Along the scribed radius, start with one anchor bolt and work counterclockwise to locate one quarter of the anchor bolts then clockwise to locate another quarter of the anchor bolts. Working off of the last anchor bolts in each quarter, locate the remaining anchor bolts in the last two quarters.

Figure 2-2 *Anchor bolt chords for 60' diameter*



Diameter	60' (2-Post)		60' (3-Post)	
# of Anchors	40		60	
Bolt Radius	30' – 2-7/8"	9.217 m	30' – 2-7/8"	9.217 m
Chord 1	4' – 9"	1.448 m	3' – 2"	0.965 m
Chord 2	9' – 5-1/2"	2.883 m	6' – 3-7/8"	1.927 m
Chord 3	14' – 1-7/16"	4.304 m	9' – 5-9/16"	2.884 m
Chord 4	18' – 8-5/16"	5.698 m	12' – 6-15/16"	3.834 m
Chord 5	23' – 1-3/4"	7.055 m	15' – 7-7/8"	4.772 m
Chord 6	27' – 5-1/2"	8.369 m	18' – 8-5/16"	5.698 m
Chord 7	31' – 7-1/4"	9.633 m	21' – 8-1/8"	6.607 m
Chord 8	35' – 6-5/8"	10.836 m	24' – 7-1/4"	7.499 m
Chord 9	39' – 3-3/8"	11.973 m	27' – 5-1/2"	8.369 m
Chord 10	42' – 9-3/16"	13.035 m	30' – 2-15/16"	9.219 m
Chord 11	–	–	32' – 11-5/16"	10.041 m
Chord 12	–	–	35' – 6-5/8"	10.836 m
Chord 13	–	–	38' – 3/4"	11.601 m
Chord 14	–	–	40' – 5-11/16"	12.336 m
Chord 15	–	–	42' – 9-1/4"	13.037 m

3 Hardware Requirements

Topics Covered in this Chapter

- Bolt and Nut Pairings
- Hardware for 2-Post Sidewall Sheets
- Hardware for 3-Post Sidewall Sheets
- Bolt Torque Specifications
- Identifying Bolt Grades
- Color Chart for Bin Hardware Buckets
- Bolt and Nut Identifications

Bolt and Nut Pairings

This chart lists shows the correct nut to use with each size of bolt.

Nut Part Number	Nut Size	Nut Type	Hex or Flanged (Nut)	Bolt Size	Bolt Part Number
S-3611	5/16"	YDP	Flanged	5/16" x 1"	S-10260
S-9426	3/8"	JS	Flanged	3/8" x 1"	S-7485
				3/8" x 1"	S-7487
				3/8" x 1-1/2"	S-7488
S-9281	7/16"	JS	Hex	7/16" x 3-1/4"	S-10261
S-10251	7/16"	YDP	Flanged	7/16" x 1-1/4"	S-10250
				7/16" x 2"	S-10381
S-10784	M10	-	Flanged	M10 x 25	S-10779

Hardware for 2-Post Sidewall Sheets

Refer to the below chart for the hardware requirements for 2-post sidewall sheets on commercially stiffened bins that are 21'-78' in diameter.

Table 3-1 *Hardware for 2-post sidewall sheets*

Gauge	Horizontal Seam Bolt Size (Quantity)	Vertical Seam Bolt Size (Quantity)	Stiffener to Sidewall Bolt Size (Quantity)	Overlap Seam Bolt Size (Quantity)
20	M10 x 25 (10)	M10 x 25 (42)	M10 x 40 (18)	M10 x 25 (3)
19	M10 x 25 (10)	M10 x 25 (42)	M10 x 40 (18)	M10 x 25 (3)
18	M10 x 25 (10)	M10 x 25 (42)	M10 x 40 (18)	M10 x 25 (3)
17	M10 x 25 (10)	M10 x 25 (42)	M10 x 40 (18)	M10 x 25 (3)
16	M10 x 25 (10)	M10 x 25 (42)	M10 x 40 (18)	M10 x 25 (3)
15	M10 x 25 (10)	M10 x 25 (42)	M10 x 40 (18)	M10 x 25 (3)
14	M10 x 25 (18)	M10 x 25 (42)	M10 x 40 (18)	M10 x 40 (3)
13.5	M10 x 25 (18)	M10 x 25 (42)	M10 x 40 (18)	M10 x 40 (3)
13	M10 x 25 (18)	M10 x 25 (42)	M10 x 40 (18)	M10 x 40 (3)
12	M10 x 25(18)	M10 x 25 (42)	M10 x 40 (18)	M10 x 40 (3)
11	M10 x 25 (18)	M10 x 25 (42)	M10 x 40 (18)	M10 x 40 (3)
10	M10 x 25 (18)	M10 x 25 (42)	M10 x 40 (18)	M10 x 40 (3)
14 Double Lam	M10 x 40 (18)	M10 x 40 (42)	M10 x 40 (18)	M10 x 40 (3)
13.5 Double Lam	M10 x 40 (18)	M10 x 40 (42)	M10 x 40 (18)	M10 x 40 (3)
13 Double Lam	M10 x 40 (18)	M10 x 40 (42)	M10 x 40 (18)	M10 x 40 (3)
12 Double Lam	M10 x 40 (18)	M10 x 40 (42)	M10 x 40 (18)	M10 x 40 (3)
11 Double Lam	M10 x 40 (18)	M10 x 40 (42)	M10 x 40 (18)	M10 x 40 (3)
10 Double Lam	M10 x 40 (18)	M10 x 40 (42)	M10 x 40 (18)	M10 x 40 (3)
9 Double Lam	M10 x 40 (18)	M10 x 40 (53)	M10 x 60 (18)	M10 x 60 (9)

Hardware for 3-Post Sidewall Sheets

Refer to the below chart for the hardware requirements for 3-post sidewall sheets on commercially stiffened bins that are 21'-78' in diameter.

Table 3-2 *Hardware for 3-post sidewall sheets*

Gauge	Horizontal Seam Bolt Size (Quantity)	Vertical Seam Bolt Size (Quantity)	Stiffener to Sidewall Bolt Size (Quantity)	Overlap Seam Bolt Size (Quantity)
20	M10 x 25 (11)	M10 x 25 (42)	M10 x 40 (27)	M10 x 25 (3)
19	M10 x 25 (11)	M10 x 25 (42)	M10 x 40 (27)	M10 x 25 (3)
18	M10 x 25 (11)	M10 x 25 (42)	M10 x 40 (27)	M10 x 25 (3)
17	M10 x 25 (11)	M10 x 25 (42)	M10 x 40 (27)	M10 x 25 (3)
16	M10 x 25 (11)	M10 x 25 (42)	M10 x 40 (27)	M10 x 25 (3)
15	M10 x 25 (11)	M10 x 25 (42)	M10 x 40 (27)	M10 x 25 (3)
14	M10 x 25 (18)	M10 x 25 (42)	M10 x 40 (27)	M10 x 40 (3)
13.5	M10 x 25 (18)	M10 x 25 (42)	M10 x 40 (27)	M10 x 40 (3)
13	M10 x 25 (18)	M10 x 25 (42)	M10 x 40 (27)	M10 x 40 (3)
12	M10 x 25 (18)	M10 x 25 (42)	M10 x 40 (27)	M10 x 40 (3)
11	M10 x 25 (18)	M10 x 25 (42)	M10 x 40 (27)	M10 x 40 (3)
10	M10 x 25 (18)	M10 x 25 (42)	M10 x 40 (27)	M10 x 40 (3)
14 Double Lam	M10 x 40 (18)	M10 x 40 (42)	M10 x 40 (27)	M10 x 40 (3)
13.5 Double Lam	M10 x 40 (18)	M10 x 40 (42)	M10 x 40 (27)	M10 x 40 (3)
13 Double Lam	M10 x 40 (18)	M10 x 40 (42)	M10 x 40 (27)	M10 x 40 (3)
12 Double Lam	M10 x 40 (18)	M10 x 40 (42)	M10 x 40 (27)	M10 x 40 (3)
11 Double Lam	M10 x 40 (18)	M10 x 40 (42)	M10 x 40 (27)	M10 x 40 (3)
10 Double Lam	M10 x 40 (18)	M10 x 40 (42)	M10 x 40 (27)	M10 x 40 (3)
9 Double Lam	M10 x 40 (18)	M10 x 40 (53)	M10 x 60 (27)	M10 x 60 (9)
8 Double Lam	M10 x 40 (18)	M10 x 40 (53)	M10 x 60 (27)	M10 x 60 (9)
7 Double Lam	M10 x 40 (18)	M10 x 40 (53)	M10 x 60 (27)	M10 x 60 (9)
6 Double Lam	M10 x 40 (18)	M10 x 40 (53)	M10 x 60 (27)	M10 x 60 (9)
5 Double Lam	M10 x 40 (18)	M10 x 40 (53)	M10 x 60 (27)	M10 x 60 (9)
9 Triple Lam	M10 x 60 (18)	M10 x 60 (53)	M10 x 60 (27)	M10 x 60 (9)
8 Triple Lam	M10 x 60 (18)	M10 x 60 (53)	M10 x 60 (27)	M10 x 60 (9)
7 Triple Lam	M10 x 60 (18)	M10 x 60 (53)	M10 x 60 (27)	M10 x 60 (9)
6 Triple Lam	M10 x 60 (18)	M10 x 60 (53)	M10 x 60 (27)	M10 x 75 (9)
5 Triple Lam	M10 x 60 (18)	M10 x 60 (53)	M10 x 60 (27)	M10 x 75 (9)

Bolt Torque Specifications

The torque specification table below will help the installer determine how tight a specific bolt must be. A bolt that has been over tightened can be just as dangerous as one that hasn't been tightened enough.

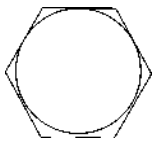
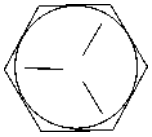
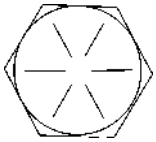
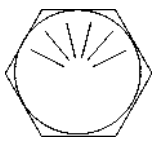
IMPORTANT: *Bolts should not be tightened in excess of the torque specifications as listed in the below chart.*

Bolt	Minimum Torque				Maximum Torque			
	Sealing Joints (joints with sealing washers)		Structural Joints (joints without sealing washers)		Sealing Joints (joints with sealing washers)		Structural Joints (joints without sealing washers)	
	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m	ft-lb	N-m
5/16"-18 JS Grade 8 with seal M8 Grade 10.9 with seal	20	27	—	—	25	34	—	—
3/8"-16 JS Grade 8 with seal M10 Grade 10.9 with seal	30	41	—	—	35	47	—	—
7/16"-14 JS Grade 8 with seal	50	68	—	—	60	81	—	—
3/8"-16 YDP Grade 8 flanged M10 Grade 10.9 flanged	—	—	40	54	—	—	45	61
7/16"-14 YDP Grade 8 flanged	—	—	65	88	—	—	72	97
1/2"-13 YDP Grade 8 flanged	—	—	100	135	—	—	110	149

Identifying Bolt Grades

Bolts are identified by grade (or hardness). The grade can be identified by the markings on the head of the bolt. These markings will be in the form of slash marks and patterns. Use the following as a guide to determine the correct bolt grade.

Under no condition shall any other bolts be substituted for those supplied by GSI.

Grade 2 Bolts Grade 2 bolts are designated with a plain head and are not used in GSI grain bins.	
Grade 5 Bolts Grade 5 bolts are designated by three slash marks on the head. All 5/16" diameter bolts are to be grade 5 or higher.	
Grade 8 Bolts Grade 8 bolts are designated by six slash marks evenly spaced out around the head of the bolt. All 3/8", 7/16" and 1/2" diameter bolts are to be grade 8 or grade 8.2.	
Grade 8.2 Bolts Grade 8.2 bolts are designated by six slash marks on the head in a sunrise pattern. All 3/8", 7/16" and 1/2" diameter bolts are to be grade 8 or grade 8.2.	

NOTE: *Refer to 4.00" tank bolting requirements for complete bolt usage.*

Color Chart for Bin Hardware Buckets

For ease of identification, hardware is separated and identified by buckets with color coded lids or labels. Use the following chart to help identify the correct hardware.

JS Part #	YDP Part #	Color	Hardware Qty./ Bucket	Lid/ Label Color	Description
S-10260	NA	*Lime Green*	1250		5/16" x 1" bolt pre-assembled with sealing washer
S-7483	NA	*Black*	1000		5/16" x 1-1/4" bolt pre-assembled with sealing washer
NA	S-396	*Red*	5000		5/16" hex nut
S-10268	S-3611	*Gold*	3500		5/16" flange nut
S-7487	NA	*Grey*	850		3/8" x 1" bolt pre-assembled with sealing washer
S-7485	NA	*Light Green*	850		3/8" x 1" flange bolt without sealing washer
S-7488	NA	*Orange*	650		3/8" x 1-1/2" bolt pre-assembled with sealing washer
S-7486	NA	*Dark Brown*	700		3/8" x 1-1/2" flange bolt without sealing washer
NA	S-456	*Yellow*	3000		3/8" hex nut
S-9426	NA	*Purple*	2500		3/8" flange nut
NA	S-10250	*Light Pink*	500		7/16" x 1-1/4" flanged bolt
S-10261	NA	*Natural (Clear)*	200		7/16" x 3-1/4" flange bolt pre-assembled with sealing washer
S-9281	NA	*Fire Orange*	1500		7/16" hex nut
NA	S-10251	*Pink*	1250		7/16" un-serrated flange nut
S-10782	NA	*Light Purple & Red*	750		M10 x 25 flange bolt
S-10779	NA	*Light Blue & Pink*	750		M10 x 25 flange bolt pre-assembled with a conical HDPE sealing washer
S-10780	NA	*Orange & Lime Green*	600		M10 x 40 flange bolt pre-assembled with a conical HDPE sealing washer
S-10781	NA	*Pink & Dark Grey*	350		M10 x 60 flange bolt pre-assembled with a conical HDPE sealing washer
S-10800	NA	*Dark Green & Red*	100		M10 x 75 flange bolt pre-assembled with a conical HDPE sealing washer
S-10784	NA	*Grey & Burgundy*	1500		M10 flange nut
S-10785	NA	*Yellow & Black*	1000		M10 flange nut pre-assembled with a conical HDPE sealing washer

Bolt and Nut Identifications

Use the following information to identify the bolts, nuts and where each must be used during installation.

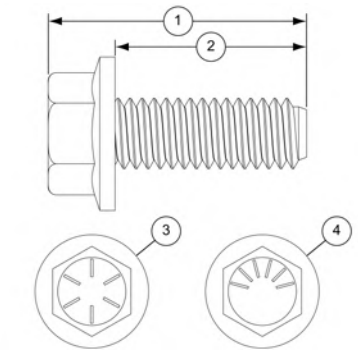
Bolt (S-7485)

An S-7485 is a 3/8" x 1" JS flange bolt without a sealing washer.

Bolt (S-7485) is used in the following locations:

- Use to connect the C-clamps to stiffener or wind ring brackets in wind rings.
- Use to connect the eave bracket to the inside stiffener.
- The color of bucket lid/label is light green.

1	1.375" (3.49 cm)	3	Grade 8
2	1.000" (2.54 cm)	4	Grade 8.2



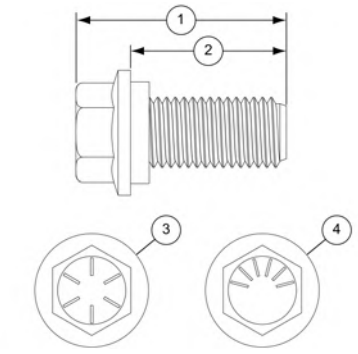
Bolt (S-7487)

An S-7487 is a 3/8" x 1" JS flange bolt that is pre-assembled with a sealing washer.

Bolt (S-7487) is used in the following locations:

- Use to connect the top panel to the center collar brackets.
- Use to connect the cap plate to the inner center collar.
- Use to connect the flashing lock to the top panel.
- The color of bucket lid/label is grey.

1	1.375" (3.49 cm)	3	Grade 8
2	1.000" (2.54 cm)	4	Grade 8.2



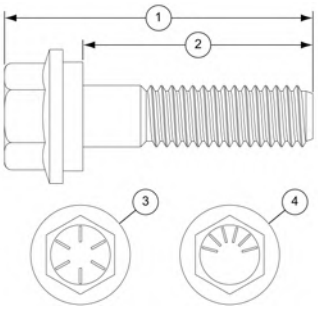
Bolt (S-7488)

An S-7488 is a 3/8" x 1-1/2" JS flange bolt that is pre-assembled with a sealing washer.

Bolt (S-7488) is used in the following locations:

- Use to connect the lower stand-off brackets to the outer center collar.
- Use to connect the stand-off plates and stand-off brackets to the top plate and outer center collar.
- The color of bucket lid/label is orange.

1	1.875" (4.76 cm)	3	Grade 8
2	1.500" (3.81 cm)	4	Grade 8.2

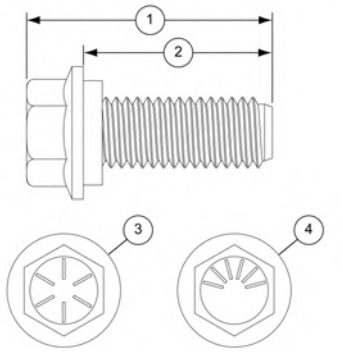


Bolt (S-10260)

An S-10260 is a 5/16" x 1" JS flange bolt that is pre-assembled with a sealing washer.

Bolt (S-10260) is used in the following locations:

- Use to connect the roof panels together, where they overlap.
- Use to connect the eave angle to sidewall sheet.
- Use to connect the roof panels to eave angles.
- Use to connect the roof flashings together, where they overlap.
- Use to connect the roof flashings to the roof panels.
- The color of the bucket lid/label is lime green.



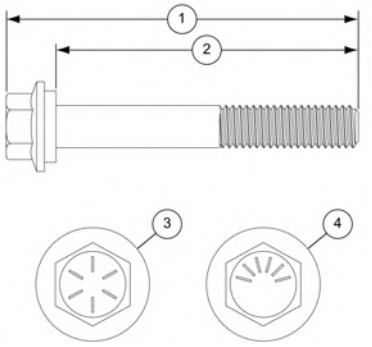
1	1.357" (3.45 cm)	3	Grade 8
2	1.000" (2.54 cm)	4	Grade 8.2

Bolt (S-10261)

An S-10261 is a 7/16" x 3-1/4" JS flange bolt that is pre-assembled with a sealing washer.

Bolt (S-10261) is used in the following locations:

- Use in wind ring splice and over pipe connections.
- The color of the bucket lid/label is natural (clear).



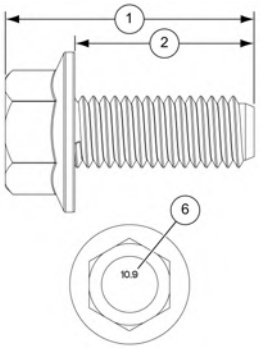
1	3.710" (9.42 cm)	3	Grade 8
2	3.250" (8.26 cm)	4	Grade 8.2

Bolt (S-10782)

An S-10782 is a M10 x 25 flange bolt without a sealing washer.

Bolt (S-10782) is used in the following locations:

- Used in stiffener splice connections.
- The color of bucket lid/label is light purple and red.



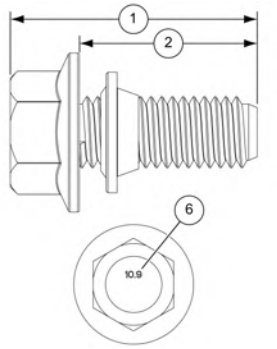
1	1.366" (3.47 cm)	6	Grade 10.9
2	0.984" (2.5 cm)		

Bolt (S-10779)

An S-10779 is a M10 x 25 flange bolt that is pre-assembled with a conical HDPE sealing washer.

Bolt (S-10779) is used in the following locations:

- Use to connect the horizontal, vertical and overlap seams on 20 gauge to 15 gauge sidewall connections.
- Use to connect the base angles to the sidewall sheets.
- Use to connect the horizontal and vertical seams on 14 gauge to 10 gauge sidewall connections.
- The color of bucket lid/label is light blue and pink.



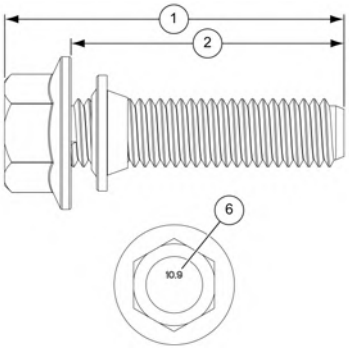
1	1.366" (3.47 cm)	6	Grade 10.9
2	0.984" (2.5 cm)		

Bolt (S-10780)

An S-10780 is a M10 x 40 flange bolt that is pre-assembled with a conical HDPE sealing washer.

Bolt (S-10780) is used in the following locations:

- Use to connect the stiffener with sidewall on 20 gauge to 10 gauge double laminated connections.
- Use to connect the overlap seams on 14 gauge to 10 gauge double laminated sidewall connections.
- Use to connect the horizontal and vertical seams on 14 gauge to 5 gauge double laminated sidewall connections.
- Use to connect the inside stiffener to the sidewall and outside stiffener.
- The color of bucket lid/label is orange and lime green.



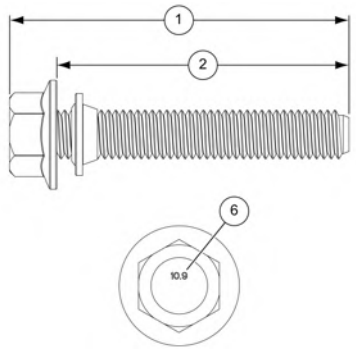
1	1.957" (4.97 cm)	6	Grade 10.9
2	1.574" (4 cm)		

Bolt (S-10781)

An S-10781 is a M10 x 60 flange bolt that is pre-assembled with a conical HDPE sealing washer.

Bolt (S-10781) is used in the following locations:

- Use to connect the overlap seams on 9 gauge to 5 gauge double laminated sidewall connections.
- Use to connect the horizontal, vertical and seams on 9 gauge to 7 gauge triple laminated sidewall connections.
- Use to connect the horizontal and vertical seams on 6 gauge to 5 gauge triple laminated sidewall connections.
- Use to connect the stiffener with sidewall on 9 gauge and heavier laminated connections.
- The color of bucket lid/label is pink and dark grey.



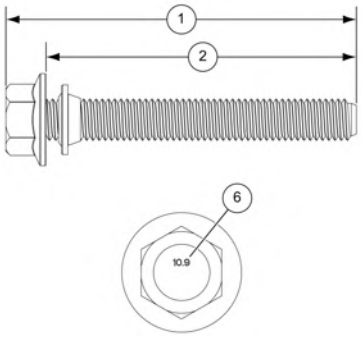
1	2.744" (6.97 cm)	6	Grade 10.9
2	2.362" (6 cm)		

Bolt (S-10800)

An S-10800 is a M10 x 75 flange bolt that is pre-assembled with a conical HDPE sealing washer.

Bolt (S-10800) is used in the following locations:

- Use to connect the overlap seams on 6 gauge and heavier triple laminated sidewall connections.
- The color of bucket lid/label is dark green and red.



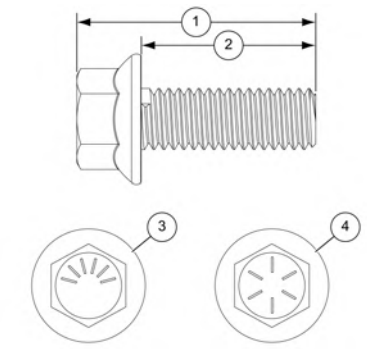
1	3.335" (8.47 cm)	6	Grade 10.9
2	2.952" (7.5 cm)		

Bolt (S-10250)

An S-10250 is a 7/16" x 1-1/4" JS bolt.

Bolt (S-10250) is used in the following locations:

- Use to connect the rafter to the eave bracket.
- Use to connect the roof panel clips to the rafter.
- Use to connect the tension plate and compression member to the eave bracket.
- Use to connect the rafter clips to the rafter.
- Use to assemble the laminated purlins.
- Use to connect the purlin clips to the rafter and purlin to the purlin clips.
- Use to connect the X-bracing to the rafter.
- Use to connect the rafter clips to the center collar.
- The color of the bucket lid/label is light pink.



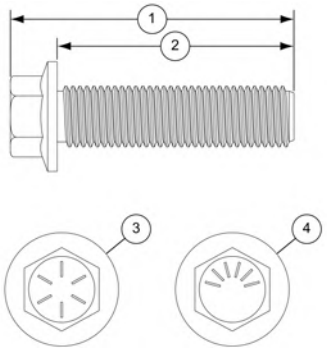
1	1.542" (3.92 cm)	3	Grade 8.2
2	1.250" (3.18 cm)	4	Grade 8

Bolt (S-10381)

An S-10381 is a 7/16" x 2" JS hex bolt with flanged head and without a sealing washer.

Bolt (S-10381) is used in the following locations:

- Use to connect the outer center collar pieces together.
- The color of the bucket lid/label is



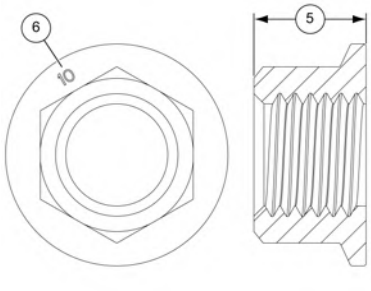
1	2.400" (6.09 cm)	3	Grade 8
2	2.000" (5.08 cm)	4	Grade 8.2

Nut (S-10784)

An S-10784 is a M10 flange nut.

Nut (S-10784) is used in the following locations:

- Use to connect all non-laminated sidewall connections and stiffener splice connections.
- Use to connect the base angles to the sidewall sheets.
- Use to connect the inside stiffener to the sidewall and outside stiffener.



5	0.43" (1.1 cm)	6	Grade 10.9

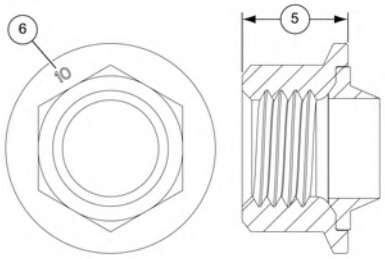
Nut (S-10785)

An S-10785 is a M10 flange nut that is pre-assembled with a conical HDPE sealing washer.

Nut (S-10785) is used in the following locations:

- Used to connect all laminated sidewall connections.

5	0.43" (1.1 cm)	6	Grade 10.9



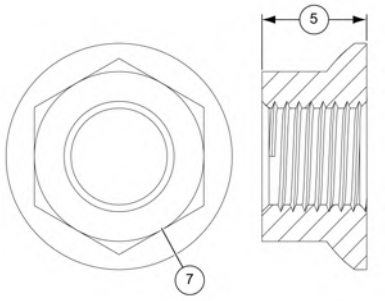
Nut (S-9426)

An S-9426 is a 3/8" flange nut.

Nut (S-9426) is used in the following locations:

- Use to connect the C-clamps to stiffener or wind ring brackets in wind rings.
- Use to connect the eave bracket to the inside stiffener.
- Use to connect the lower stand-off brackets to the outer center collar.
- Use to connect the top panel to the center collar brackets.
- Use to connect the stand-off plates and stand-off brackets to the top plate and outer center collar.
- Use to connect the flashing lock to the top panel.

5	0.347" (0.88 cm)	7	Grade 5



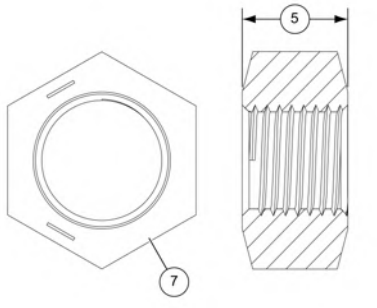
Nut (S-9281)

An S-9281 is a 7/16" hex nut.

Nut (S-9281) is used in the following locations:

- Use in wind ring splice and over pipe connections.

5	0.385" (0.977 cm)	7	Grade 5



NOTES

4 Assembling the Sidewall Sheets

Topics Covered in this Chapter

- Guidelines for Constructing the Sidewall Sheets
- Color Codes for Sidewall Gauge Identification
- Gauge Sheet
- Orientation Detail for Sidewall Sheets (2-Post)
- Orientation Detail for Sidewall Sheets (3-Post)
- References for Sidewall Sheets and Caulks
- Caulking and Assembling the Standard (Non-Laminated) Sheets
- Outer Sheet Caulking Instructions for Laced Lamination
- Lacing Overview of Double Laminated Sidewall Sheets
- Caulking and Assembling the Double Laminated Sheets

Guidelines for Constructing the Sidewall Sheets

1. Before bolting the sidewall sheets together, check for the proper gauge of steel for the first ring. Higher gauge numbers denote the thinner materials. (For example, 20 gauge material is thinner than 14 gauge.)
2. In erecting most grain bins, the thinnest material usually goes on top, therefore the first sidewall ring you assemble will be the top ring of the bin.
3. Check and identify the various gauges of the sidewall with the color code chart given below and begin building accordingly.
4. Assemble the top ring first.

Color Codes for Sidewall Gauge Identification

Refer to the below chart to identify the sidewall gauge based on the color code painted on the corners of the sidewall sheets.

Table 4-1 *Color codes for sidewall gauges*

Sidewall Gauge	Color Code	Sidewall Gauge	Color Code
20	Red	13	Dark Blue and Yellow
19	Black and Yellow	12	Black
18	Orange	11	Pink
17	Light Blue and Pink	10	Light Blue
16	Blue	9	Dark Blue and Orange
15	Red and Brown	8	Yellow and Purple
14	Green	7	Brown
13.5	Brown/Pink		

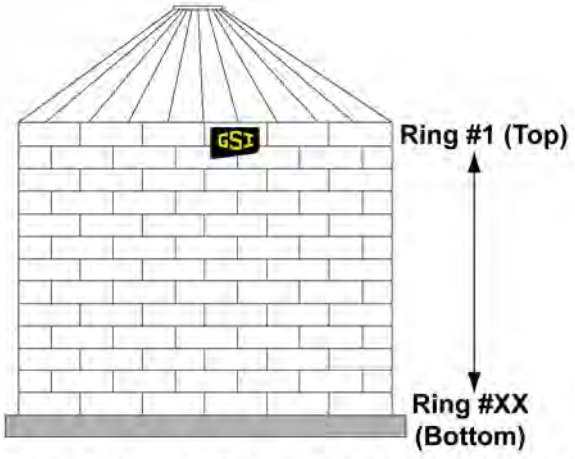
Gauge Sheet

Sidewall and Stiffener Gauge Sheet for 60' Diameter 2-Post Bin

Table 4-2 *Gauge sheet for 60' diameter 2-post (20 rings and shorter)*

Ring #	Gauges																			
	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener
	11 Ring		**12 Ring**		**13 Ring**		**14 Ring**		**15 Ring**		**16 Ring**		**17 Ring**		**18 Ring**		**19 Ring**		**20 Ring**	
1	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
2	17		17	16	17		17	16	17		17	16	17		17	16	17		17	16
3	19	16	19		19	16	19		19	16	19		19	16	19		19	16	19	
4	18		18	16	18		18	16	18		18	16	18		18	16	18		18	16
5	17	14	17		17	15	17		17	14	17		17	14	17		17	14	17	
6	16		16	13	16		16	13	16		16	13	16		16	13	16		16	13
7	15	13	15		15	13	15		15	13	15		15	13	15		15	13	15	
8	14		14	13	14		14	13	14		14	13	14		14	13	14		14	13
9	14	12	14		14	12	14		14	12	14		14	12	14		14	12	14	
10	13.5		13.5	11	13.5		13.5	11	13.5		13.5	11	13.5		13.5	11	13.5		13.5	11
11	13.5	10	13.5		13.5	10	13.5		13.5	10	13.5		13.5	10	13.5		13.5	10	13.5	
12			13	8	13		13	9	13		13	9	13		13	9	13		13	9
13					13	6	13		13	8	13		13	8	13		13	8	13	
14							12	6	12		12	6	12		12	6	12		12	6
15									12	6	12		12	6	12		12	6	12	
16											12	5	12		12	5	12		12	5
17													11	2	11		11	2	11	
18															11	2	11		11	2
19																	11	2+12	11	
20																			11	2+12

Number of stiffener columns: **40**



"XX" indicates the bottom ring for each diameter.

- Standard wind ring location.

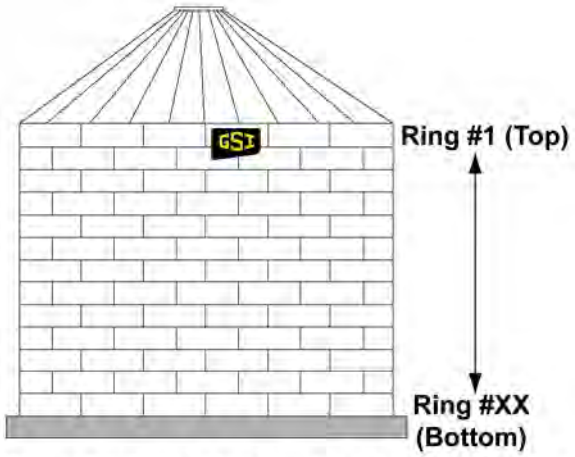
NOTE:

1. *Refer to sidedraw section in this manual for wind ring locations for sidedraw systems.*
2. *1-Ring door weldment in second ring from the bottom of the bin.*

Table 4-3 *Gauge sheet for 60' diameter 2-post (21 rings and taller)*

Ring #	Gauges													
	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener
	21 Ring		22 Ring		23 Ring		24 Ring		25 Ring		26 Ring		27 Ring	
1	16	16	16	16	16	16	16	16	16	16	16	16	16	16
2	17		17	16	17		17	16	17		17	16	17	
3	19	16	19		19	16	19		19	16	19		19	16
4	18		18	16	18		18	16	18		18	16	18	
5	17	14	17		17	14	17		17	14	17		17	14
6	16		16	13	16		16	13	16		16	13	16	
7	15	13	15		15	13	15		15	13	15		15	13
8	14		14	13	14		14	13	14		14	13	14	
9	14	12	14		14	12	14		14	12	14		14	12
10	13.5		13.5	11	13.5		13.5	11	13.5		13.5	11	13.5	
11	13.5	10	13.5		13.5	10	13.5		13.5	10	13.5		13.5	10
12	13		13	9	13		13	9	13		13	9	13	
13	13	8	13		13	6	13		13	6	13		13	6
14	12		12	6	12		12	6	12		12	6	12	
15	12	6	12		12	6	12		12	6	12		12	6
16	12		12	5	12		12	5	12		12	5	12	
17	11	2	11		11	2	11		11	2	11		11	2
18	11		11	2	11		11	2	11		11	2	11	
19	11	2+12	11		11	2+12	11		11	2+12	11		11	2+12
20	11		11	2+12	11		11	2+12	11		11	2+12	11	
21	11	2+12	11		11	2+12	11		11	2+12	11		11	2+12
22			10	2+10	10		10	2+10	10		10	2+10	10	
23					10	2+10	10		10	2+10	10		10	2+10
24							10	2+8	10		10	2+8	10	
25									10	2+6	10		10	2+6
26											10	2+5	10	
27													10	2+2

Number of stiffener columns: **40**



"XX" indicates the bottom ring for each diameter.

- Standard wind ring location.

NOTE:

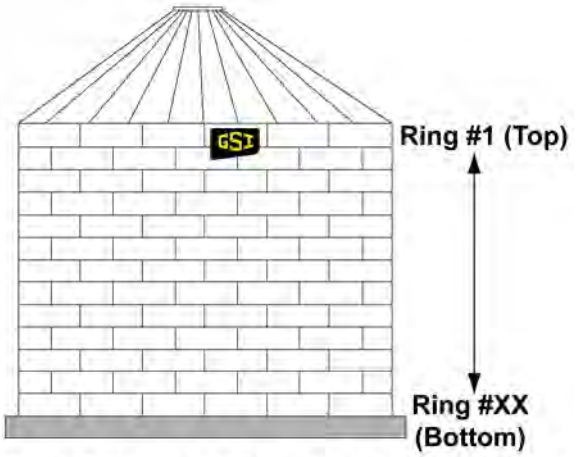
1. *Refer to sidedraw section in this manual for wind ring locations for sidedraw systems.*
2. *1-Ring door weldment in second ring from the bottom of the bin.*

Sidewall and Stiffener Gauge Sheet for 60' Diameter 3-Post Bin

Table 4-4 *Gauge sheet for 60' diameter 3-post (20 rings and shorter)*

Ring #	Gauges																			
	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener
	11 Ring		12 Ring		13 Ring		14 Ring		15 Ring		16 Ring		17 Ring		18 Ring		19 Ring		20 Ring	
1	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
2	17		17	16	17		17	16	17		17	16	17		17	16	17		17	16
3	19	16	19		19	16	19		19	16	19		19	16	19		19	16	19	
4	18		18	16	18		18	16	18		18	16	18		18	16	18		18	16
5	17	16	17		17	16	17		17	16	17		17	16	17		17	16	17	
6	16		16	14	16		16	14	16		16	14	16		16	14	16		16	14
7	15	13	15		15	13	15		15	13	15		15	13	15		15	13	15	
8	14		14	13	14		14	13	14		14	13	14		14	13	14		14	13
9	14	13	14		14	13	14		14	13	14		14	13	14		14	13	14	
10	13.5		13.5	13	13.5		13.5	13	13.5		13.5	13	13.5		13.5	13	13.5		13.5	13
11	13.5	12	13.5		13.5	12	13.5		13.5	12	13.5		13.5	12	13.5		13.5	12	13.5	
12			13	10	13		13	11	13		13	11	13		13	11	13		13	11
13					13	10	13		13	11	13		13	11	13		13	11	13	
14							12	10	12		12	10	12		12	10	12		12	10
15									12	8	12		12	9	12		12	9	12	
16											12	6	12		12	8	12		12	8
17													11	6	11		11	6	11	
18															11	6	11		11	6
19																	11	5	11	
20																			11	5

Number of stiffener columns: **60**



"XX" indicates the bottom ring for each diameter.

- Standard wind ring location.

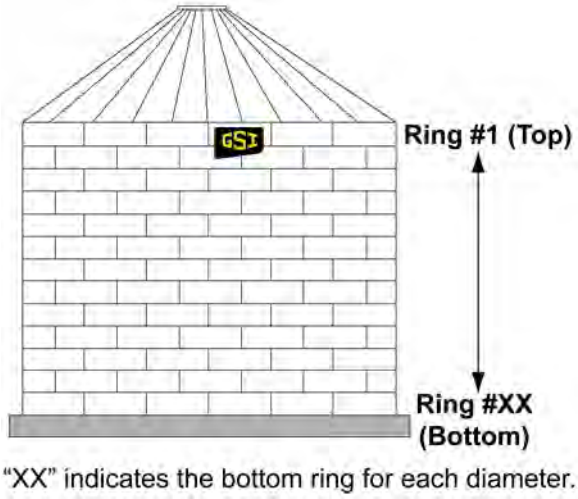
NOTE:

1. *Refer to sidedraw section in this manual for wind ring locations for sidedraw systems.*
2. *1-Ring door weldment in second ring from the bottom of the bin.*

Table 4-5 *Gauge sheet for 60' diameter 3-post (21 rings and taller)*

Ring #	Gauges																			
	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener	Sidewall	Stiffener
	21 Ring		**22 Ring**		**23 Ring**		**24 Ring**		**25 Ring**		**26 Ring**		**27 Ring**		**28 Ring**		**29 Ring**		**30 Ring**	
1	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
2	17		17	16	17		17	16	17		17	16	17		17	16	17		17	16
3	19	16	19		19	16	19		19	16	19		19	16	19		19	16	19	
4	18		18	16	18		18	16	18		18	16	18		18	16	18		18	16
5	17	16	17		17	16	17		17	16	17		17	16	17		17	15	17	
6	16		16	15	16		16	15	16		16	15	16		16	15	16		16	14
7	15	13	15		15	13	15		15	13	15		15	13	15		15	13	15	
8	14		14	13	14		14	13	14		14	13	14		14	13	14		14	13
9	14	13	14		14	13	14		14	13	14		14	13	14		14	13	14	
10	13.5		13.5	13	13.5		13.5	13	13.5		13.5	13	13.5		13.5	13	13.5		13.5	12
11	13.5	12	13.5		13.5	12	13.5		13.5	12	13.5		13.5	12	13.5		13.5	11	13.5	
12	13		13	11	13		13	11	13		13	11	13		13	11	13		13	11
13	13	11	13		13	11	13		13	11	13		13	11	13		13	10	13	
14	12		12	10	12		12	10	12		12	10	12		12	10	12		12	8
15	12	9	12		12	9	12		12	9	12		12	9	12		12	6	12	
16	12		12	8	12		12	8	12		12	8	12		12	8	12		12	6
17	11	6	11		11	6	11		11	6	11		11	6	11		11	6	11	
18	11		11	6	11		11	6	11		11	6	11		11	6	11		11	5
19	11	6	11		11	6	11		11	6	11		11	6	11		11	2	11	
20	11		11	5	11		11	5	11		11	5	11		11	5	11		11	2
21	11	2	11		11	2	11		11	2	11		11	2	11		11	2	11	
22			10	2	10		10	2	10		10	2	10		10	2	10		10	2+12
23					10	2	10		10	2	10		10	2	10		10	2+12	10	
24							10	2+12	10		10	2+12	10		10	2+12	10		10	2+12
25									10	2+12	10		10	2+12	10		10	2+12	10	
26											10	2+12	10		10	2+12	10		10	2+10
27													10	2+12	10		10	2+10	10	
28															14DL	2+10	14DL		14DL	2+8
29																	14DL	2+6	14DL	
30																			13.5DL	2+6

Number of stiffener columns: **60**



"XX" indicates the bottom ring for each diameter.

- Standard wind ring location.

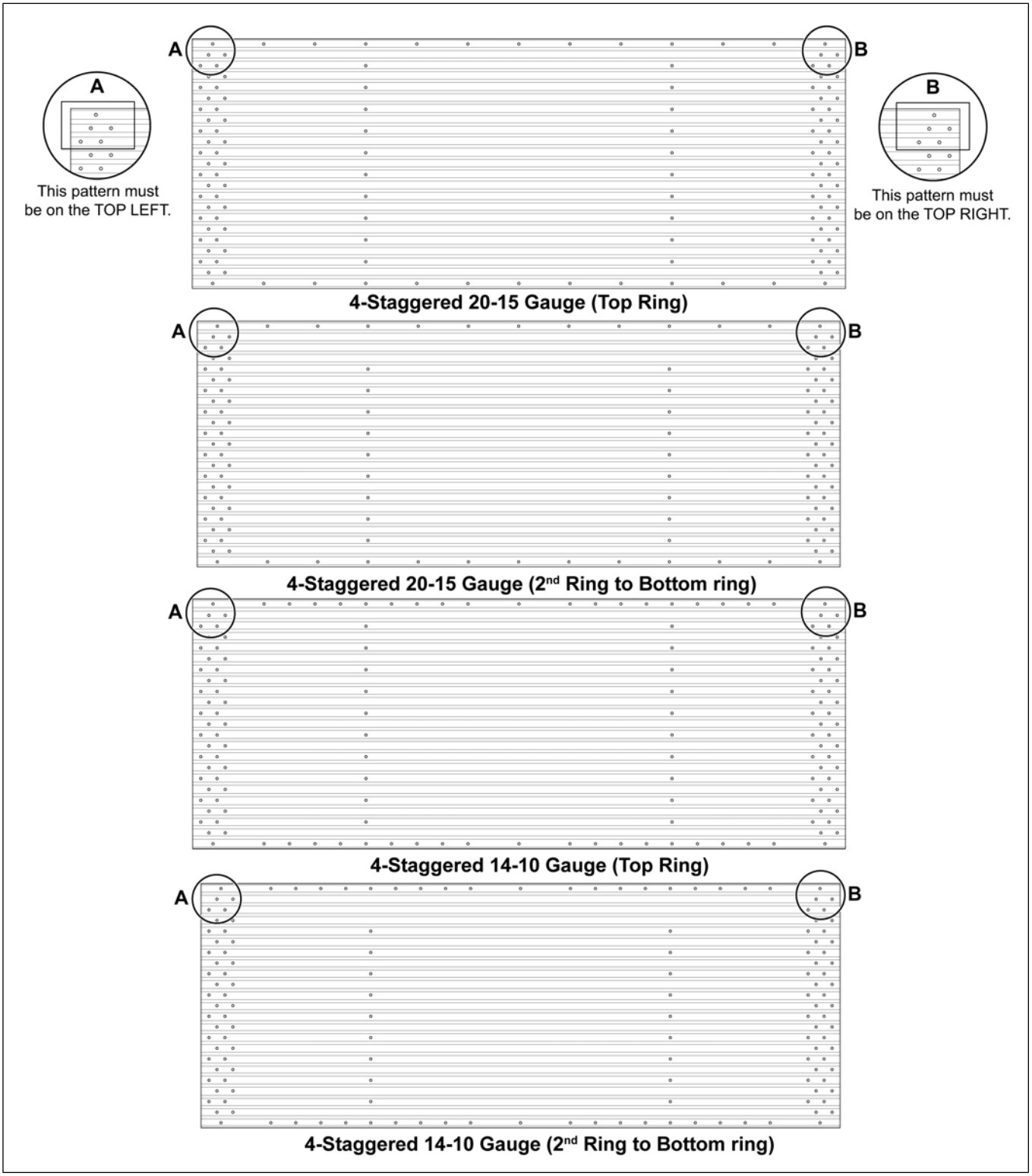
NOTE:

1. *Refer to sidedraw section in this manual for wind ring locations for sidedraw systems.*
2. *1-Ring door weldment in second ring from the bottom of the bin.*

Orientation Detail for Sidewall Sheets (2-Post)

To avoid the misalignment of the holes, it is necessary to use the correct orientation of the top sidewall sheet during installation.

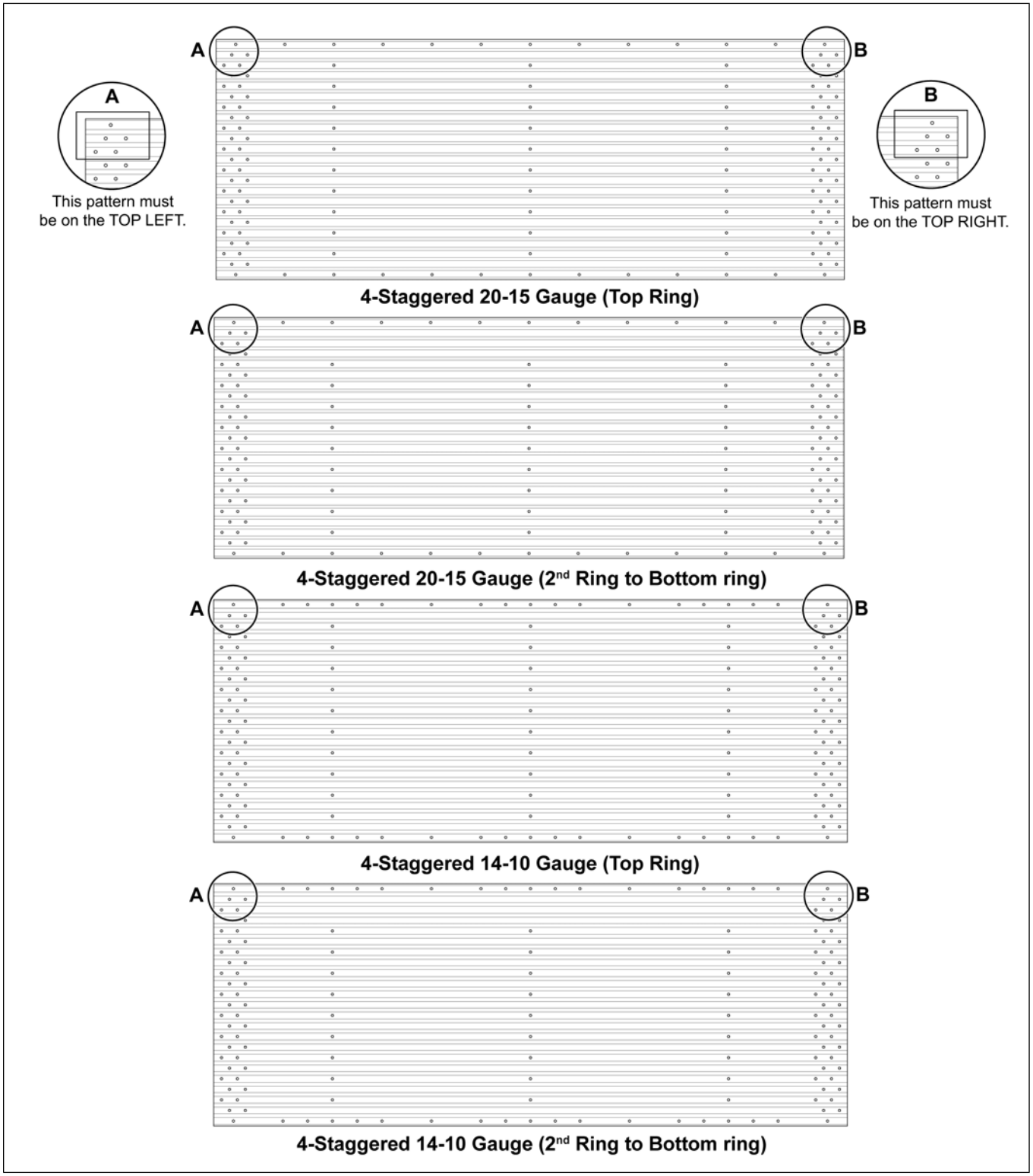
Figure 4-1 *Orientation details of 2-post sidewall sheets (viewed from outside of the bin)*



Orientation Detail for Sidewall Sheets (3-Post)

To avoid the misalignment of the holes, it is necessary to use the correct orientation of the sidewall sheet during installation.

Figure 4-2 *Orientation details of 3-post sidewall sheets (viewed from outside of the bin)*



References for Sidewall Sheets and Caulks

To avoid the misinterpretation of callouts during installation, follow the references for sidewall sheets and caulks used in this section.

Table 4-6 ***For Non-Laminated Sheets***

Callout Reference	Part Number	Description
1	–	Sidewall sheet
2	S-4458	1/8" x 1/4" caulking sealant (vertical)
3	S-4458	1/8" x 1/4" caulking sealant (horizontal - 10")

Table 4-7 ***For Laminated Sheets***

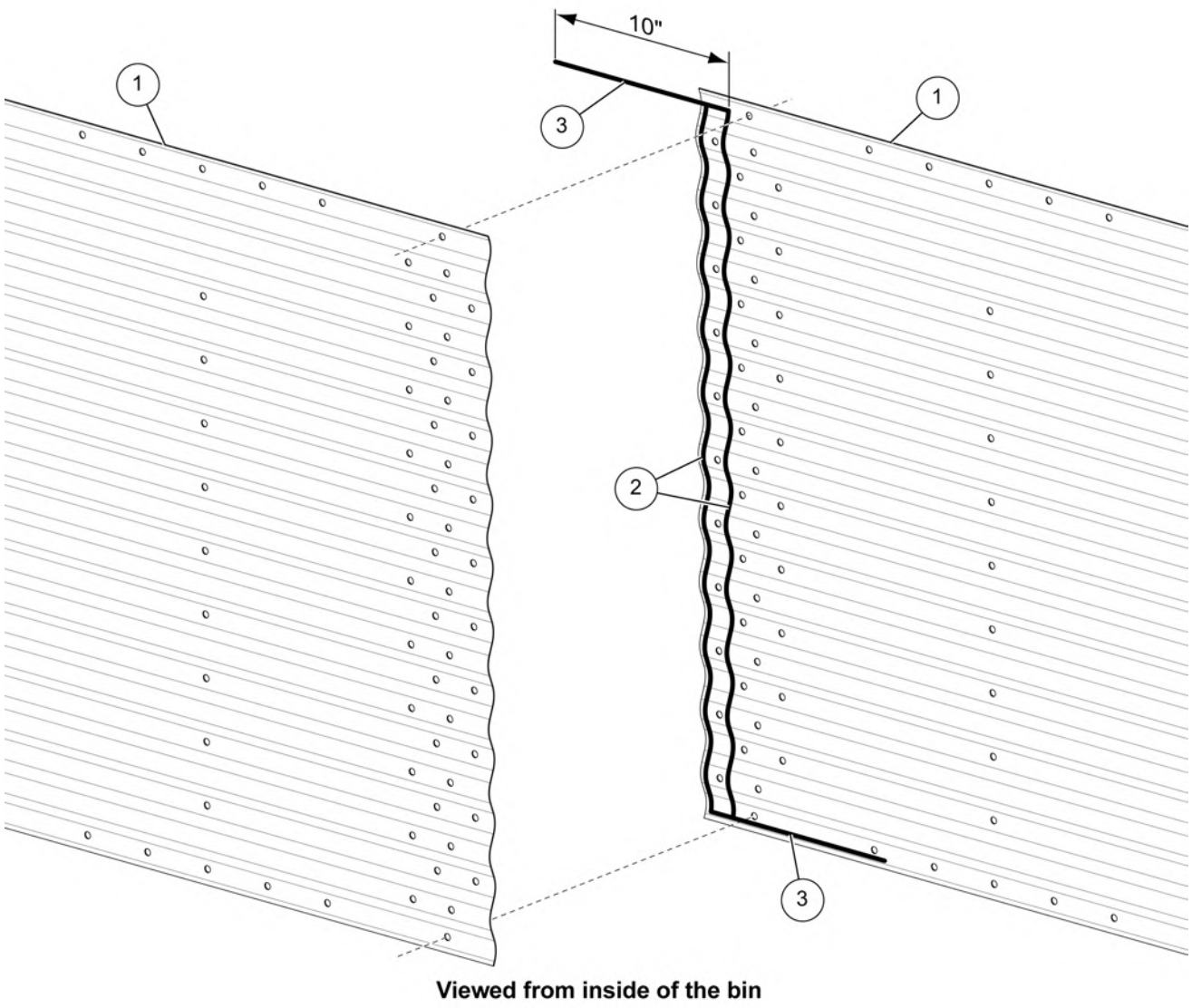
Callout Reference	Part Number	Description
1O	–	Outer sidewall sheet
1I	–	Inner sidewall sheet
2	S-4458	1/8" x 1/4" caulking sealant (vertical)
3	S-4458	1/8" x 1/4" caulking sealant (horizontal - 13")
4	S-10716	1/8" x 1-1/4" caulking strip (around stiffener holes from top horizontal seam to bottom horizontal seam)
5	S-10716	1/8" x 1-1/4" caulking strip (horizontal - between 7.5" to 13")

Caulking and Assembling the Standard (Non-Laminated) Sheets

To keep out moisture from overlapping the sheets, apply caulking to each sidewall sheet prior to installation.

1. Apply strip caulk (2) near the outside edge of the outer sheet and between the outer two rows of bolts, then apply 10" (25.4 cm) long strip caulk (3) along the horizontal seams.
2. Always assemble the sidewall sheets (1) with the overlap in the same direction as shown below.

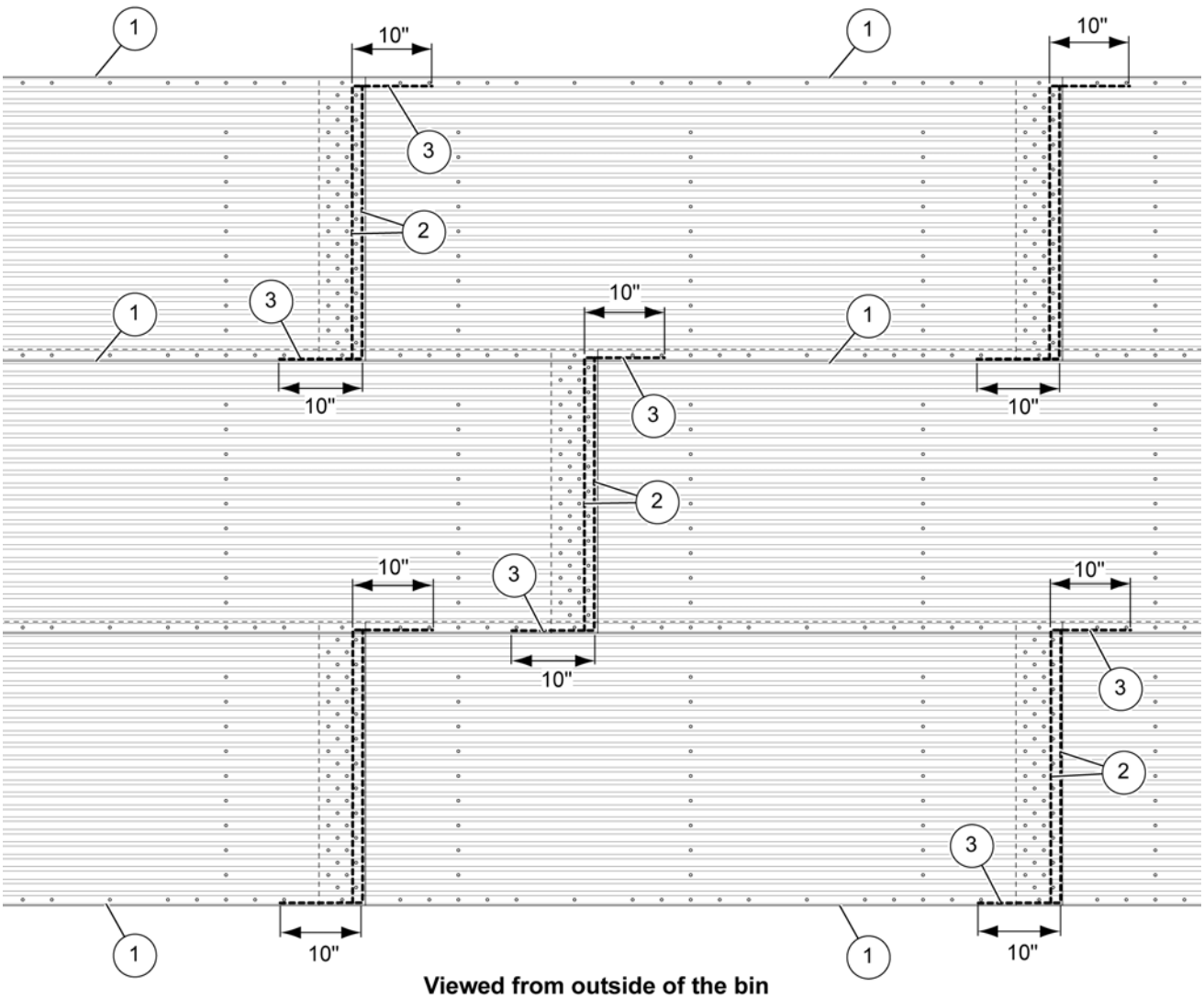
Figure 4-3 *Caulking details for assembling the non-laminated sidewall sheets*



1	Sidewall sheet	3	10" (25.4 cm) Horizontal strip of caulk
2	Vertical strip of caulk		

3. Before bolting the next ring into place, apply one 10" (25.4 cm) long strip of caulk (3) on the front of the under-lapped sheet at each joint.
4. Also, place a 10" (25.4 cm) long strip of caulk (3) along the lower horizontal edge of the lapping sheet (1) at every vertical seam. This will fill the space that occurs between the holes caused by the overlapping sheets.
5. Start assembling the sidewall sheets end to end (overlapping the same way throughout), until the ring is completed.

Figure 4-4 *Caulking and assembling the non-laminated sidewall sheets*



1	Sidewall sheet	3	10" (25.4 cm) Horizontal strip of caulk
2	Vertical strip of caulk		

6. Use the supplied tube caulk to fill the larger gaps that occur with heavier gauges.

Outer Sheet Caulking Instructions for Laced Lamination

To help keep the moisture out between the laminated sidewall sheets, it is necessary to apply caulking over each set of stiffener holes and at the ends of the laminated outer sidewall sheet.

1. Apply a strip of caulking (4) over the stiffener holes on the outer sheet (1O).

   NOTE: *The caulking strips (4) should be applied to the full height of the sheet, from the top horizontal seam to the bottom horizontal seam.*

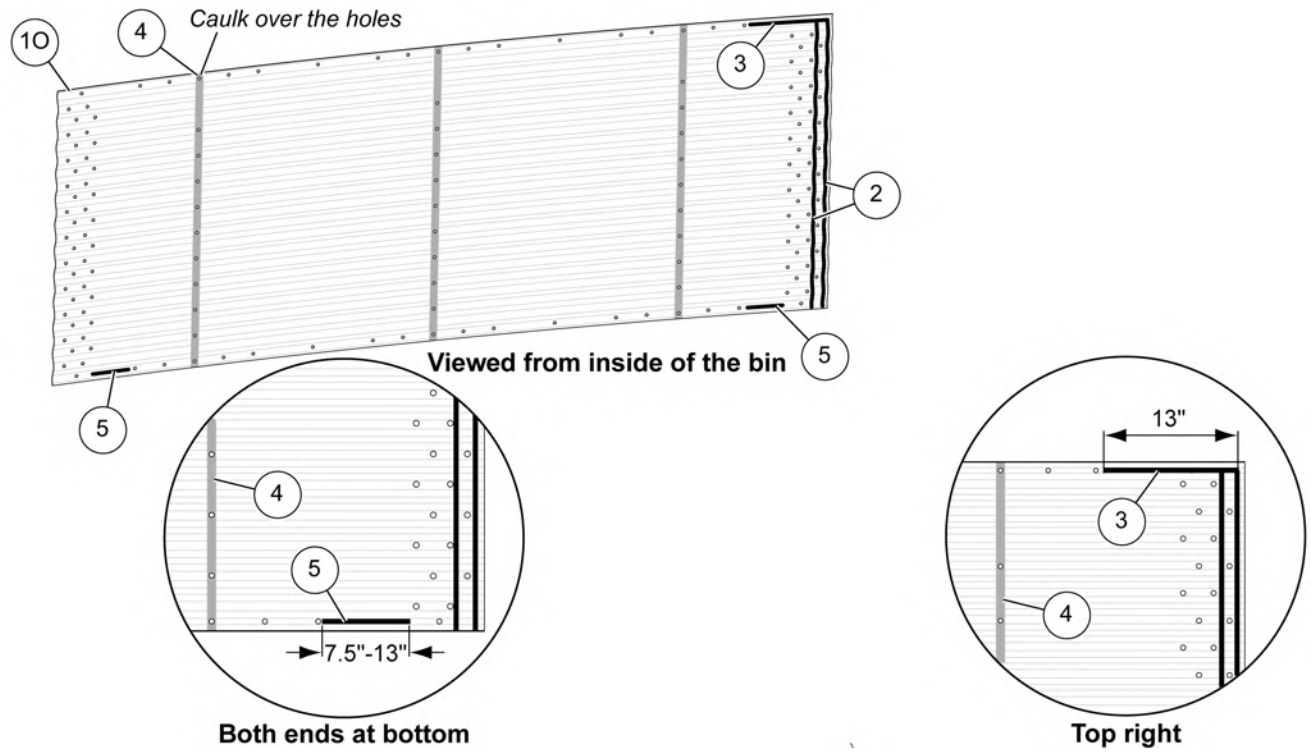
2. Apply a vertical strip of caulk (2) between the outside edge of the outer sheet (1O) and first row of holes and another vertical strip (2) between the first and second row of holes.

3. Extend the caulk (3) horizontally 13" (33 cm) between the edge of the sheet and first horizontal seam hole at the top right of outer sheet (1O).

4. Apply a horizontal strip of caulk (5) between the overlapping vertical seam edge and first horizontal seam hole at both the ends of the outer sheet (1O). The length of the caulk strip (5) varies between 7.5" (19 cm) and 13" (33 cm).

   NOTE: *Do not extend this caulking (5) into the overlapping vertical seam area.*

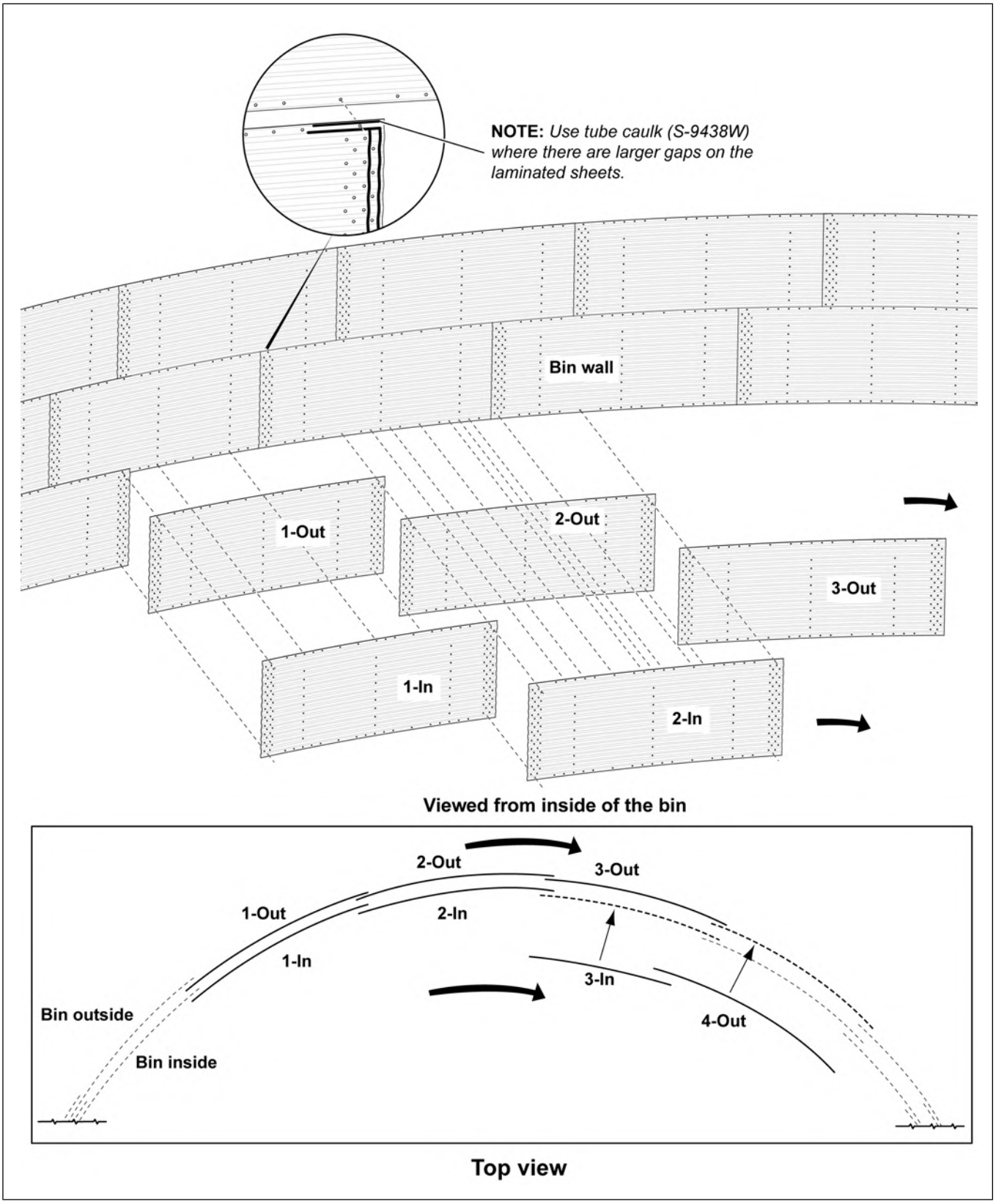
Figure 4-5 *Caulking between laminated sheets*



1O	Outer sidewall sheet	4	1/8" x 1-1/4" caulking strip (stiffener hole) (S-10716)
2	1/8" x 1/4" caulking strip (vertical) (S-4458)	5	1/8" x 1-1/4" caulking strip (horizontal – 7.5" to 13") (S-10716)
3	1/8" x 1/4" caulking strip (horizontal – 13") (S-4458)		

Lacing Overview of Double Laminated Sidewall Sheets

Figure 4-6 *Lacing overview of double laminated sheets*



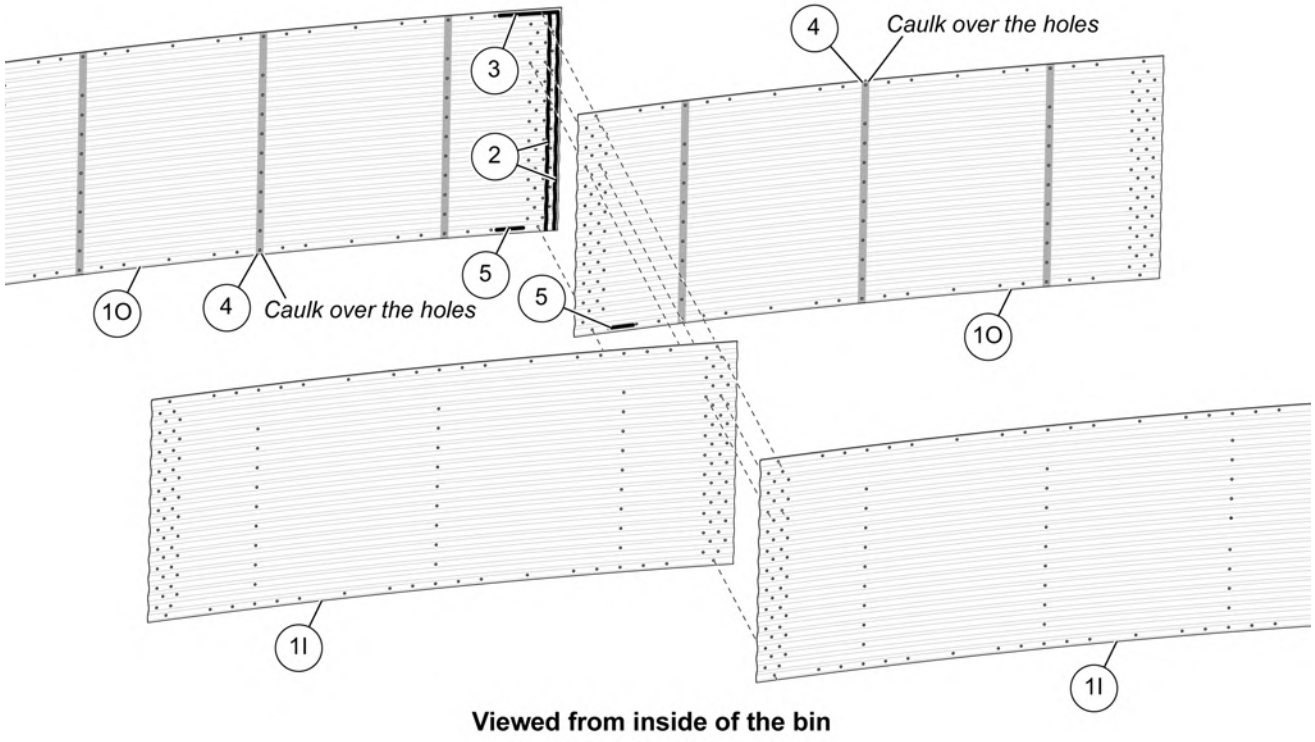
Caulking and Assembling the Double Laminated Sheets

Each outer sidewall sheet (1O) must be layered and caulked prior to assembling sidewall sheet seams together. **The inner sidewall sheets (1I) do not have any caulking.**

1. Apply a vertical strip of caulk (2) between the outside edge of the outer sheet (1O) and first row of holes and another vertical strip (2) between the first and second row of holes.
2. Apply a horizontal strip of caulk (3) between the edge of the sheet and first horizontal seam hole.
3. Apply a strip of caulking (4) over the stiffener holes on the outer sheet (1O).
4. Apply a horizontal strip of caulk (5) between the overlapping vertical seam edge and first horizontal seam hole at both the sides of the outer sheet (1O).

   NOTE: *Always assemble the sidewall sheets with the overlap in the same direction.*

Figure 4-7 *Caulking between double laminated sidewall sheets*

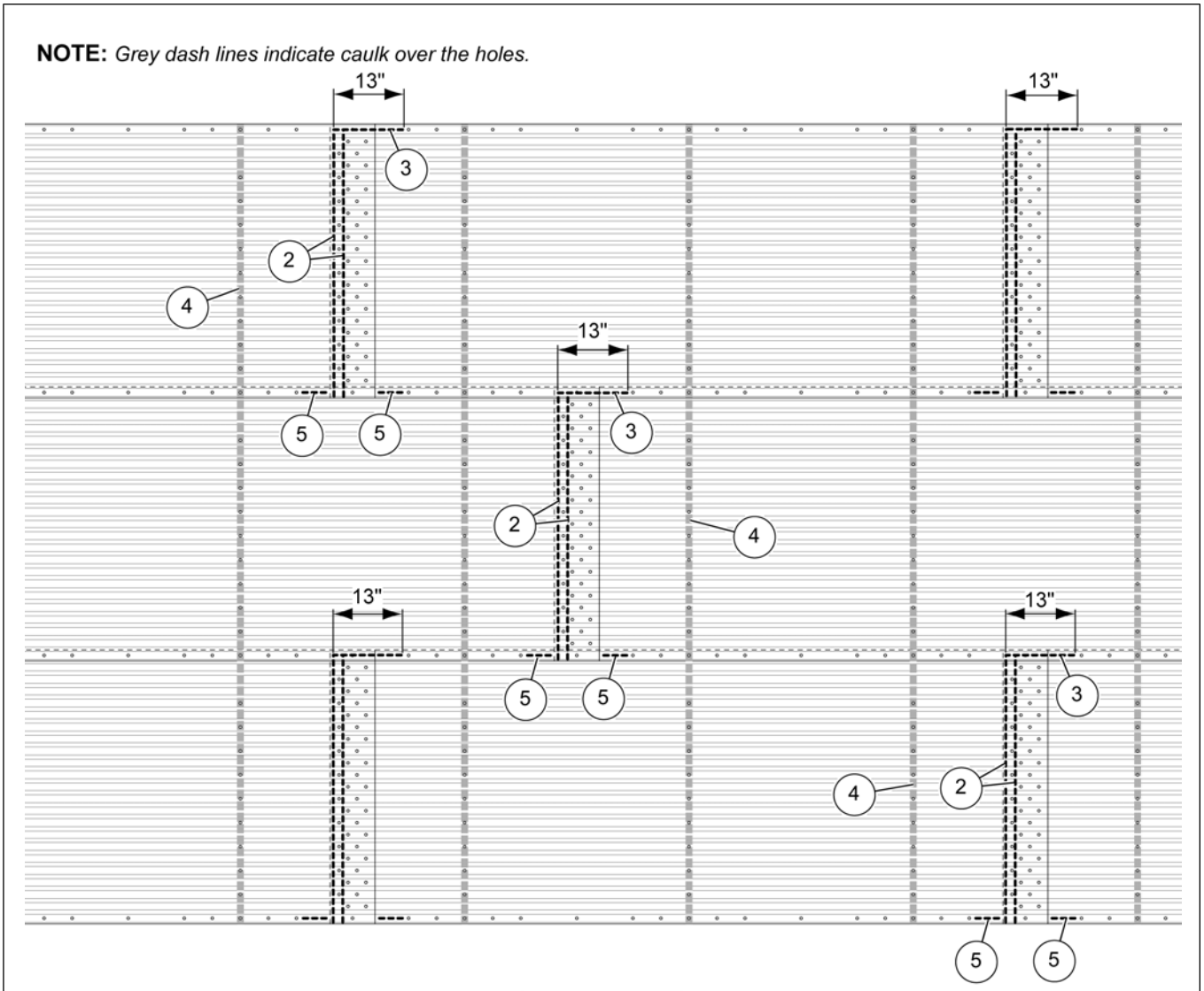


1I	Inner sidewall sheet	3	1/8" x 1/4" caulking strip (horizontal) (S-4458) (Laminates: 13")
1O	Outer sidewall sheet	4	1/8" x 1-1/4" caulking strip (stiffener hole) (S-10716)
2	1/8" x 1/4" caulking strip (vertical) (S-4458)	5	1/8" x 1-1/4" caulking strip (horizontal) (S-10716) (Laminates: 7.5" to 13")

5. Before bolting the next ring into place, apply a strip of caulk (3) along the horizontal edge of the overlapping sheet at every overlapping seam. This will fill the space that occurs between the holes caused by the overlapping sheets.

NOTE: *Always assemble the sidewall sheets with the overlap in the same direction.*

Figure 4-8 *Caulking and assembling the double laminated sidewall sheets*



Viewed from outside of the bin

2	1/8" x 1/4" caulking strip (vertical) (S-4458)	4	1/8" x 1-1/4" caulking strip (stiffener hole) (S-10716)
3	1/8" x 1/4" caulking strip (horizontal) (S-4458) (Laminates: 13")	5	1/8" x 1-1/4" caulking strip (horizontal) (S-10716) (Laminates: 7.5" to 13")

6. Use the supplied tube caulk to fill the larger gaps that occur with heavier gauges and laminated gauges.

5 Installing the Base Angle

Topics Covered in this Chapter

- Installing the Base Angle
- Installing the Base Angle Shims
- Installing the Anchor Bolt Washer

Installing the Base Angle

Installing the base angle ring will help reinforce and seal the final ring of the sidewall.

What You Should Know
The base angle overlap should be offset two holes from the stiffener. Do not place the overlap in line with the stiffener.

1. Place the base angle (6) at the bottom portion of the final ring of the sidewall sheet (5).

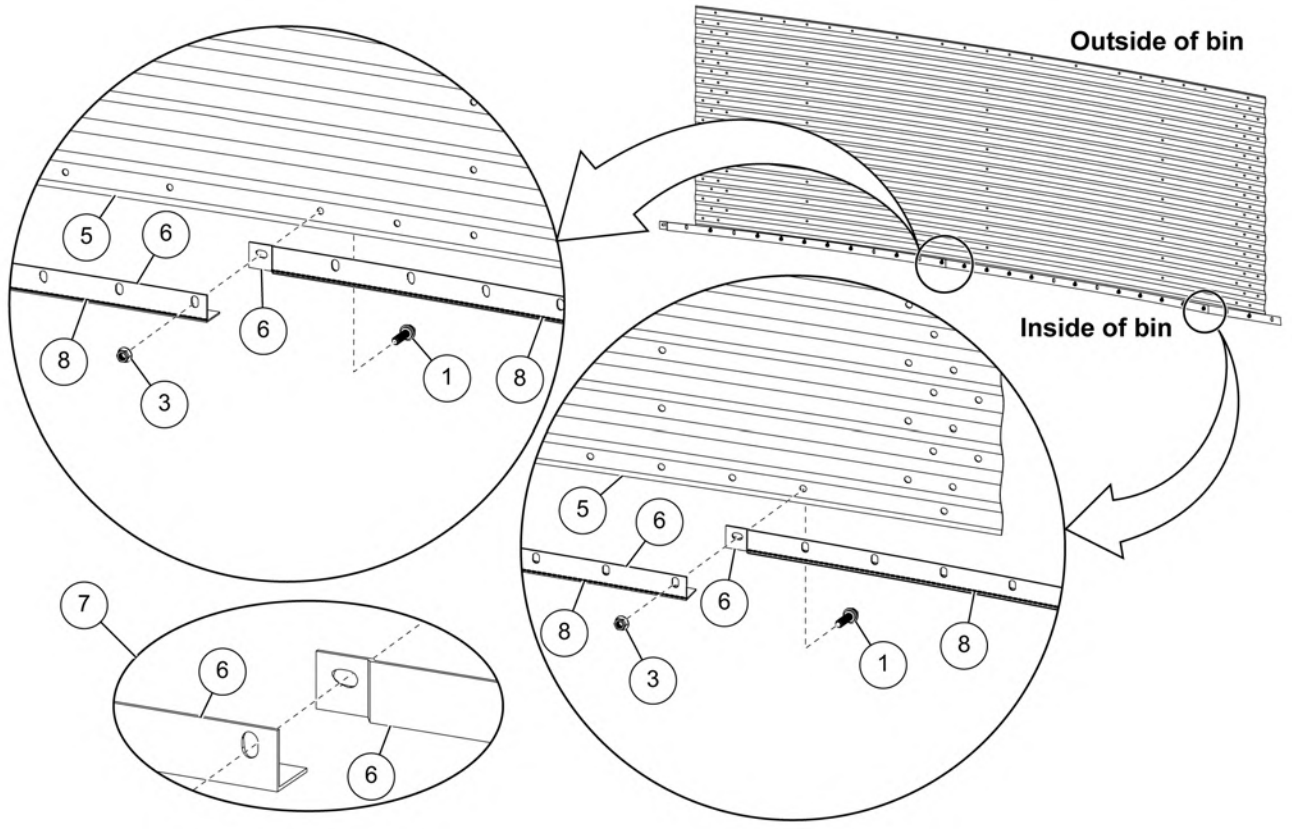
   NOTE: *The sidewall sheet (5) will sit on top of the base angle (6) with the vertical portion of the base angle (6) on the inside of the bin and each end of the base angle (6) will connect to the next base angle (6).*

2. Install M10 x 40 flange bolts (1) and M10 flange nuts (3) to connect the base angle (6) to the sidewall sheet (5). Leave the end hole of each base angle (6), until the next base angle (6) is installed.
3. Align the next base angle (6) end hole with the previous base angle (6) end hole and install to the sidewall sheet (5) using M10 x 40 flange bolts (1) and M10 flange nuts (3).
4. Repeat this procedure for the remaining base angles (6) overlapping the previously installed base angles (6).
5. Before the bolts (1) are tightened, push the base angles (6) tight against the bottom edge of each sheet.
6. Tighten the hardware to the recommended torque specifications, see *Bolt Torque Specifications, page 26*.
7. Before lowering the bin, apply the optional mastic sealer strip (8) to the entire underneath side of the base angles (6).

   NOTE: *If optional mastic sealer strip (8) is not used, it is recommended that some other method should be utilized to seal the base ring to the concrete.*

8. Lower the bin onto the foundation and check for an adequate seal.

Figure 5-1 *Installing the base angle*



1	M10 x 40 flange bolt with HDPE sealing washer (S-10780)	6	Base angle (B-7031)
3	M10 flange nut (S-10784)	7	Base angle offset example
5	Sidewall sheet (final ring assembly)	8	Optional mastic sealer (or equivalent)

NOTE: *If using the base boot (CTS-4048 or CTS-4049), do not install the three flange bolts behind the base plate that attach the base angle to the sidewall. Fill the holes with tube caulk (S-9438W) provided.*

Installing the Base Angle Shims

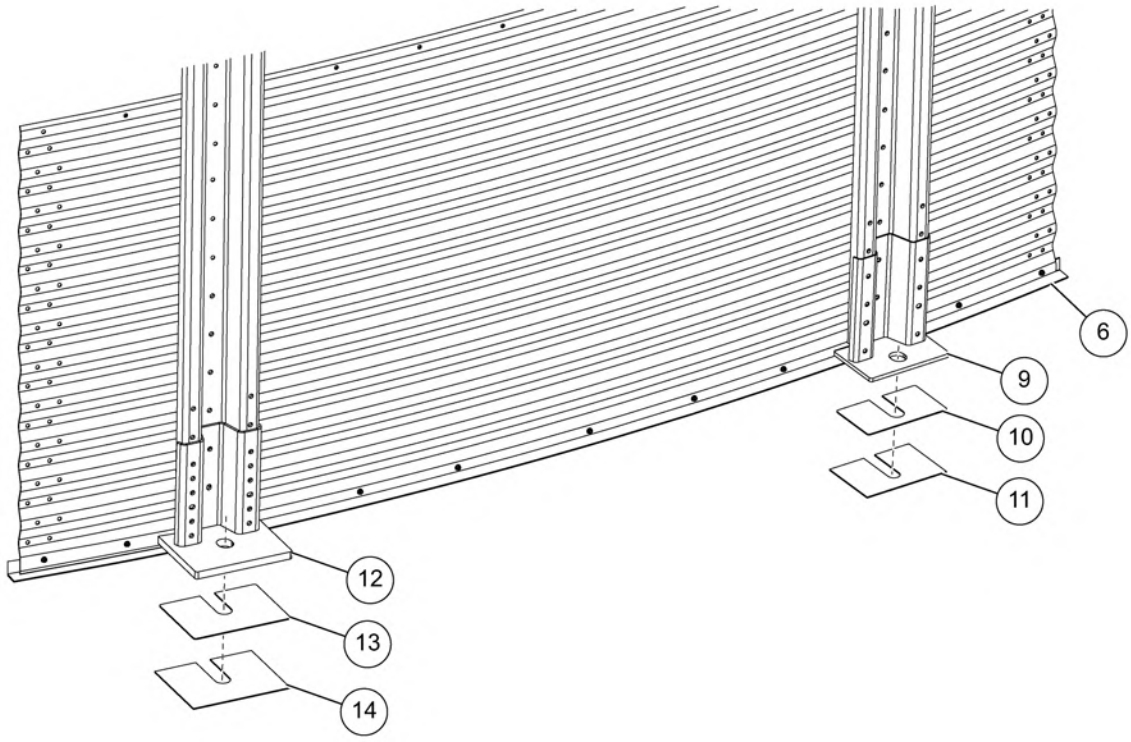
A section of the base boot plate will rest on top of the base angle, therefore causing the base boot to rest unevenly on the foundation. To offset this, base angle shims are required to ensure the base boot sets evenly on the foundation.

What You Should Know

1. Place the required base angle shim (10 or 13) around the anchor bolt next to the base angle (6).
2. Place the base stiffener over the anchor bolt onto the required shim.
3. If needed, add standard shims (11 or 14) under the required base angle shim.

NOTE: *If more than one additional shim is required, then the shims must be welded together to the base plate (9 or 12) or the base plate must be grouted to provide the proper elevation.*

Figure 5-2 *Installing the base angle shims*



6	Base angle (B-7031XX)	12	8" x 10" base plate (CTS-4048XX or CTS-4049XX)
9	6" x 9" base plate (CTS-4046XX or CTS-4045XX)	13	Required base angle shim for 8" x 10" base plate (B-7028)
10	Required base angle shim for 6" x 9" base plate (B-7027)	14	Standard shim for 8" x 10" base plate (SS-7212)
11	Standard shim for 6" x 9" base plate (SS-6953)		

Installing the Anchor Bolt Washer

Anchor bolt washers help to cover the oversized hole in the base plate.

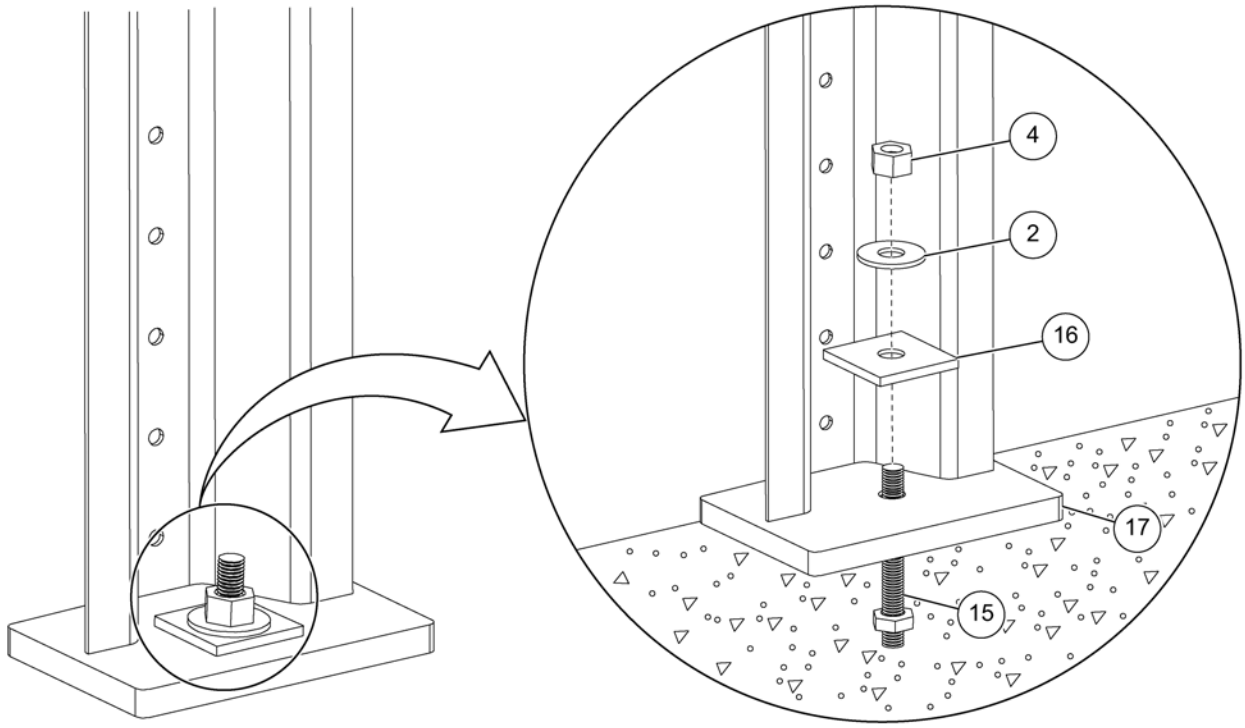
Before You Begin
Make sure the anchor bolts are secured and the base plates are installed.

1. Place a square plate washer (16) onto the anchor bolt (15).

   NOTE: *The square washer (provided) must be placed between the base boot plate (17) and flat washer (2).*

2. Place a flat washer (2) above the square washer (16) and secure with a nut (4).
3. Tighten to the recommended torque specification, see *Bolt Torque Specifications, page 26*.

Figure 5-3 *Installing the anchor bolt washer*



2	Flat washer	16	Square anchor plate washer
4	Anchor nut	17	Base boot
15	Anchor bolt		

6 Stiffeners

Topics Covered in this Chapter

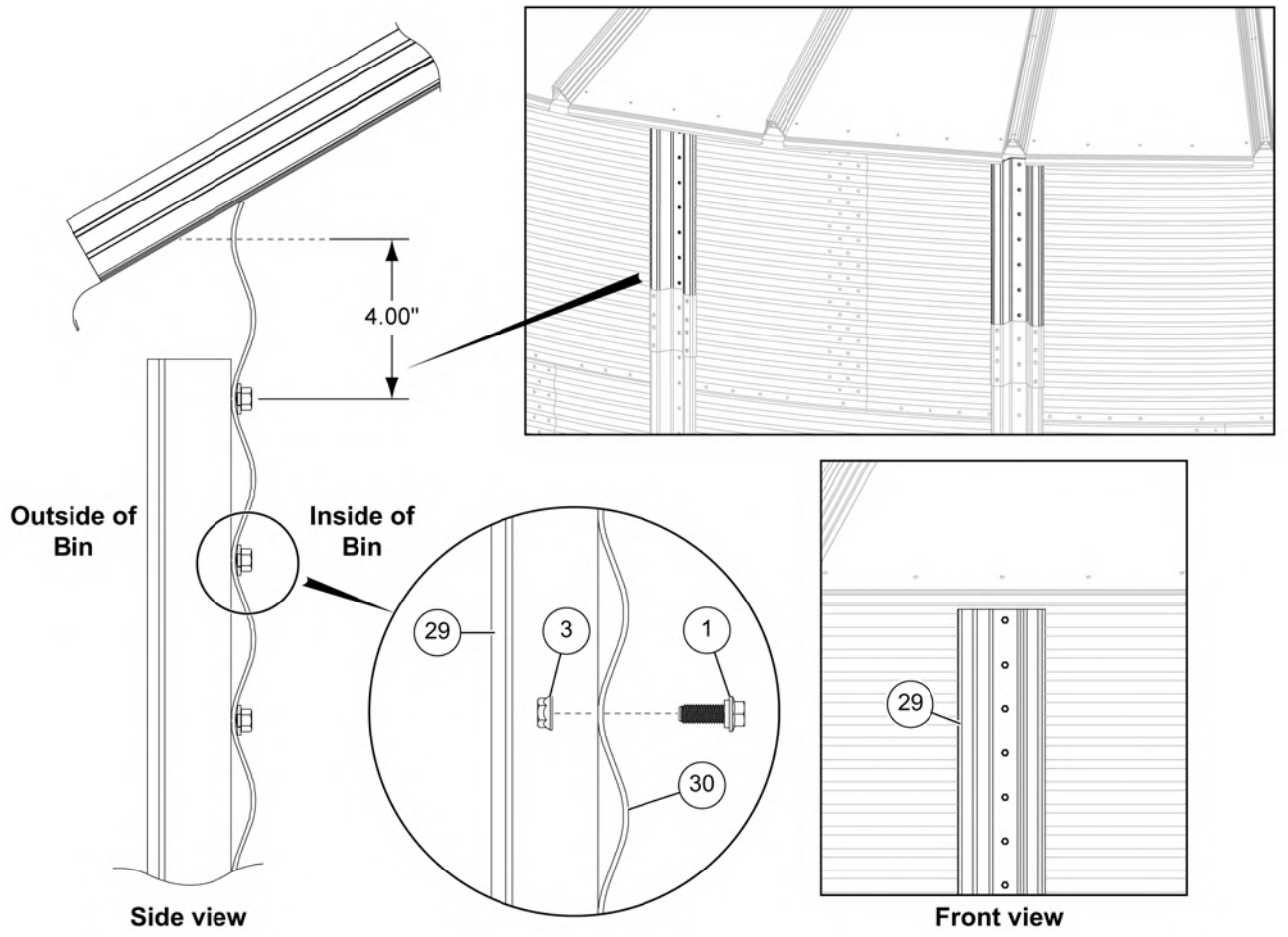
- Stiffener Starting Location
- Stiffener Splice Location
- Stiffener Part Number Description
- Color Codes for Stiffener Gauge Identification
- Standard Stiffeners
- Top Stiffeners
- Stiffeners Splice
- Base Stiffeners
- Base Boots
- One-Ring Top Stiffener (15-18 Ga.) to a One-Ring Stiffener (15-18 Ga.)
- One-Ring Top Stiffener (15-18 Ga.) to a Two-Ring Stiffener (15-18 Ga.)
- One-Ring Top Stiffener (15-18 Ga.) to a Two-Ring Stiffener (8-14 Ga.)
- One-Ring Stiffener (15-18 Ga.) to a Two-Ring Stiffener (15-18 Ga.)
- One-Ring Stiffener (15-18 Ga.) to a Two-Ring Stiffener (8-14 Ga.)
- Two-Ring Stiffener (15-18 Ga.) to a Two-Ring Stiffener (8-14 Ga.)
- Two-Ring Stiffener (15-18 Ga.) to a Two-Ring Stiffener (15-18 Ga.)
- Two-Ring Stiffener (8-14 Ga.) to a Two-Ring Stiffener (8-14 Ga.)
- Two-Ring Stiffener (8-14 Ga.) to a Two-Ring Stiffener (2-6 Ga.)
- Two-Ring Stiffener (8-14 Ga.) to a Base Stiffener (8 Ga.)
- Two-Ring Stiffener (8-14 Ga.) to a Base Stiffener (10-14 Ga.)
- Two-Ring Stiffener (2-6 Ga.) to a Base Stiffener (2-6 Ga.)
- Two-Ring Stiffener (15-18 Ga.) to a Base Stiffener (10-14 Ga.)
- Two-Ring Stiffener (2-6 Ga.) to a Laminated Stiffener (2 Ga.) with an Insert (10-12 Ga.)
- Laminated Stiffeners (2 Ga.) with Inserts (10-12 Ga.)
- Laminated Stiffener (2 Ga.) with an Insert (10-12 Ga.) to a Laminated Base Stiffener (2 Ga.) with a Base Insert (10-12 Ga.)
- Base Stiffener (10-16 Ga.) to a Base Boot
- Base Stiffener (2+12 Ga. - 6 Ga.) to a Base Boot
- Laminated Base Stiffener (2 Ga.) with Insert (2+10 to 2+12 Ga.) to a Base Boot
- Standard Stiffener to a 12-Bolt Pattern Laminated Stiffener with Insert
- 12-Bolt Pattern Laminated Stiffeners with Insert
- 12-Bolt Pattern Laminated Stiffener to Laminated Base Stiffener with Inserts to a Base Boot
- 12-Bolt Pattern Laminated Stiffener to Laminated Base Stiffener with Inserts to a Base Boot

Stiffener Starting Location

1. All stiffeners should be installed on the exterior of the bin.
2. Install the top stiffener (29) to the top sidewall sheet (30) at a distance of 4" from the top hole in the bin wall.
3. Use M10 x 25 flange bolts (1) with neoprene washer and M10 flange nuts (3) to secure the top stiffener (29) to the sidewall sheet (30).

   NOTE: *Install the flange bolts (1) with bolt head on the inside of the bin.*

Figure 6-1 *Top stiffener starting location*



1	M10 x 25 flange bolt with HDPE sealing washer (S-10779)	29	Top stiffener
3	M10 flange nut (S-10784)	30	Sidewall sheet

Stiffener Splice Location

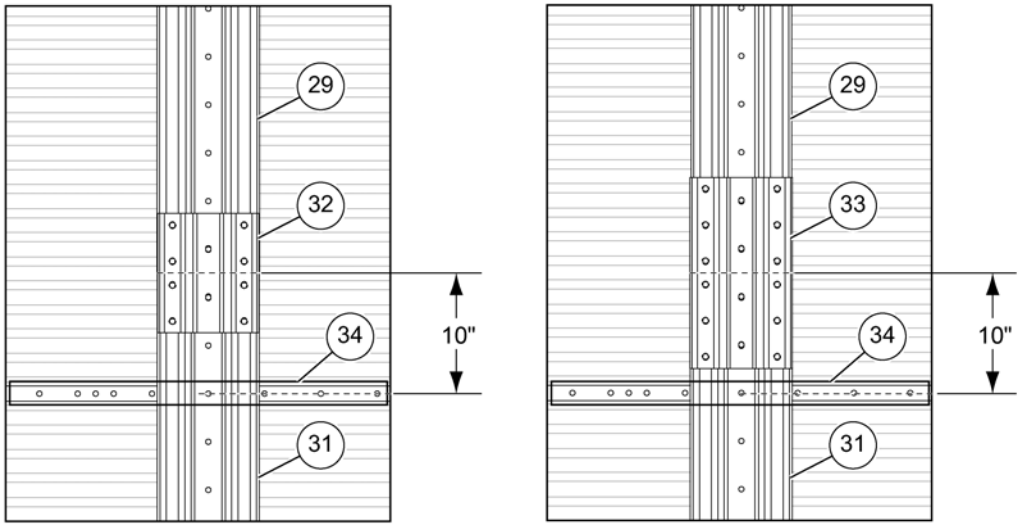
1. All stiffeners should be installed on the exterior of the bin.
2. Align the stiffener splice (32 or 33) with the holes at the ends of the two stiffeners (29 and 31).

   NOTE: *Make sure the center of the stiffener splice (stiffener ends) is at 10" above the horizontal seam.*

3. Use M10 x 25 flange bolts (1) and M10 flange nuts (3) to secure the stiffener splice to the stiffeners.

   NOTE: *Install the flange bolts (1) with bolt head on the inside of the bin.*

Figure 6-2 *Stiffener splice location*



1	M10 x 25 flange bolt with HDPE sealing washer (S-10779)	32	Short splice
3	M10 flange nut (S-10784)	33	Long splice
29	Top stiffener	34	Horizontal seam in bin sidewall
31	Bottom stiffener		

Stiffener Part Number Description

The part numbers in the following tables use an “XX” at the end of the number to represent the gauge of the material.

Color Codes for Stiffener Gauge Identification

Refer to the below charts toto identify the stiffener gauge based on the color code painted on the ends of the stiffeners.

NOTE: *See Gauge Sheet, page 36 for ring location of stiffeners.*

Table 6-1 *Color codes for stiffener gauges*

Sidewall Gauge	Color Code
0	No Color (Zinc)
2	Ochre
5	Fluorescent Green
6	White
8	Yellow
9	Dark Blue and Orange
10	Light Blue
11	Pink
12	Black
13	Dark Blue and Yellow
14	Dark Green
15	Red and Brown
16	Dark Blue
17	Light Blue and Pink
18	Orange

Table 6-2 *Stripe color codes for stiffener gauges*

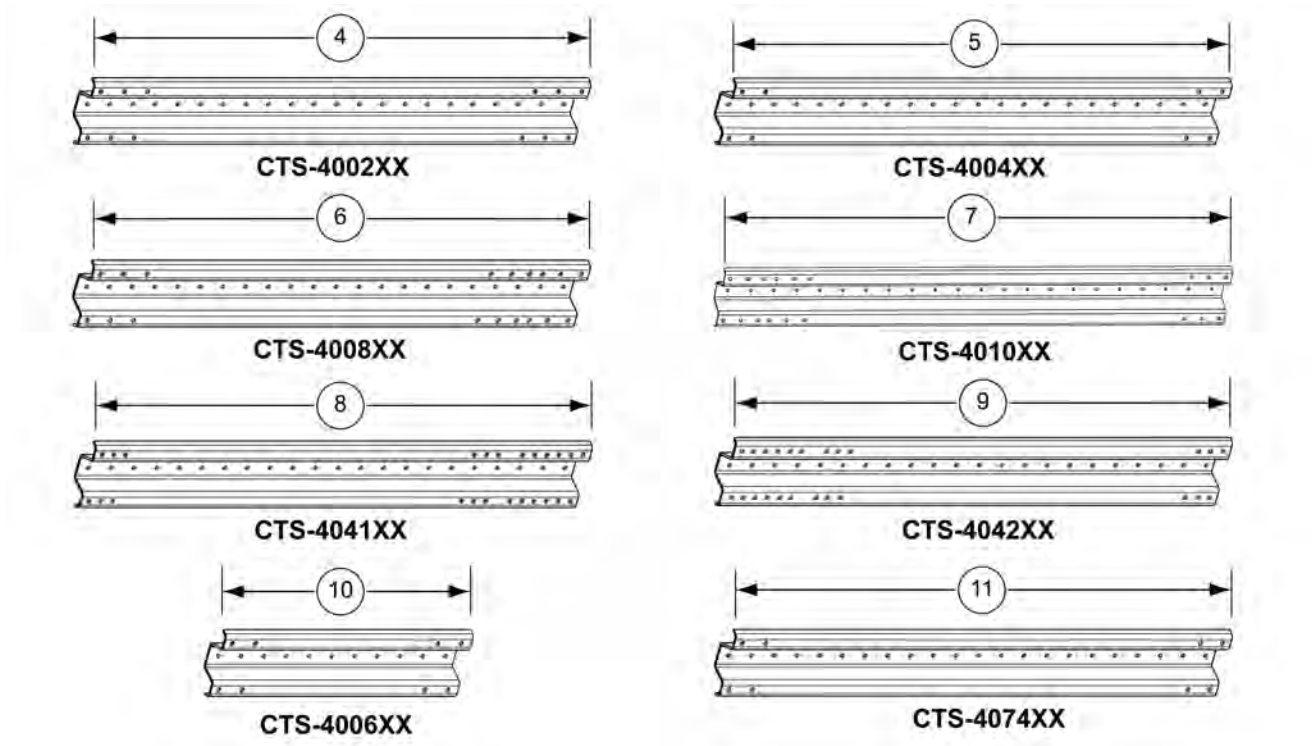
Stiffener Type	Stripe Color
Base Stiffener	Red
Back (Laminated)	Dark Green
Insert (Laminated)	Gold
Close Punched	Light Blue
Special Galvanized 115	Fluorescent Red and Orange
Special Galvanized 140	Florescent Pink
Special Galvanized 165	Florescent Pink and Fluorescent Orange
12-Bolt Pattern Stiffener	Brown

NOTE: *Extra colored stripes will be centered on the gauge color. If more than one color of stripe is needed, they will be painted next to each other and centered on the gauge color.*

Standard Stiffeners

Refer to the below information to determine the differences between the types of standard two-ring stiffeners.

Figure 6-3 *Standard stiffeners*

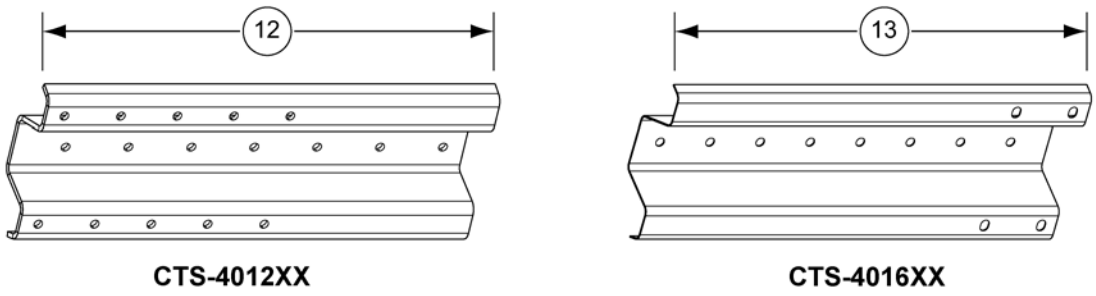


Call Out	Part Number	Description	Length	Available Gauges
4	CTS-4002XX	Two-ring stiffener	87.938" (223 cm)	2, 5, 6
5	CTS-4004XX	Two-ring stiffener	87.938" (223 cm)	15 - 18
6	CTS-4008XX	Two-ring laminated stiffener	87.938" (223 cm)	2
7	CTS-4010XX	Two-ring insert	87.938" (223 cm)	10 - 12
8	CTS-4041XX	Two-ring laminated stiffener	87.938" (223 cm)	2
9	CTS-4042XX	Two-ring insert	87.938" (223 cm)	10 - 12
10	CTS-4006XX	One-ring stiffener	43.938" (111 cm)	15 - 18
11	CTS-4074XX	Two-ring stiffener	87.938" (223 cm)	8 - 14

Top Stiffeners

Refer to the below information to determine the differences between the two types of top stiffeners.

Figure 6-4 *Top stiffeners*

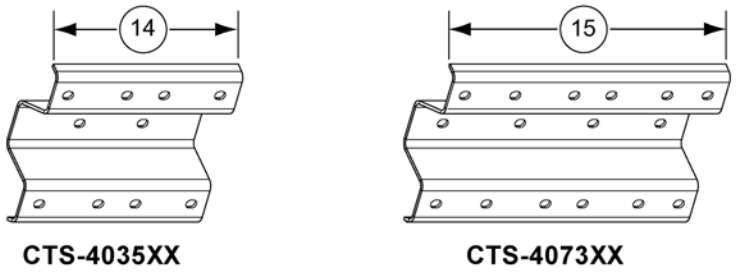


Call Out	Part Number	Description	Length	Available Gauges
12	CTS-4012XX	Inside top stiffener	28.938" (73.5 cm)	2, 5, 6, 8, 10, 12, 14
13	CTS-4016XX	Outside top stiffener	28.938" (73.5 cm)	15 - 18

Stiffeners Splice

Refer to the below information to determine the gauge of the splice needed to connect the stiffeners.

Figure 6-5 *Stiffener splice*



Call Out	Part Number	Description	Length	Available Gauges
14	CTS-4035XX	Stiffener splice	9.938" (25.24 cm)	12, 14
15	CTS-4073XX	Stiffener splice	15.906" (40.40 cm)	10

Refer to the below chart to determine the gauge of the splice, which is determined by the gauge of the stiffeners that are being connected. If connecting a heavier gauge to a lighter gauge stiffener, always use the heavier gauge splice for the 13 to 12, 8 to 6 gauge connections.

For example: If connecting a 13 gauge stiffener to a 12 gauge stiffener, use the 12 gauge splice. If connecting an 8 gauge stiffener to a 6 gauge stiffener, use the 10 gauge splice.

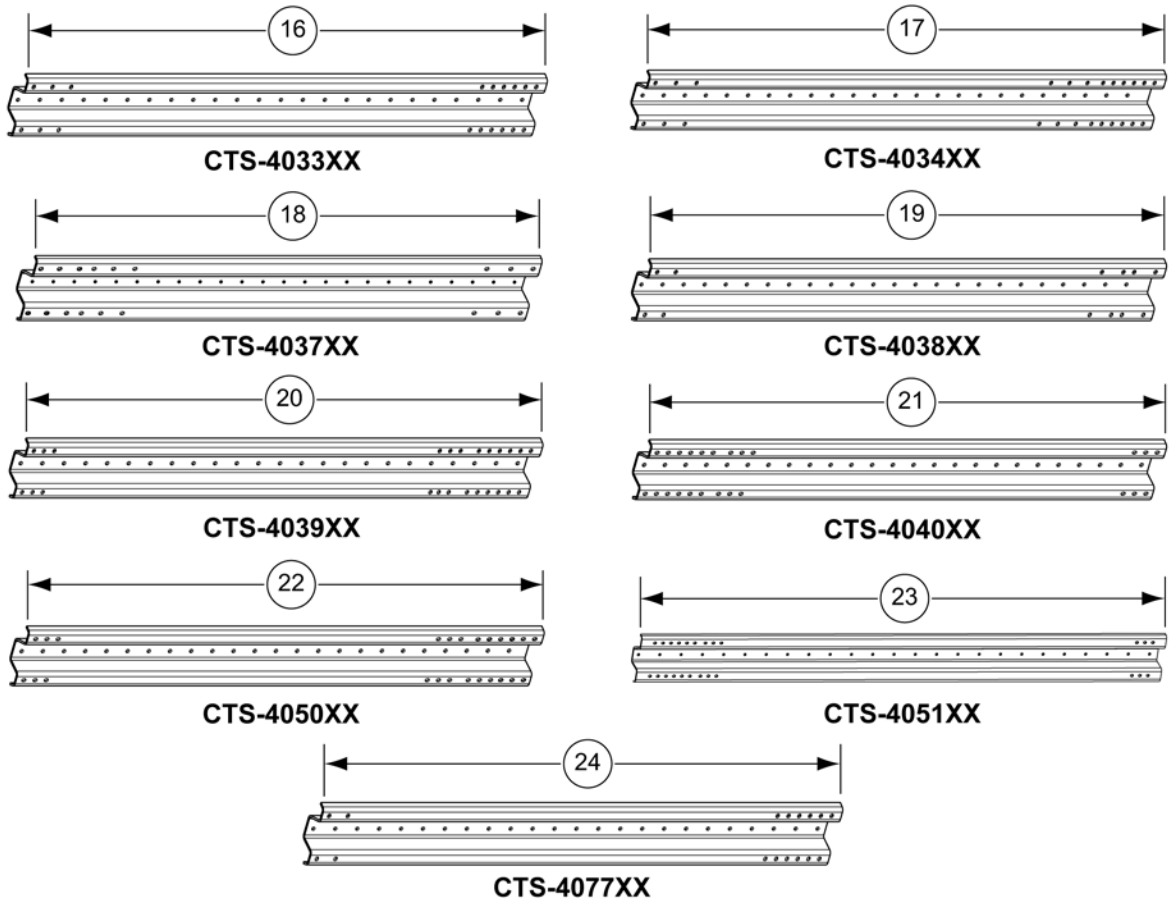
Table 6-3 *Splice usage*

Stiffener Gauge	Splice Gauge		
	10 Gauge	12 Gauge	14 Gauge
18			X
17			X
16			X
15			X
14			X
13			X
12		X	
11		X	
10		X	
9		X	
8		X	
6	X		
5	X		
2	X		

Base Stiffeners

Refer to the below information to determine the differences between the base stiffeners.

Figure 6-6 *Base stiffeners*

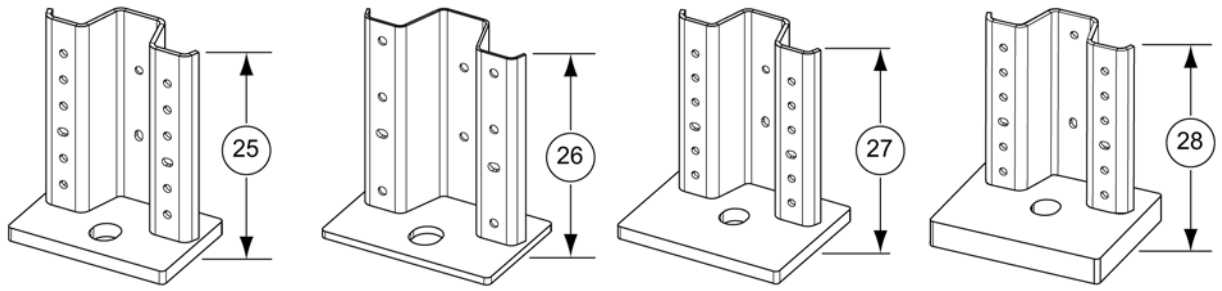


Call Out	Part Number	Description	Length	Available Gauges
16	CTS-4033XX	Base stiffener	98.126" (249 cm)	2, 5, 6
17	CTS-4034XX	Laminated base stiffener	98.126" (249 cm)	2
18	CTS-4037XX	Base insert	92.516" (235 cm)	10, 12
19	CTS-4038XX	Base stiffener	98.501" (250 cm)	10, 12, 14
20	CTS-4039XX	Laminated base stiffener	97.376" (247 cm)	2
21	CTS-4040XX	Base insert	98.516" (250 cm)	2, 5, 6, 8
22	CTS-4050XX	Laminated base stiffener	98.126" (249 cm)	2
23	CTS-4051XX	Two-ring insert	87.938" (223 cm)	2, 5, 6, 8 - 14
24	CTS-4077XX	Base stiffener	98.126" (249 cm)	8

Base Boots

Refer to the below information to determine the differences between the base boots.

Figure 6-7 *Base boots*



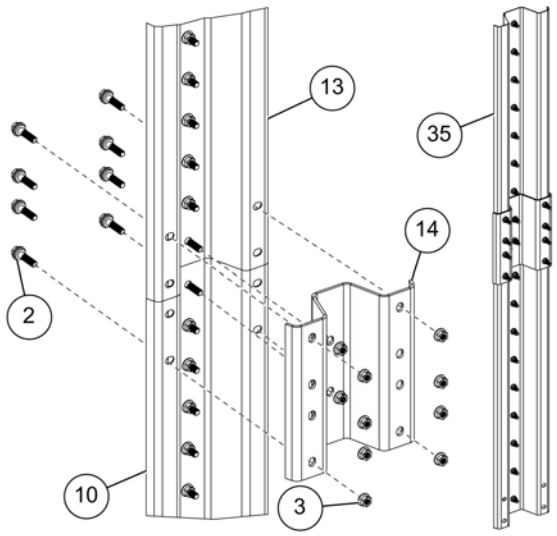
Call Out	Part Number	Description	Height	Base Plate Size
25	CTS-404502	Base boot weldment for 8 Ga. through a laminated 2 Ga. with an 11 Ga. insert	11.391" (29 cm)	6" x 9" x 3/4" (15 x 23 x 1.90 cm)
26	CTS-404610	Base boot weldment for 16 Ga. through 9 Ga. base stiffeners	11.391" (29 cm)	6" x 9" x 3/8" (15 x 23 x 0.95 cm)
27	CTS-404802	Base boot for 2 Ga. laminated base stiffeners with 10 Ga. insert	11.391" (29 cm)	8" x 10" x 3/4" (20 x 25 x 1.90 cm)
28	CTS-404902	Base boot weldment for 2+8 to 2+2 base stiffeners	11.391" (29 cm)	8" x 10" x 1-1/2" (20 x 25 x 3.81 cm)

One-Ring Top Stiffener (15-18 Ga.) to a One-Ring Stiffener (15-18 Ga.)

Refer to the below information for a standard connection of a one-ring top stiffener (CTS-4016XX) to a one-ring stiffener (CTS-4006XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
10	One-ring stiffener (CTS-4006XX)
13	One-ring top stiffener (CTS-4016XX)
14	Splice (CTS-4035XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

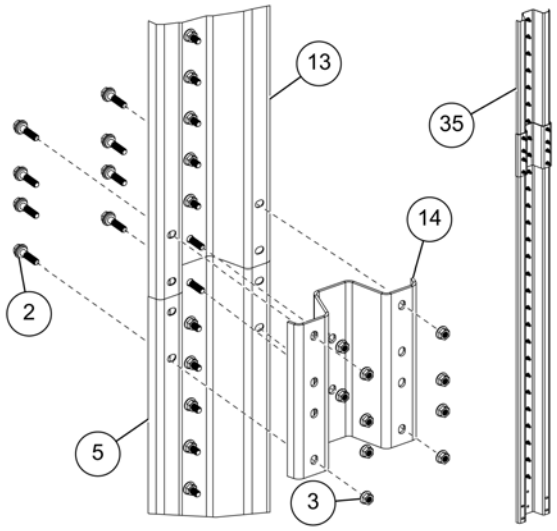


One-Ring Top Stiffener (15-18 Ga.) to a Two-Ring Stiffener (15-18 Ga.)

Refer to the below information for a standard connection of a one-ring top stiffener (CTS-4016XX) to a two-ring stiffener (CTS-4004XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
5	Two-ring stiffener (CTS-4004XX)
13	One-ring top stiffener (CTS-4016XX)
14	Splice (CTS-4035XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

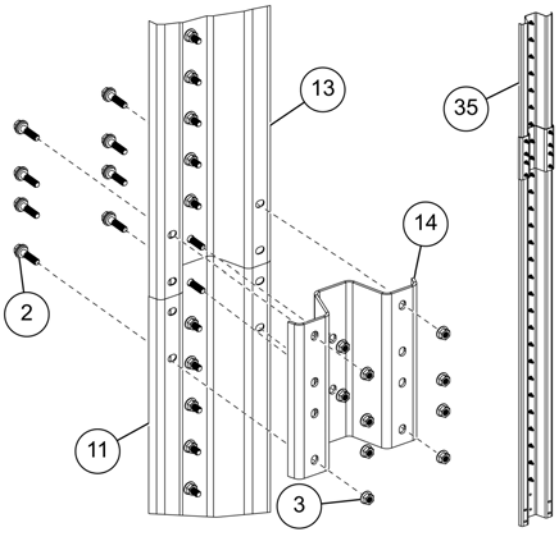


One-Ring Top Stiffener (15-18 Ga.) to a Two-Ring Stiffener (8-14 Ga.)

Refer to the below information for a standard connection of a one-ring top stiffener (CTS-4016XX) to a two-ring stiffener (CTS-4074XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
11	Two-ring stiffener (CTS-4074XX)
13	One-ring top stiffener (CTS-4016XX)
14	Splice (CTS-4035XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

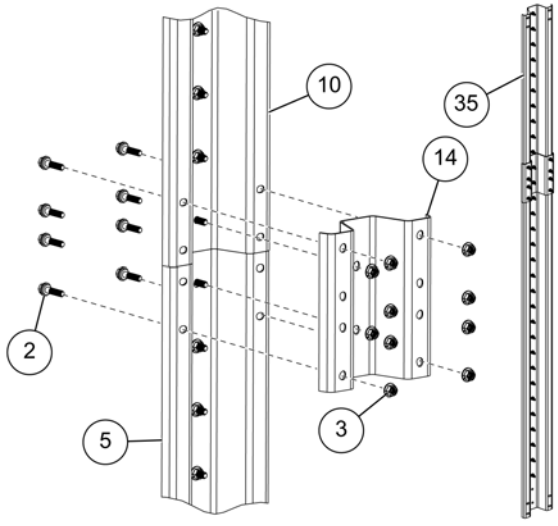


One-Ring Stiffener (15-18 Ga.) to a Two-Ring Stiffener (15-18 Ga.)

Refer to the below information for a standard connection of a one-ring stiffener (CTS-4006XX) to a two-ring stiffener (CTS-4004XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
5	Two-ring stiffener (CTS-4004XX)
10	One-ring stiffener (CTS-4006XX)
14	Splice (CTS-4035XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

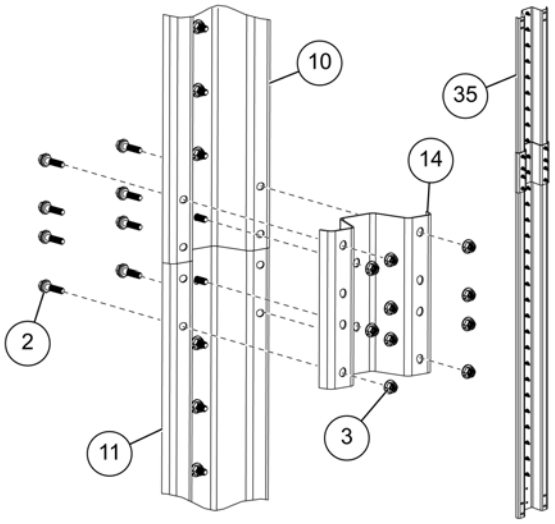


One-Ring Stiffener (15-18 Ga.) to a Two-Ring Stiffener (8-14 Ga.)

Refer to the below information for a standard connection of a one-ring stiffener (CTS-4006XX) to a two-ring stiffener (CTS-4074XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
10	One-ring stiffener (CTS-4006XX)
11	Two-ring stiffener (CTS-4074XX)
14	Splice (CTS-4035XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

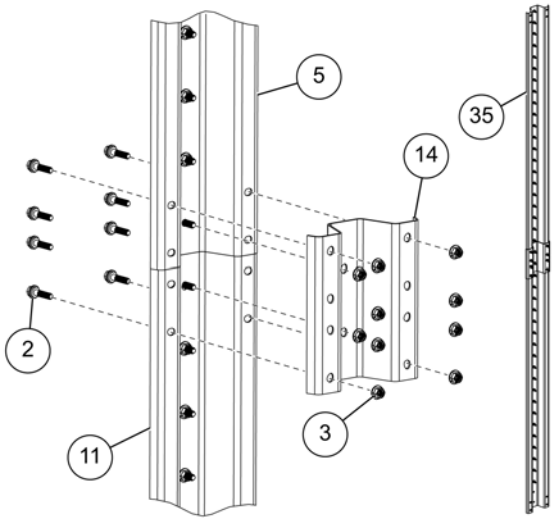


Two-Ring Stiffener (15-18 Ga.) to a Two-Ring Stiffener (8-14 Ga.)

Refer to the below information when connecting a two-ring stiffener (CTS-4004XX) to a two-ring stiffener (CTS-4074XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
5	Two-ring stiffener (CTS-4004XX)
11	Two-ring stiffener (CTS-4074XX)
14	Splice (CTS-4035XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

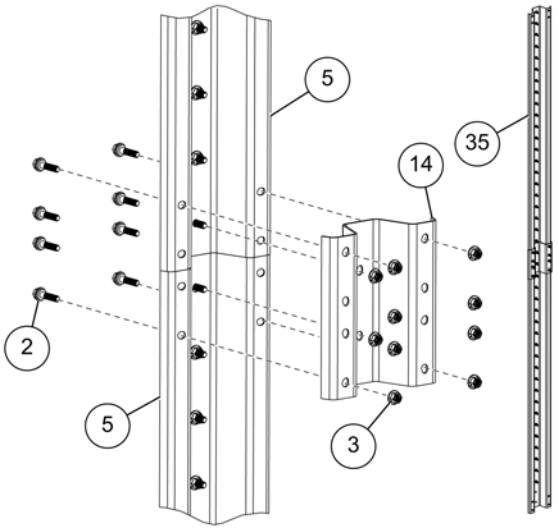


Two-Ring Stiffener (15-18 Ga.) to a Two-Ring Stiffener (15-18 Ga.)

Refer to the below information when connecting a two-ring stiffener (CTS-4004XX) to a two-ring stiffener (CTS-4004XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
5	Two-ring stiffener (CTS-4004XX)
14	Splice (CTS-4035XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

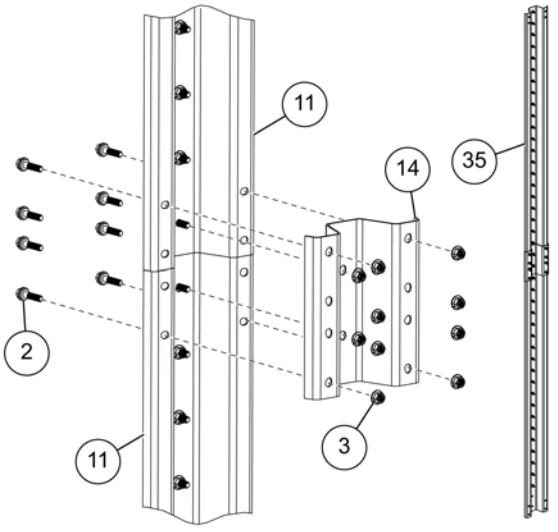


Two-Ring Stiffener (8-14 Ga.) to a Two-Ring Stiffener (8-14 Ga.)

Refer to the below information when connecting a two-ring stiffener (CTS-4074XX) to a two-ring stiffener (CTS-4074XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
11	Two-ring stiffener (CTS-4074XX)
14	Splice (CTS-4035XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

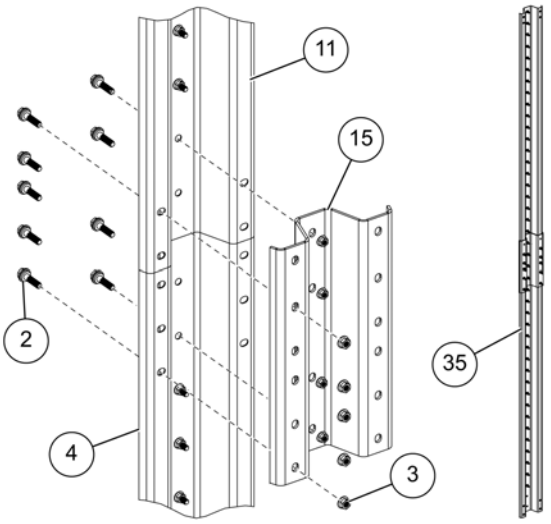


Two-Ring Stiffener (8-14 Ga.) to a Two-Ring Stiffener (2-6 Ga.)

Refer to the below information when connecting a two-ring stiffener (CTS-4074XX) to a two-ring stiffener (CTS-4002XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
4	Two-ring stiffener (CTS-4002XX)
11	Two-ring stiffener (CTS-4074XX)
15	Splice (CTS-4073XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

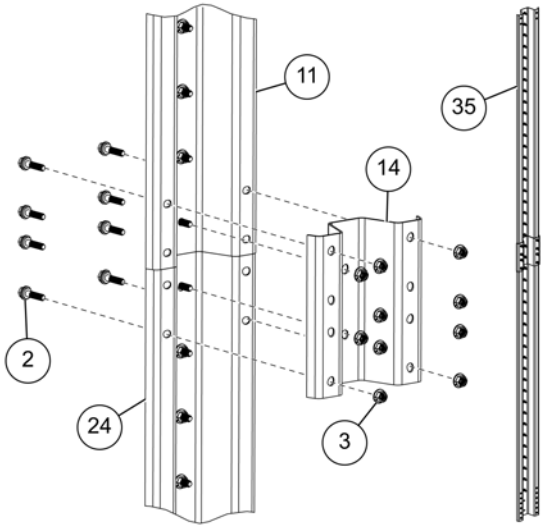


Two-Ring Stiffener (8-14 Ga.) to a Base Stiffener (8 Ga.)

Refer to the below information when connecting a two-ring stiffener (CTS-4074XX) to a two-ring stiffener (CTS-4077XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
11	Two-ring stiffener (CTS-4074XX)
14	Splice (CTS-4035XX)
24	Base stiffener (CTS-4077XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

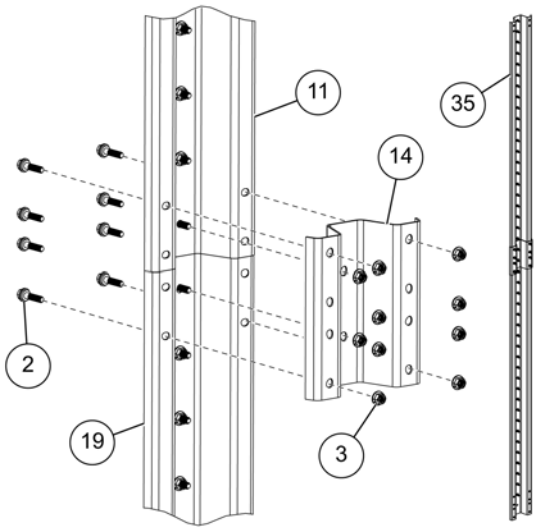


Two-Ring Stiffener (8-14 Ga.) to a Base Stiffener (10-14 Ga.)

Refer to the below information when connecting a two-ring stiffener (CTS-4074XX) to a base stiffener (CTS-4038XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
11	Two-ring stiffener (CTS-4074XX)
14	Splice (CTS-4035XX)
19	Base stiffener (CTS-4038XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

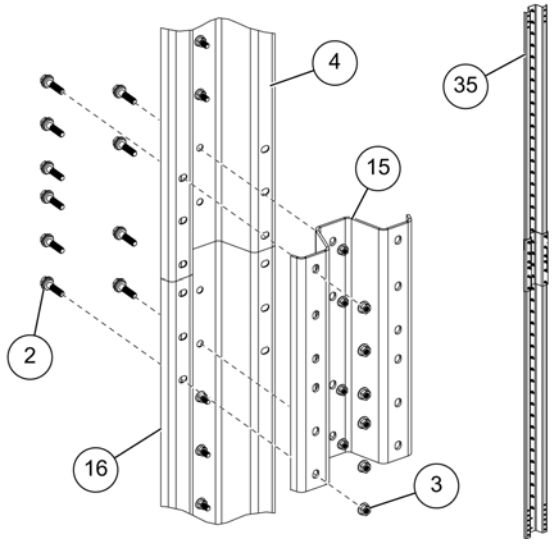


Two-Ring Stiffener (2-6 Ga.) to a Base Stiffener (2-6 Ga.)

Refer to the below information when connecting a two-ring stiffener (CTS-4002XX) to a two-ring stiffener (CTS-4033XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
4	Two-ring stiffener (CTS-4002XX)
15	Splice (CTS-4073XX)
16	Base stiffener (CTS-4033XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

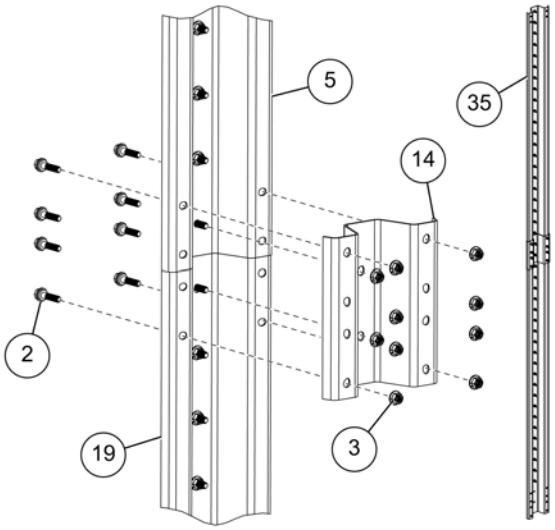


Two-Ring Stiffener (15-18 Ga.) to a Base Stiffener (10-14 Ga.)

Refer to the below information when connecting a two-ring stiffener (CTS-4004XX) to a base stiffener (CTS-4038XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
5	Two-ring stiffener (CTS-4004XX)
14	Splice (CTS-4035XX)
19	Base stiffener (CTS-4038XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

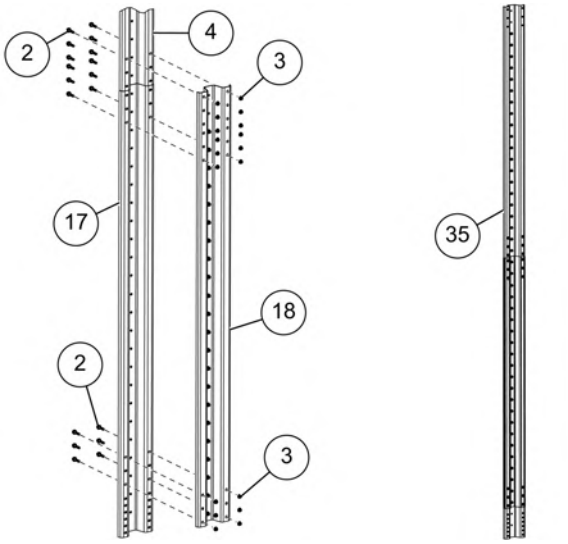


Two-Ring Stiffener (2-6 Ga.) to a Laminated Stiffener (2 Ga.) with an Insert (10-12 Ga.)

Refer to the below information when connecting a two-ring stiffener (CTS-4002XX) to a laminated stiffener (CTS-4034XX) and insert (CTS-4037XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
4	Two-ring stiffener (CTS-4002XX)
17	Laminated stiffener (CTS-4034XX)
18	Insert (CTS-4037XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

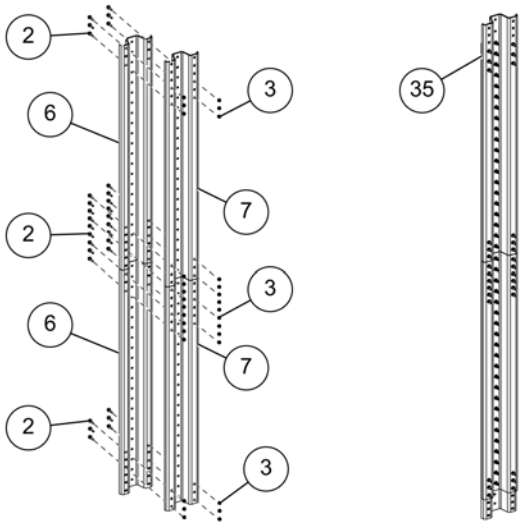


Laminated Stiffeners (2 Ga.) with Inserts (10-12 Ga.)

Refer to the below information when connecting a laminated stiffener (CTS-4008XX) to an insert (CTS-4010XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
6	Laminated stiffener (CTS-4008XX)
7	Insert (CTS-4010XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

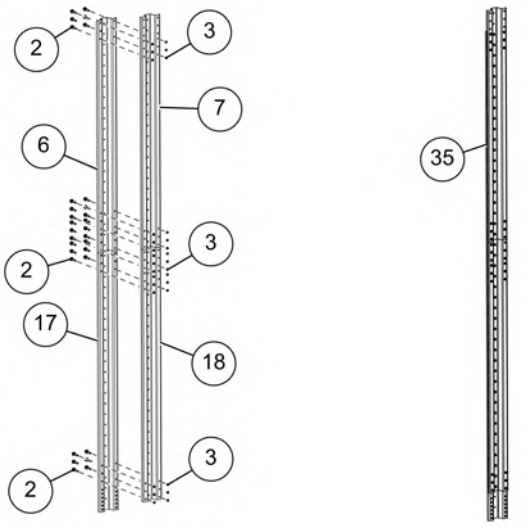


Laminated Stiffener (2 Ga.) with an Insert (10-12 Ga.) to a Laminated Base Stiffener (2 Ga.) with a Base Insert (10-12 Ga.)

Refer to the below information when connecting a laminated stiffener and insert (CTS-4008XX and CTS-4010XX) to a laminated base stiffener and base insert (CTS-4034XX and CTS-4037XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
6	Laminated stiffener (CTS-4008XX)
7	Insert (CTS-4010XX)
17	Laminated base stiffener (CTS-4034XX)
18	Base insert (CTS-4037XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

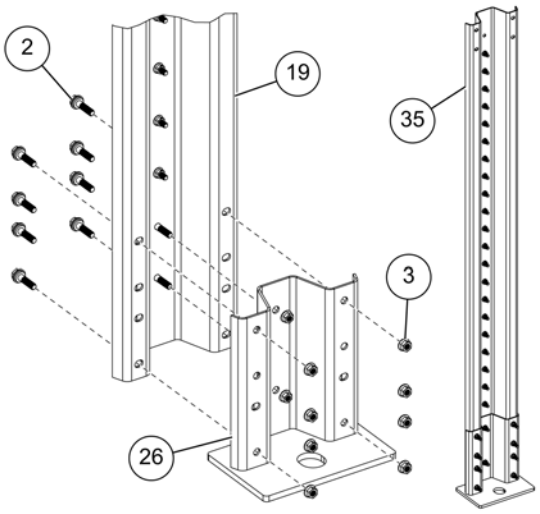


Base Stiffener (10-16 Ga.) to a Base Boot

Refer to the below information when connecting a base stiffener (CTS-4038XX) to a base boot (CTS-4046XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
19	Base stiffener (CTS-4038XX)
26	Base boot (CTS-4046XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

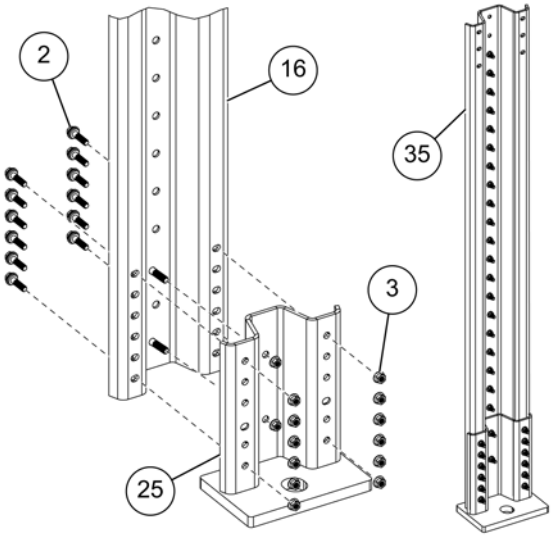


Base Stiffener (2+12 Ga. - 6 Ga.) to a Base Boot

Refer to the below information when connecting a base stiffener (CTS-4033XX) to a base boot (CTS-4045XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
16	Base stiffener (CTS-4033XX)
25	Base Boot (CTS-4045XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

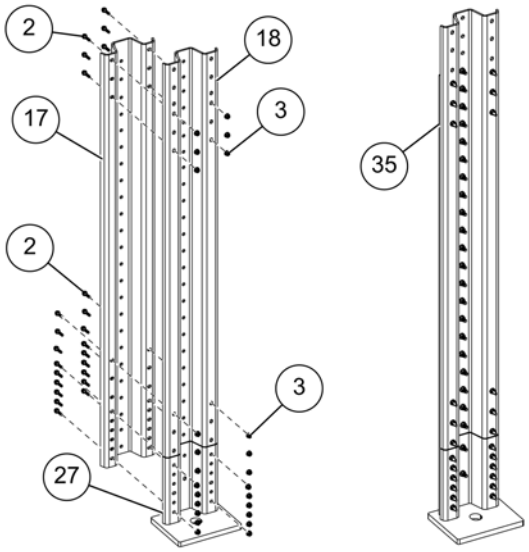


Laminated Base Stiffener (2 Ga.) with Insert (2+10 to 2+12 Ga.) to a Base Boot

Refer to the below information when connecting a laminated base stiffener with insert (CTS-4034XX and CTS-4037XX) to a base boot (CTS-4045XX or CTS-4048XX).

2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
17	Laminated base stiffener (CTS-4034XX)
18	Base Insert (CTS-4037XX)
27	Base boot (CTS-4045XX or CTS-4048XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

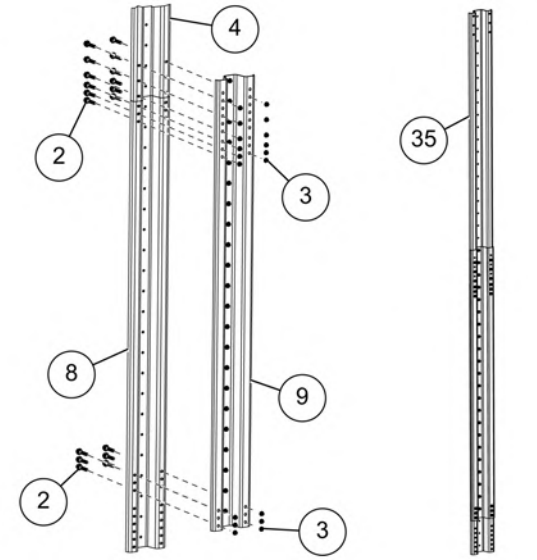


Standard Stiffener to a 12-Bolt Pattern Laminated Stiffener with Insert

Refer to the below information when connecting a standard stiffener (CTS-4002XX) to a 12-bolt pattern laminated stiffener (CTS-4041XX) with insert (CTS-4042XX).

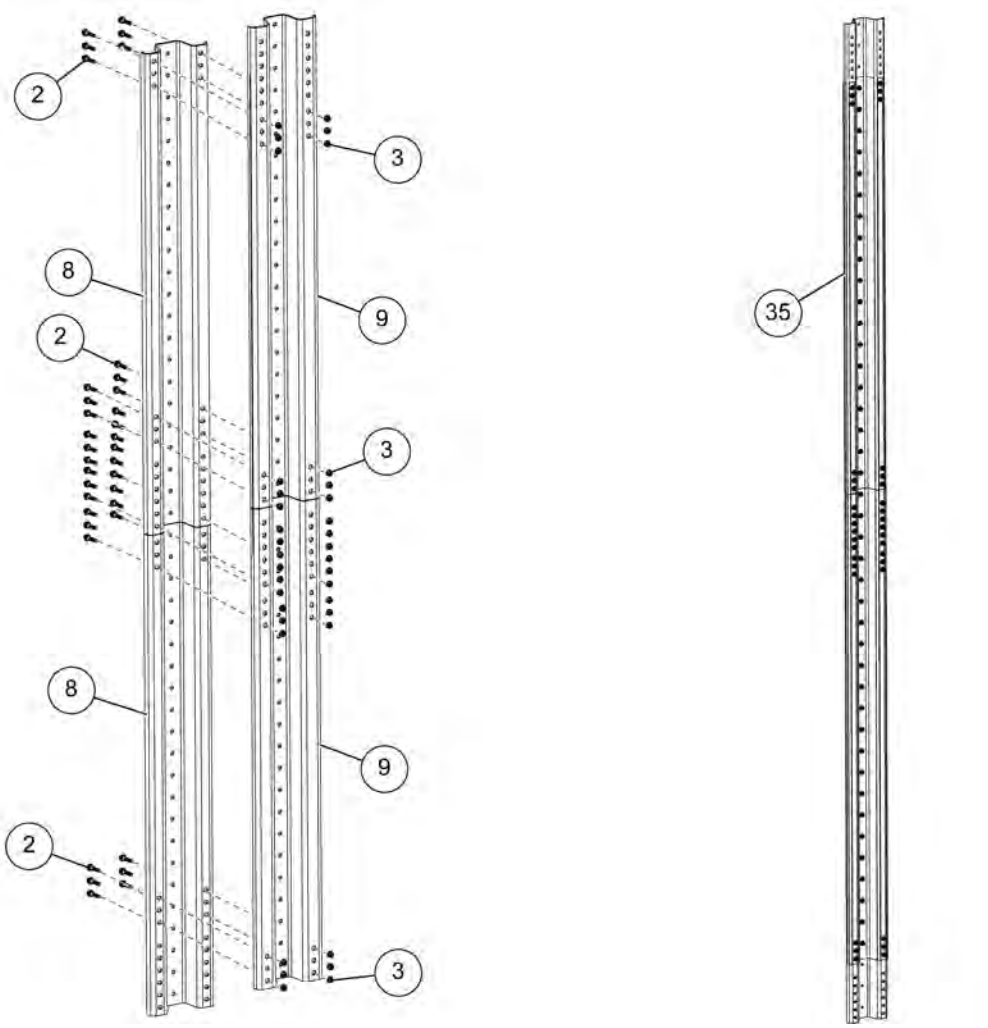
2	M10 x 25 flange bolt (S-10782)
3	M10 flange nut (S-10784)
4	Standard stiffener (CTS-4002XX)
8	Laminated stiffener (CTS-4041XX)
9	Insert (CTS-4042XX)
35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*



12-Bolt Pattern Laminated Stiffeners with Insert

Refer to the below information when connecting two 12-bolt pattern laminated stiffeners (CTS-4041XX) with inserts (CTS-4042XX).

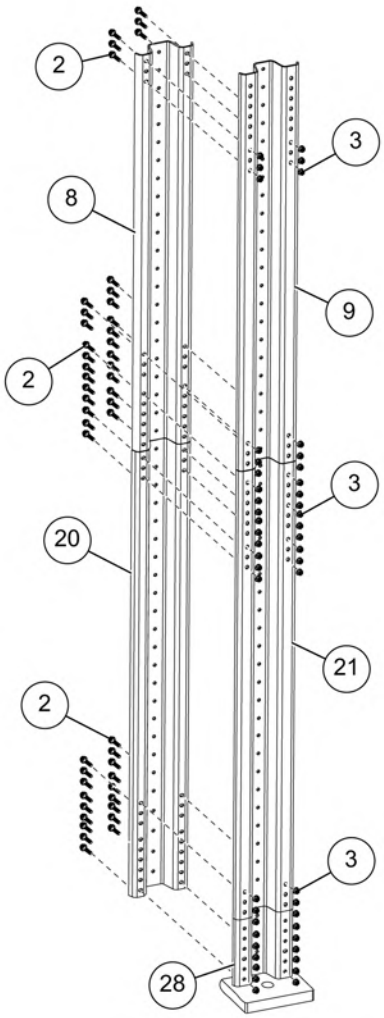


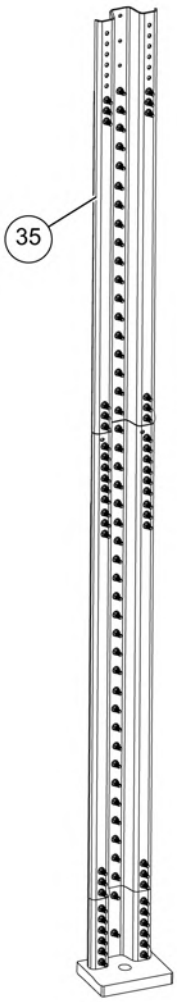
2	M10 x 25 flange bolt (S-10782)	9	Insert (CTS-4042XX)
3	M10 flange nut (S-10784)	35	Completed assembly
8	Laminated stiffener (CTS-4041XX)		

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

12-Bolt Pattern Laminated Stiffener to Laminated Base Stiffener with Inserts to a Base Boot

Refer to the below information when connecting a 12-bolt pattern laminated stiffener (CTS-4041XX) and a laminated base stiffener (CTS-4042XX) with inserts (CTS-4039XX and CTS-4040XX) to a base boot (CTS-4049XX).



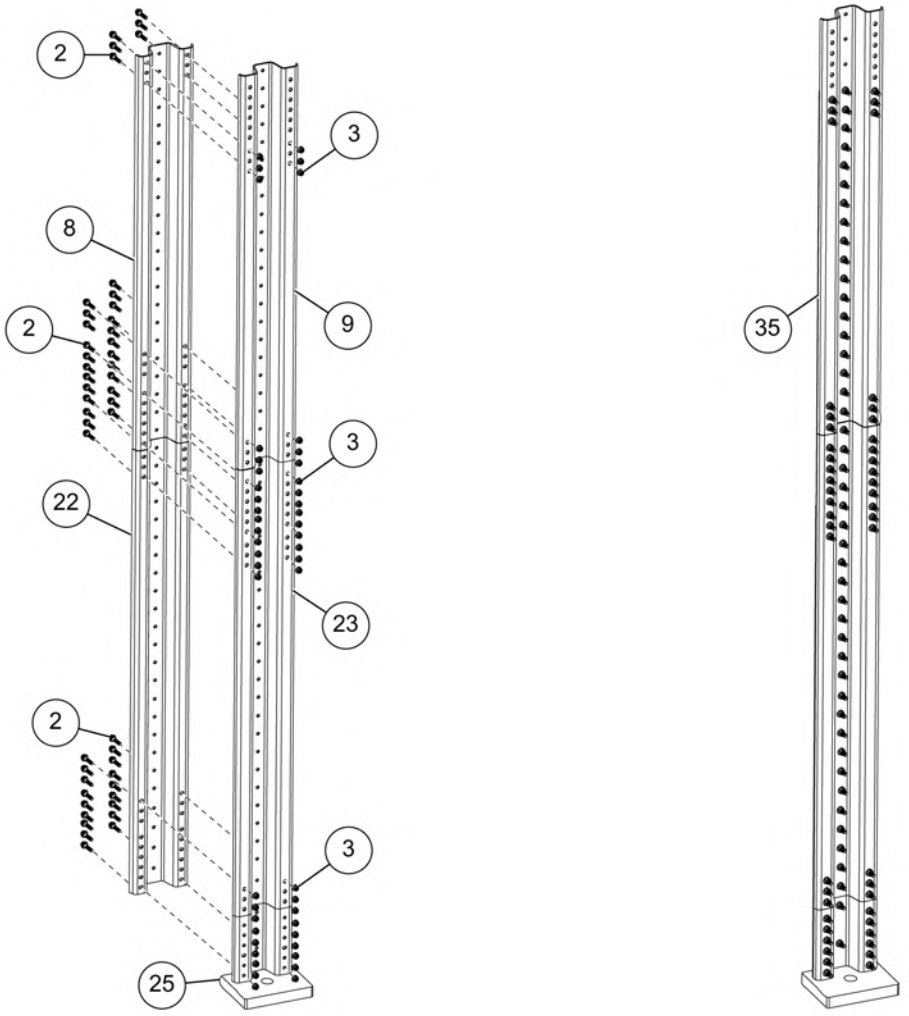


2	M10 x 25 flange bolt (S-10782)	20	Laminated base stiffener (CTS-4039XX)
3	M10 flange nut (S-10784)	21	Base insert (CTS-4040XX)
8	Laminated stiffener (CTS-4041XX)	28	Base boot (CTS-4049XX)
9	Base insert (CTS-4042XX)	35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

12-Bolt Pattern Laminated Stiffener to Laminated Base Stiffener with Inserts to a Base Boot

Refer to the below information when connecting a 12–bolt pattern laminated stiffener (CTS-4041XX) and a laminated base stiffener (CTS-4050XX) with inserts (CTS-4042XX and CTS-4051XX) to a base boot (CTS-4045XX or CTS-4048XX).



2	M10 x 25 flange bolt (S-10782)	22	Laminated base stiffener (CTS-4050XX)
3	M10 flange nut (S-10784)	23	Close-punch base Insert (CTS-4051XX)
8	Laminated stiffener (CTS-4041XX)	25	Base boot (CTS-4045XX or 4048XX)
9	Base insert (CTS-4042XX)	35	Completed assembly

NOTE: *Two-post stiffeners shown. The bolt pattern will vary for 3-post. Only place bolts where holes in the stiffeners align with holes in the sidewall sheet.*

7 Door Assemblies

Topics Covered in this Chapter

- General Information
- Door Assembly Instructions (WD-6309 and WD-6311)
- Door Assembly Instructions (NCWT0701 and NCWT0719)

General Information

Two Ring Doors for Various Bin Heights

The two ring door used for each bin depends upon the number of rings. Refer to the below table to identify the door used with each bin height.

Table 7-1 *Two ring door information*

S.No	Bin Diameter	Bin Rings	Stiffener Post	Door Assembly
1	60'	11 Rings to 15 Rings	2-Post	WD-6309
2			3-Post	WD-6311
3		16 Rings and Taller	2-Post	NCWT0701
4			3-Post	NCWT0719

1. The commercial two ring door is installed in the bottom two rings.
2. The door should normally be placed in line with the conveyor. An intermediate discharge well should be located near the wall to clear the grain from the area of the access door (as with any access door).
3. The door should be located between the two stiffeners.

Door Assembly Instructions (WD-6309 and WD-6311)

Two Ring Door Layout

Figure 7-1 *Two ring door placement - 2 post (WD-6309)*

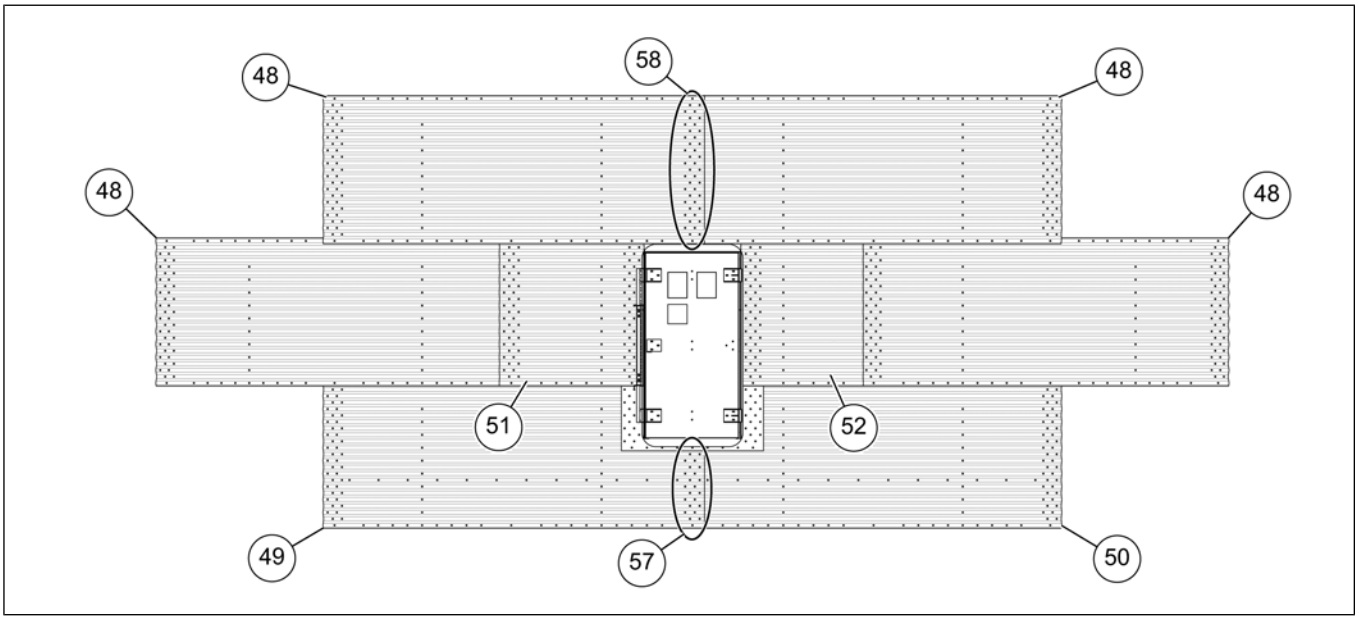
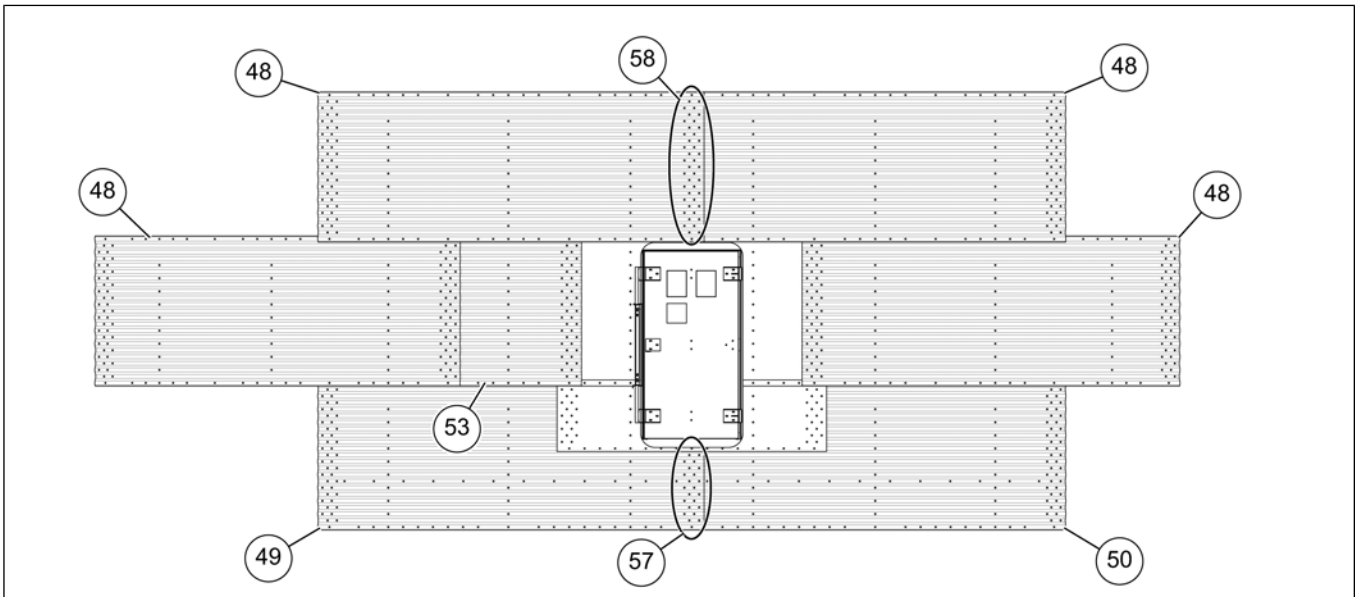


Figure 7-2 *Two ring door placement - 3 post (WD-6311)*



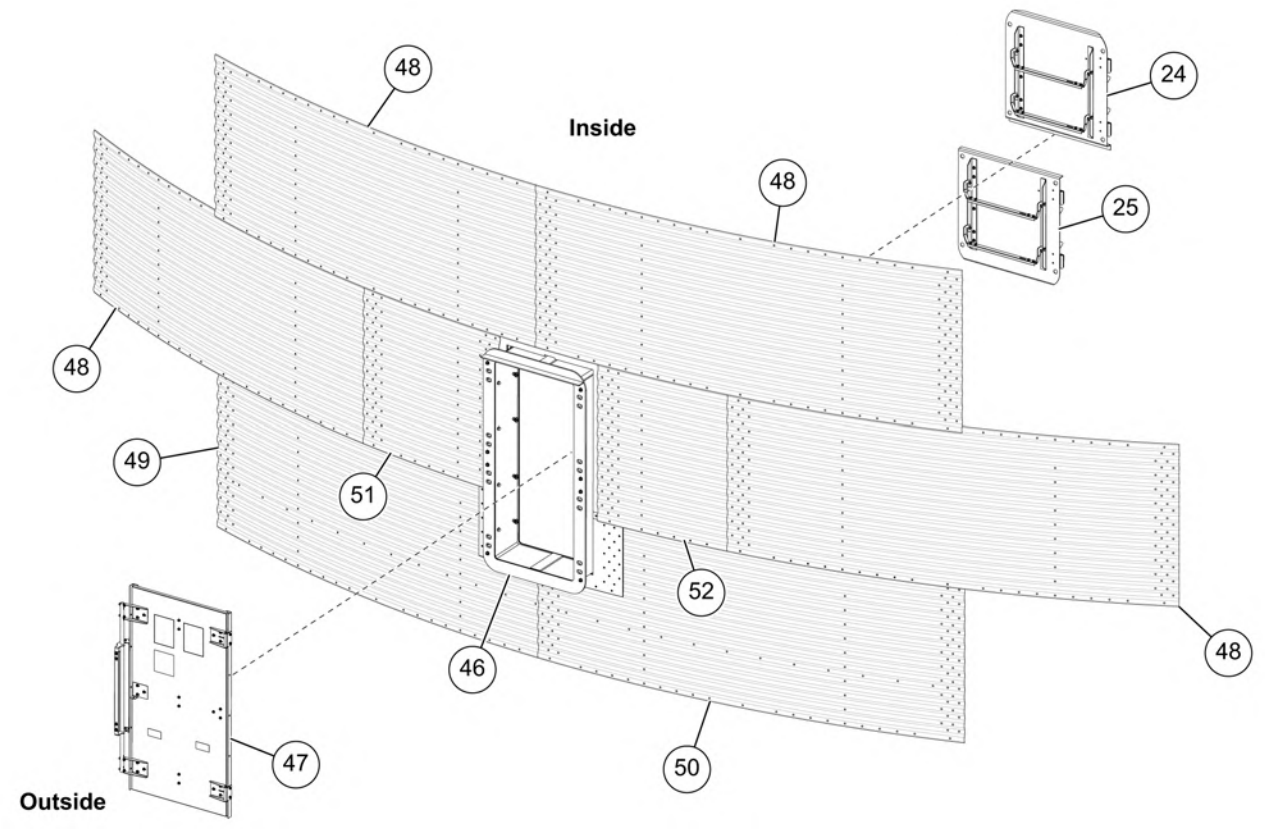
48	Sidewall sheet	52	Right short door sheet (2-post)
49	Left notch door sheet	53	Short door sheet (3-post)
50	Right notch door sheet	57	The center of the door must be positioned directly above the vertical seam.
51	Left short door sheet (2-post)	58	The center of the door must be positioned directly below the vertical seam.

Installing the Door Weldment

The two ring door is installed in the last two rings, after all the other rings have been assembled and lifted. There are two notched door sheets (49 and 50) and two short door sheets (51 and 52) that must be installed around the door weldment (46) to ensure the correct installation.

1. Install the door at the same time as you install the second ring from the bottom. The door consists of a door weldment (46), top inner door assembly (24), bottom inner door assembly (25) and outer cover assembly (47).
2. Install the notched door sheets (49 and 50) and short door sheets (51 and 52) as shown below.

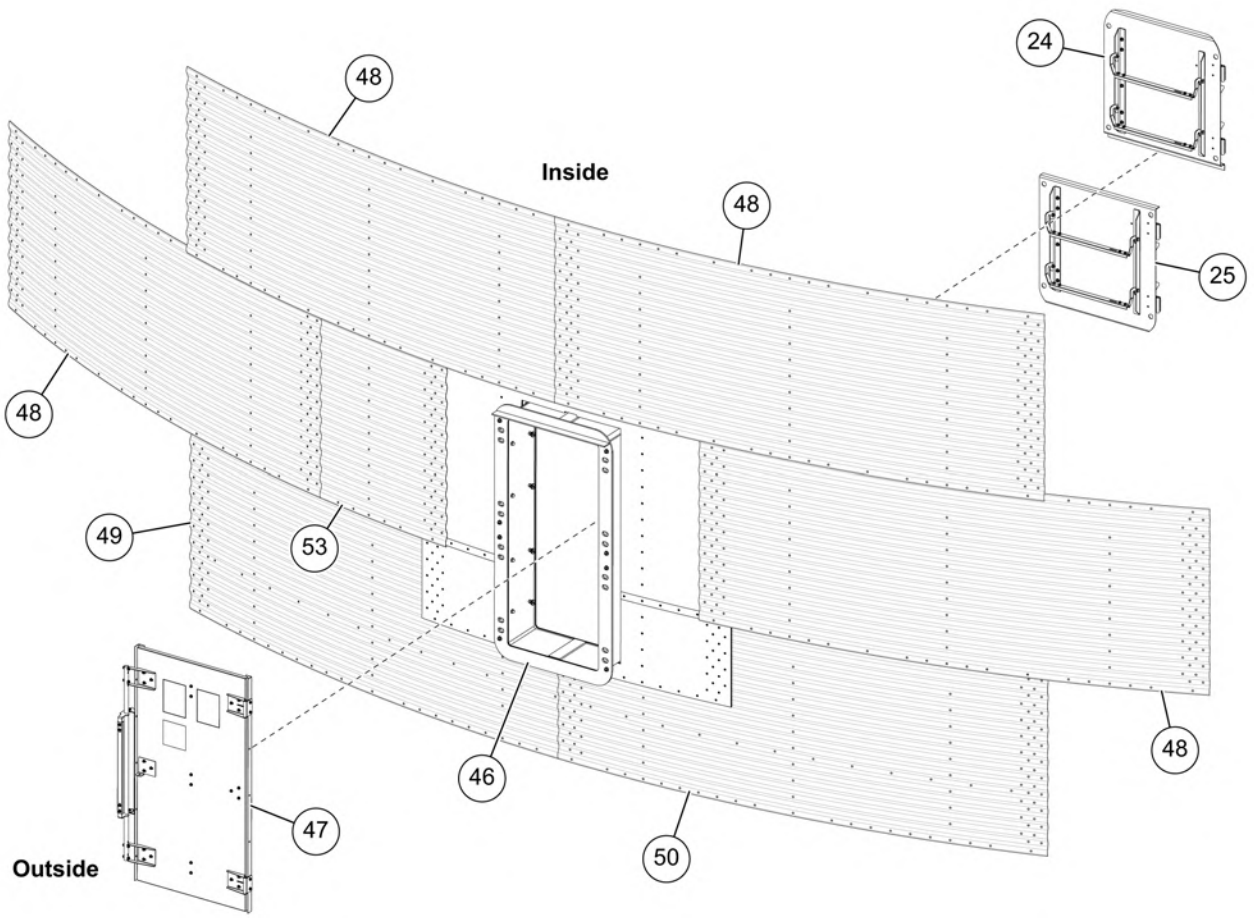
Figure 7-3 *Two ring door installation - 2 post*



24	Top inner door assembly (NCWT0193)	49	Left notch door sheet
25	Bottom inner door assembly (NCWT0195)	50	Right notch door sheet
46	Door frame weldment	51	Left short door sheet
47	Outer cover assembly	52	Right short door sheet
48	Sidewall sheet		

3. Install the door at the same time as you install the second ring from the bottom. The door consists of a door weldment (46), top inner door assembly (24), bottom inner door assembly (25) and outer cover assembly (47).
4. Install the notched door sheets (49 and 50) and short door sheet (53) as shown below.

Figure 7-4 *Two ring door installation - 3 post*

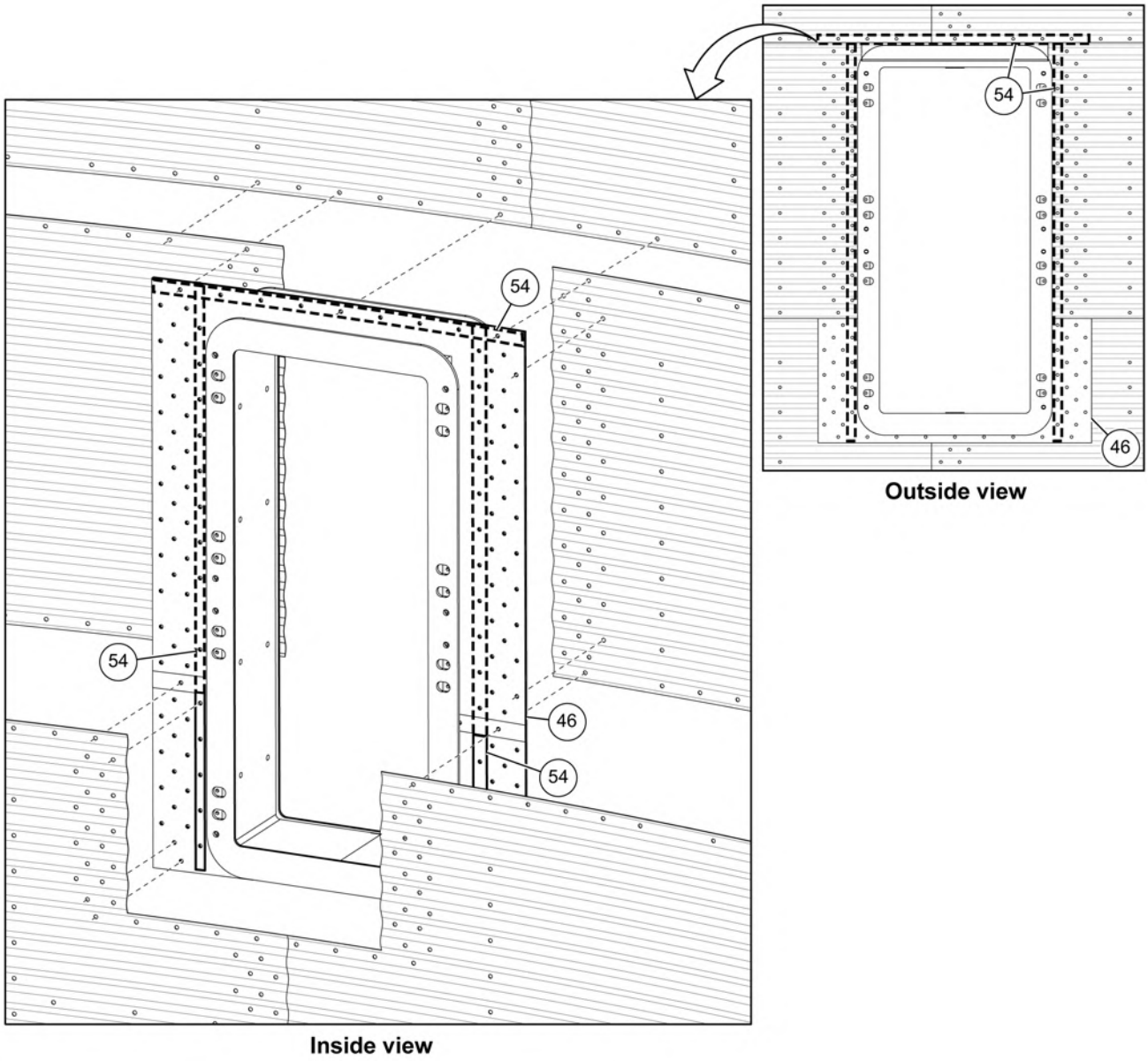


24	Top inner door assembly (NCWT0193)	48	Sidewall sheet
25	Bottom inner door assembly (NCWT0195)	49	Left notch door sheet
46	Door frame weldment	50	Right notch door sheet
47	Outer cover assembly	53	Short door sheet (3-post)

5. Before installing the door frame to the sidewall, apply caulking (54) around the door flanges before installing the door frame (46).
6. For the left and right side door flanges, apply one vertical strip of caulk (54) to each side of the vertical rows of bolts nearest to the door opening. Refer to the detail view in *Figure 7-5, page 79* for 2-post and *Figure 7-6, page 80* for 3-post.
7. For the top flange, apply one strip of caulk (54) to each side of the horizontal row of bolts.

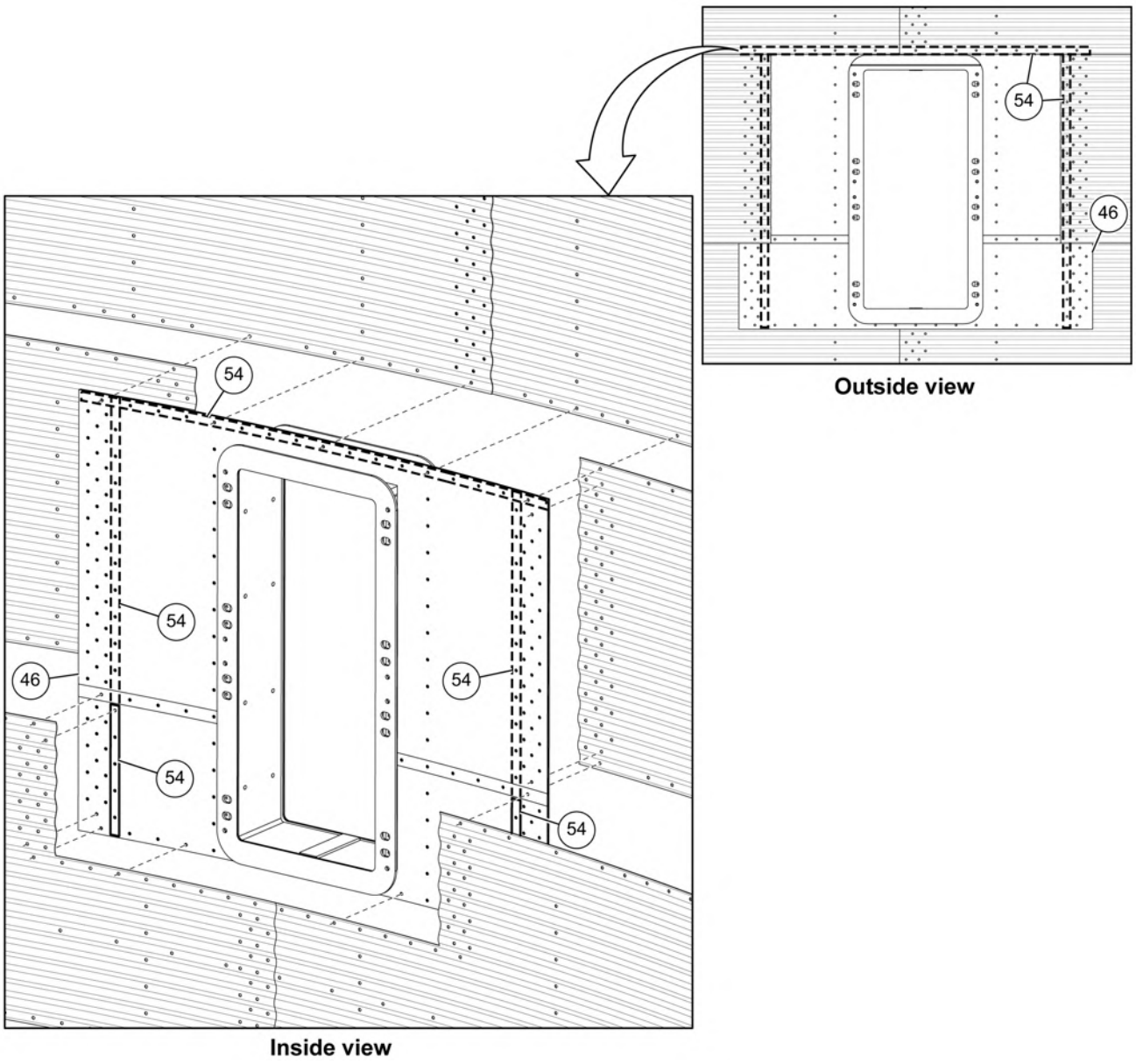
NOTE: *The top of the door frame (46) goes to the inside of the sidewall and the bottom of the door frame (46) goes to the outside of the notched sidewall sheets. Therefore depending upon the location and the overlap, caulking (54) will be applied on the outside for the top of the door frame (46) and on the inside for the bottom of the door frame (46) as shown below.*

Figure 7-5 *Caulking for door frame - 2 post*



46	Door frame weldment	54	Rope caulk

Figure 7-6 *Caulking for door frame - 3 post*



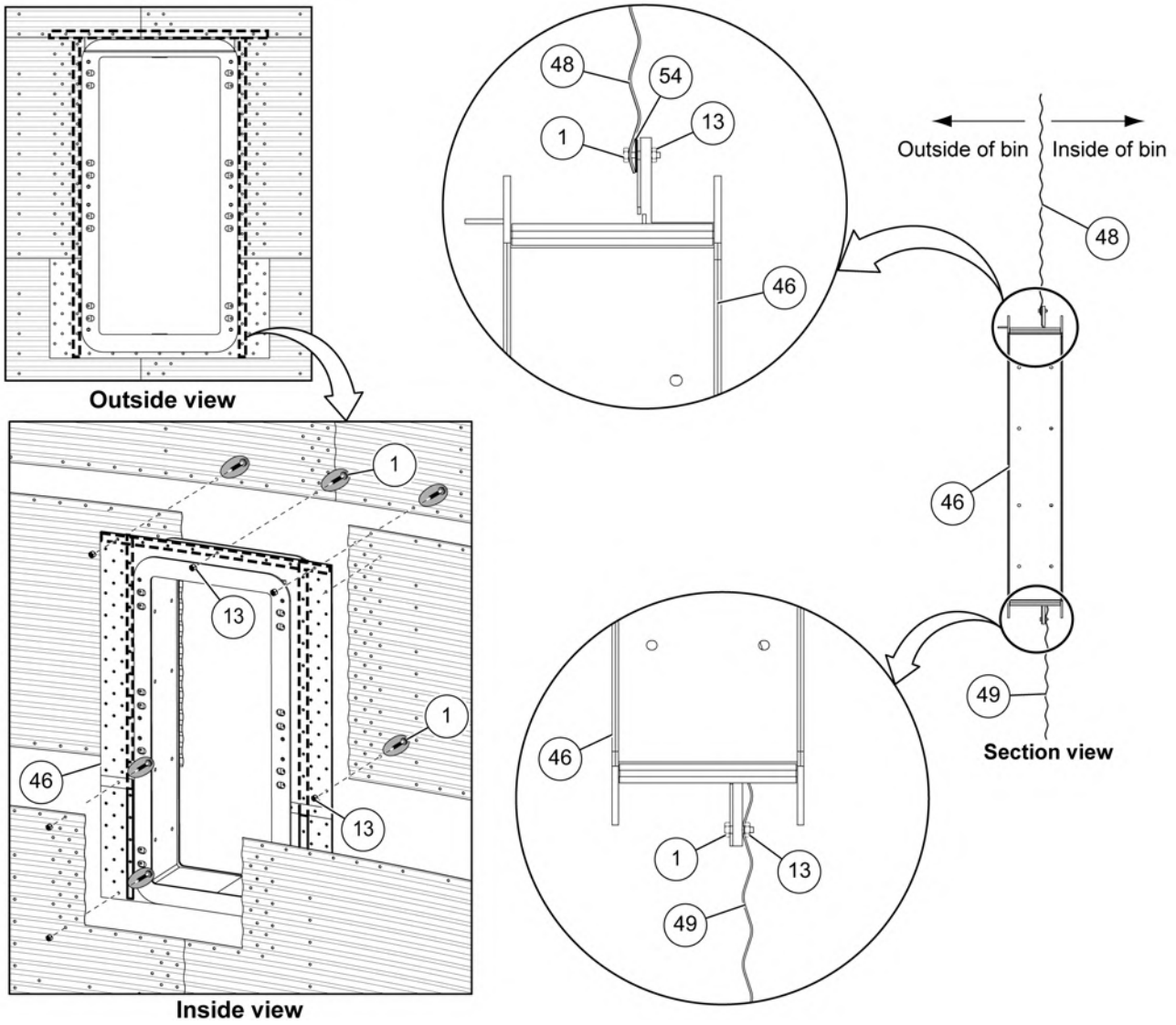
46	Door frame weldment	54	Rope caulk

8. Install the door frame weldment (46) to the **outside** of the bottom two rings using M10 x 40 flange bolts (1) and M10 flange nuts (13).

   IMPORTANT: *The top of the door frame weldment (46) must be installed to the inside of the third ring of sidewall. Remember to apply rope caulk (54) around the bolt holes at the top of the door frame weldment (46), between the door and the sidewall. (Refer to inside view in Figure 7-5, page 79 for 2-post and inside view in Figure 7-6, page 80 for 3-post.)*

   NOTE: *Install the bolt heads (1) to the outside of the bin.*

Figure 7-7 *Installing the door weldment to the sidewall*



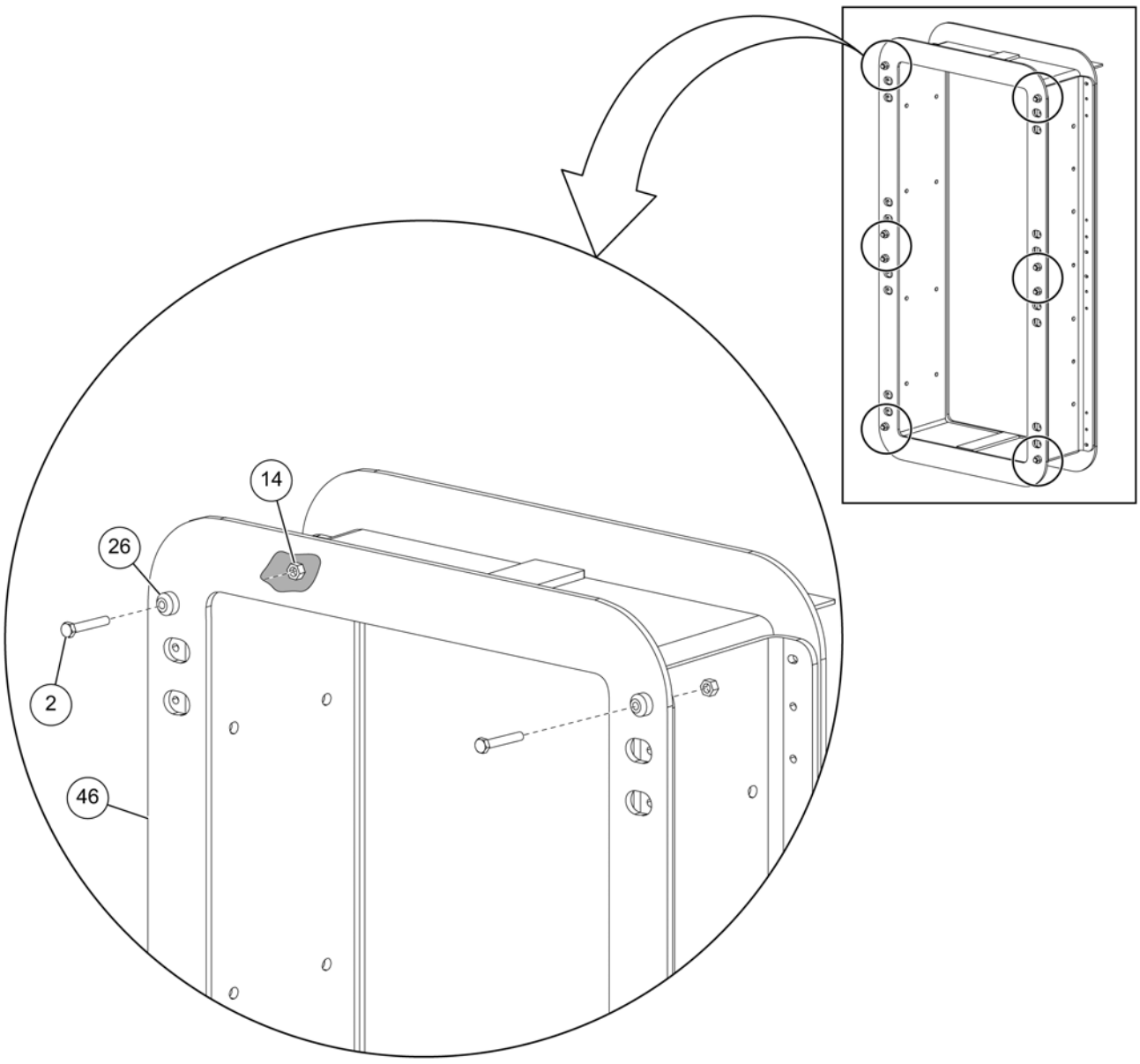
1	M10 x 40 flange bolt with sealing washer (S-10780)	48	Sidewall sheet
13	M10 flange nut (S-10784)	49	Left notch door sheet
46	Door frame weldment	54	Rope caulk

Installing the Bearing Pins

1. The bearing pins (26) are used to align the inside panels correctly with the door frame weldment (46).
2. Install eight bearing pins (26) to the door frame weldment (46) located on the inside of the bin using 5/16" x 2" HHCS bolts (2) and 5/16" lock nuts (14).

   NOTE: *Do not fully tighten bearing pins (26) until the inside doors are installed and adjusted.*

Figure 7-8 *Installing the bearing pins*



2	5/16" x 2" HHCS bolt (S-7877)	26	Bearing pins (WD-6224)
14	5/16" lock nut (S-5220)	46	Door frame weldment

Installing the Latch Bar Holders

The latch bar holders (27) are used to secure the inner doors tightly against the door frame.

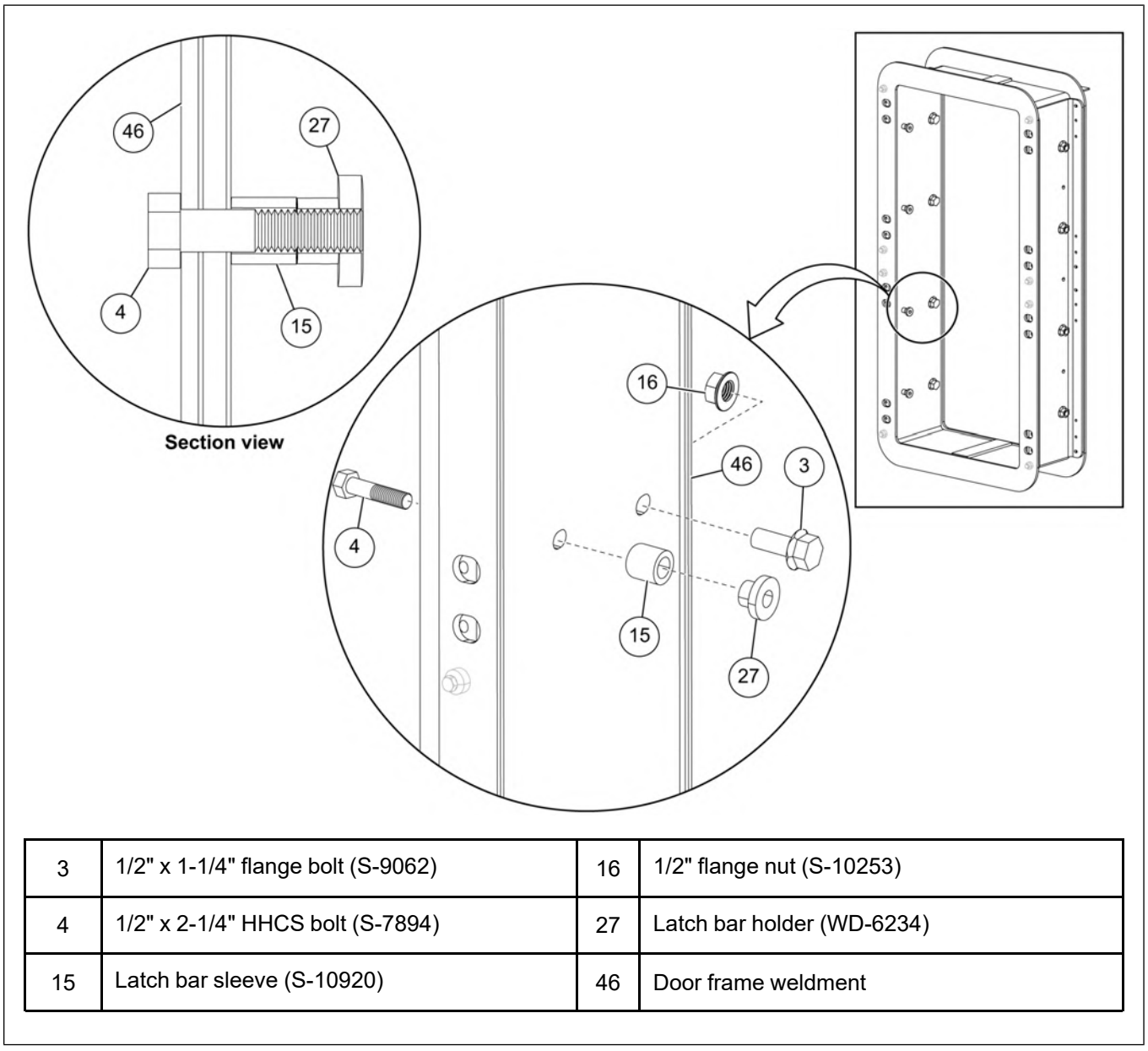
1. Install eight 1/2" x 1-1/4" flange bolts (3) and 1/2" flange nuts (16) to fill in the eight holes inside of the door frame weldment (46) located towards the outside of the bin.

   NOTE: *Bolt heads (3) must be installed on the inside of the door frame weldment (46).*

2. In the remaining holes, install the eight latch bar holders (27) to the inside of the door frame weldment (46) using 1/2" x 2-1/4" HHCS bolts (4) and a latch bar sleeve (15).

   NOTE: *Install the HHCS bolts (4) to the outside and latch bar sleeves (15) to the inside of the door frame weldment (46). Use a latch bar sleeve (15) to adjust the depth of the bearing pins in the door frame weldment (46). Do not fully tighten the latch bar holders (27) until the inside doors are installed and adjusted.*

Figure 7-9 *Installing the latch bar holders*



3	1/2" x 1-1/4" flange bolt (S-9062)	16	1/2" flange nut (S-10253)
4	1/2" x 2-1/4" HHCS bolt (S-7894)	27	Latch bar holder (WD-6234)
15	Latch bar sleeve (S-10920)	46	Door frame weldment

Assembling the Top and Bottom Inner Doors

The inner doors assemble in the same way. Make sure the hinge side of the panels are oriented correctly before starting the assembly.

1. Assemble the latch bars (32) to a set of the left and right latches (28 and 29) using four 5/16" x 1" MS screws (5) and 5/16" flange nuts (17).

   NOTE: *Install MS screws (5) with screw head on the top of the latch bar (32).*

2. Install the reinforcement angle (30) to the left side of the inner door panel using six 5/16" x 1" flange bolts (6) and 5/16" flange nuts (17).

   NOTE: *Install the flange bolts (6) with bolt head to the inside of the reinforcement angle (30).*

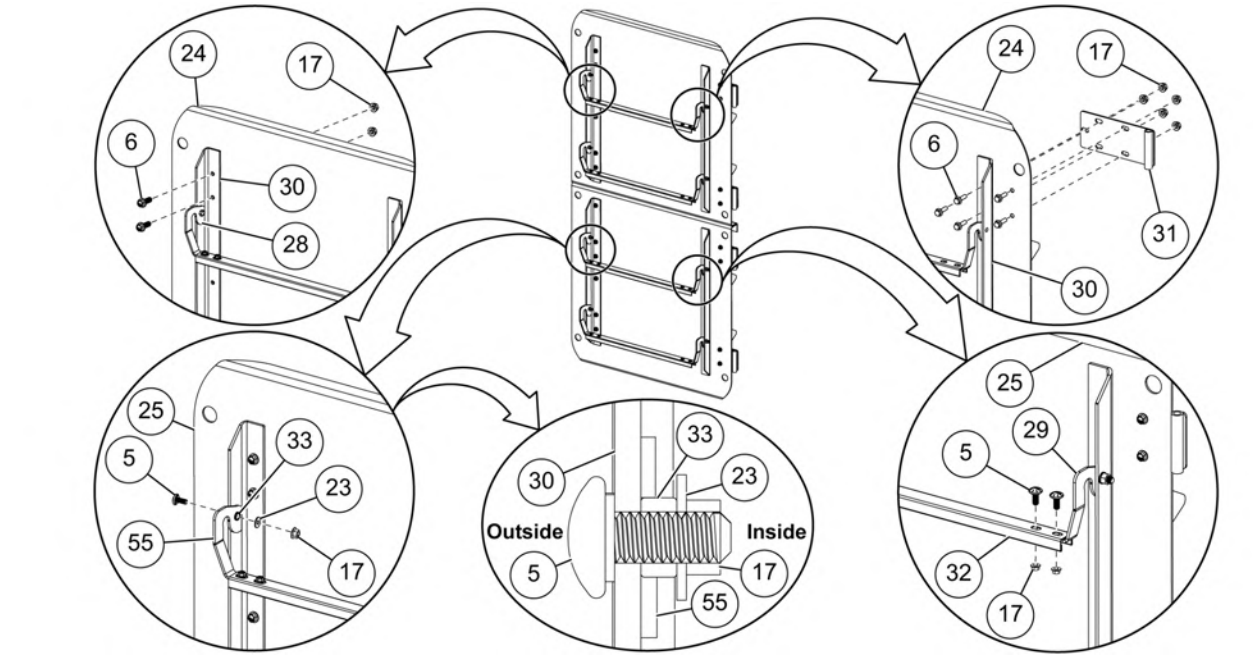
3. Install the reinforcement angle (30) to the right side of the inner door panel at the same time as the hinge straps (31) using ten 5/16" x 1" flange bolts (6) and 5/16 in. flange nuts (17).

   NOTE: *Install the flange bolts (6) with bolt head to the inside of the reinforcement angle (30).*

4. Attach the latch bar assemblies (55) to the inside of the reinforcement angels (30) using four bushings (33), 5/16" x 1" MS screws (5), 5/16" flat washers (23) and 5/16" flange nuts (17).

   NOTE: *Install MS screws (5) with screw head to the outside of the reinforcement angle (30).*

Figure 7-10 *Assembling the top and bottom inner doors*



5	5/16" x 1" MS screw with sealing washer (S-10267)	29	Inside panel right latch (WD-6037)
6	5/16" x 1" flange bolt with sealing washer (S-10260)	30	Door reinforcement angle (NCWT0298)
17	5/16" flange nut (S-3611)	31	Hinge strap (NCWT0202)
23	5/16" flat washer (S-845)	32	Latch bar (NCWT0299)
24	Top inner door panel (NCWT0193)	33	Latch bushing (WD-6040)
25	Bottom inner door panel (NCWT0195)	55	Latch bar assembly
28	Inside panel left latch (WD-6038)		

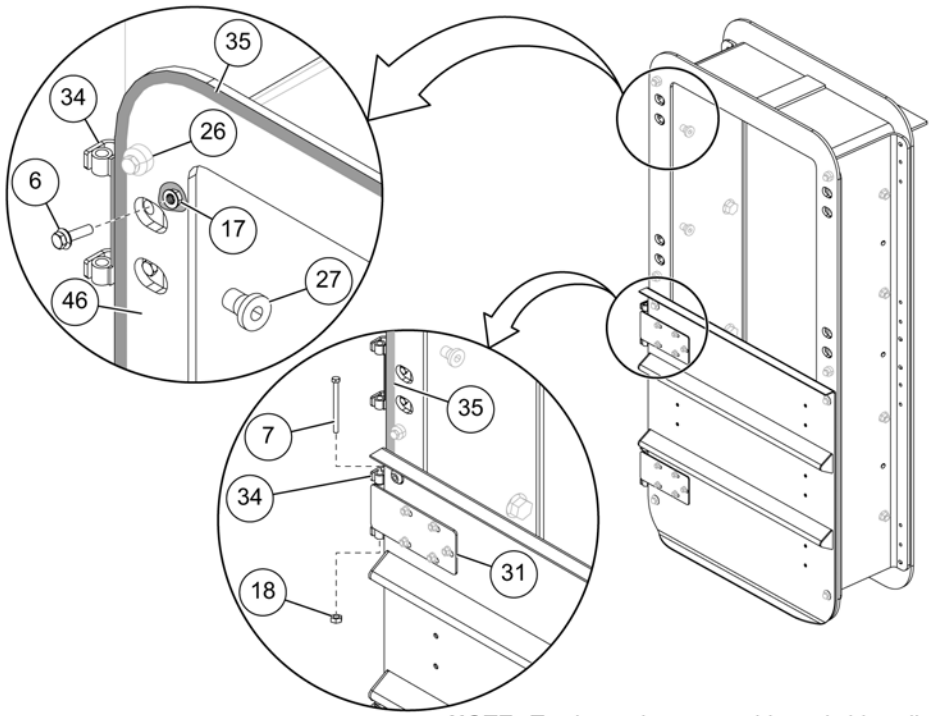
Installing the Inside Door Panels

IMPORTANT: *The inner door panels (24 and 25) must seat on the bearing pins (26) and lock over latch bar holders (27) for the door panels to close correctly. DO NOT fill the bin until the door panels have been installed correctly.*

NOTE: *Adjust the panel hinges (34) if needed to align the door on the bearing pins (26).*

1. Install four panel hinges (34) to the inside of the door frame weldment (46) on the left using eight 5/16" x 1" flange bolts (6) and 5/16" flange nuts (17).
2. Align the hinge straps (31) on the bottom door assembly with the bottom set of panel hinges (34) and install using two 3/8" x 6" HHCS bolts (7) and 3/8" lock nuts (18).
3. Align the hinge straps (31) on the top door assembly with the top set of panel hinges (34) and install using two 3/8" x 6" HHCS bolts (7) and 3/8" lock nuts (18).
4. After the doors are seated on bearing pins (26) and seal when closed, fully tighten all the bearing pins (26) and latch bar holders (27).
5. Install foam seal (35) along the outside edge of the door frame weldment (46) where the door meets the frame.

Figure 7-11 *Installing the inside door panels*



NOTE: *Top inner door assembly and sidewalls are hidden for clarity.*

6	5/16" x 1" flange bolt with sealing washer (S-10260)	27	Latch bar holder (WD-6234)
7	3/8" x 6" HHCS bolt (S-7248)	31	Hinge strap (NCWT0202)
17	5/16" flange nut (S-3611)	34	Cover hinge weldment (NCWT0200)
18	3/8" lock nut (S-8235)	35	Foam seal (S-8610)
26	Bearing pins (WD-6224)	46	Door frame weldment

Assembling the Outer Door

The outer door must be assembled before it can be installed to the column weldments.

1. Attach the middle reinforcement channel (37) at the same time as the hold-back plate (22) to the middle of the outer cover (36) using eight 5/16" x 1" flange bolts (6) and 5/16" flange nuts (19).

   NOTE: *Make sure to install the reinforcement channel (37) on the inside and hold-back plate (22) on the outside of the outer door.*

2. Install the top and bottom reinforcement channels (37) at the same time as the handle mounting brackets (40) and cover hinge brackets (39) to the outer door cover (36) using sixteen 5/16" x 1" flange bolts (6) and 5/16" flange nuts (19).

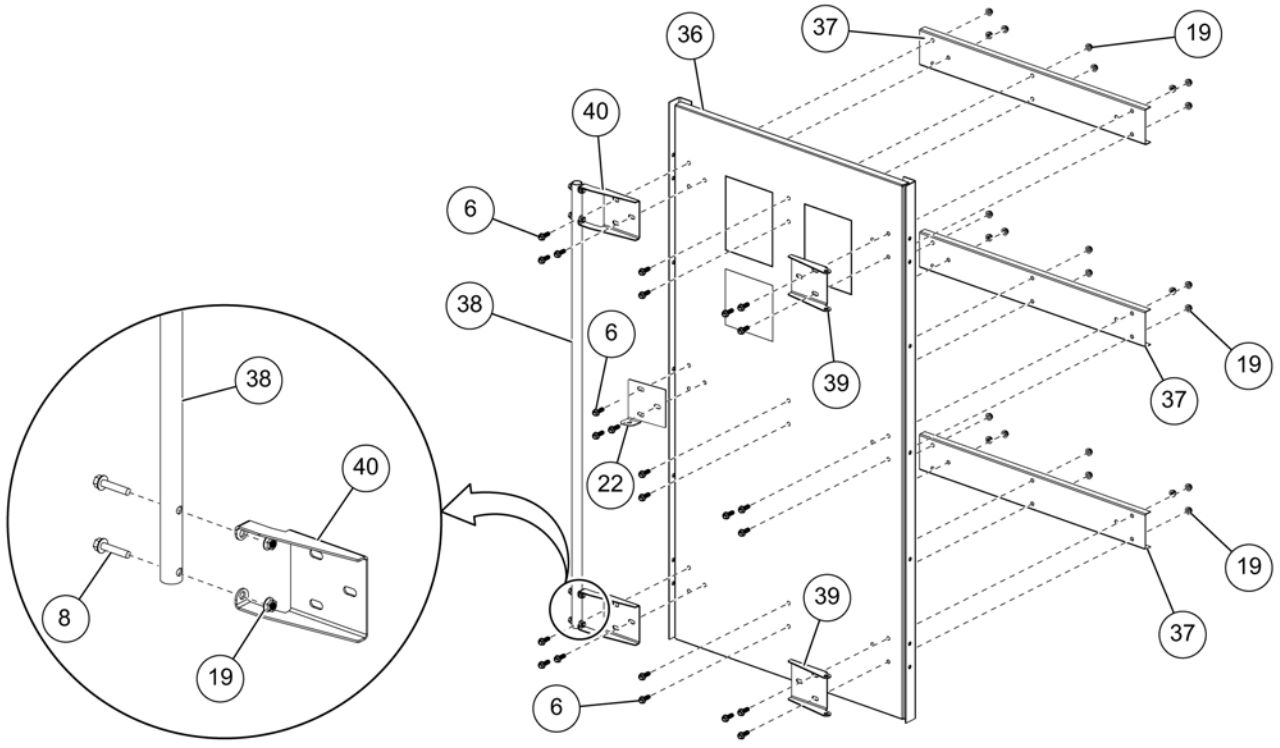
   NOTE: *Make sure to install the channels (37) on the inside and the handle mounting brackets (40) and cover hinge brackets (39) on the outside of the outer door cover (36).*

3. Install the door latch rod (38) to the handle mounting brackets (40) using four 5/16" x 1-1/2" flange bolts (8) and 5/16" flange nuts (19).

   NOTE: *Install the flange bolts (8) with bolt head to the outside of the handle.*

4. Apply decals DC-GBC-2A, DC-GBC-2S, and DC-1754 to the outside of the outer door and DC-GBC-1A and DC-GBC-1S to the inside of the outer door.

Figure 7-12 *Assembling the outer door cover*

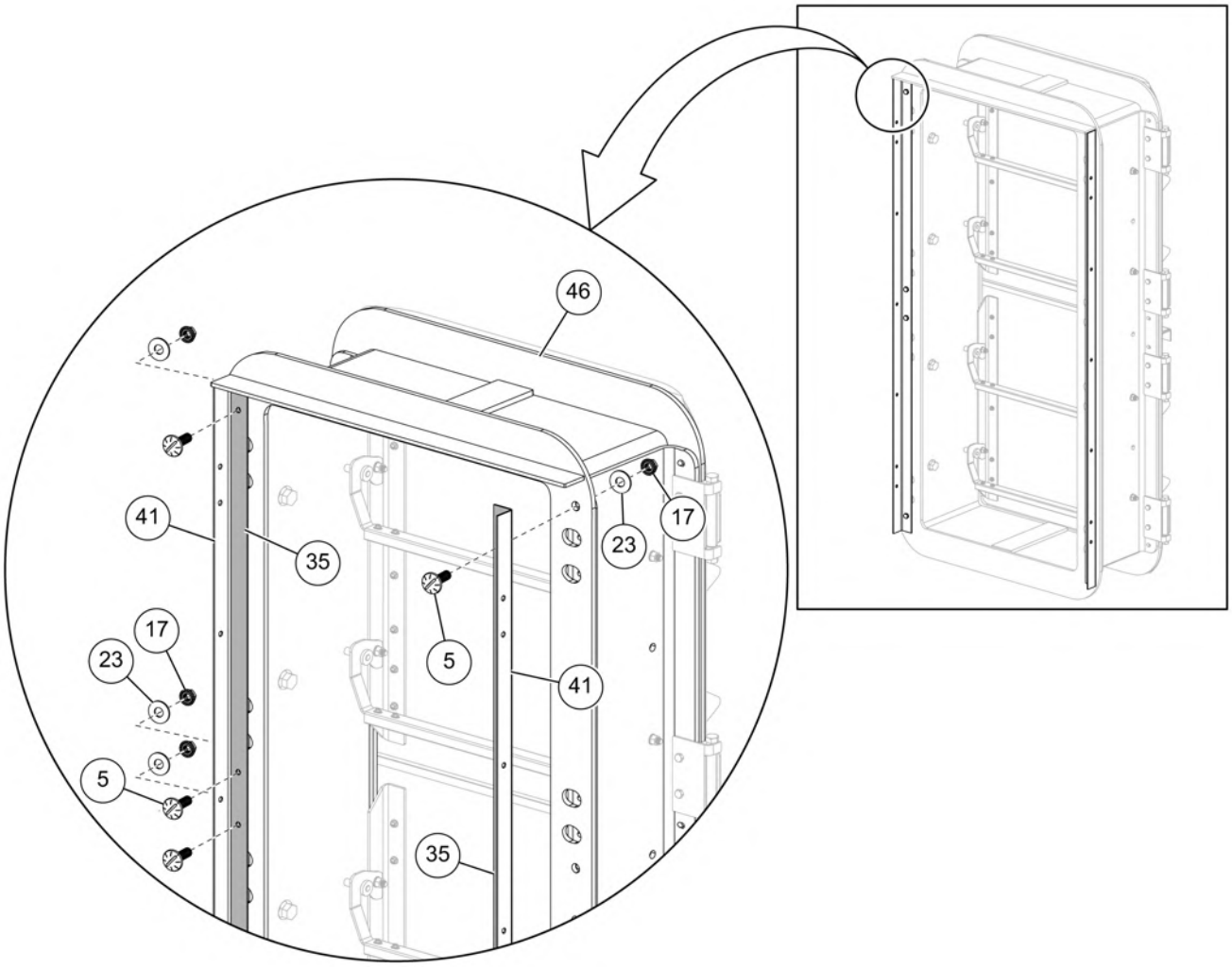


6	5/16" x 1" flange bolt with sealing washer (S-10260)	37	Reinforcement channel (NCWT0204)
8	5/16" x 1-1/2" flange bolt (S-10185)	38	Door latch rod (WD-6284)
19	5/16" flange nut (S-10268)	39	Cover hinge bracket (NCWT0170)
22	Hold-back plate (NCWT0699)	40	Handle mounting bracket (WD-6287)
36	Outer door cover (NCWT0203)		

Installing the Outer Door

1. Fill all open holes on the inside of the door frame weldment (46) with 3/8" x 1" bin bolts.
2. Install the outer door cover angles (41) to the outside of the door frame weldment (46) using eight 5/16" x 1" MS screws (5), 5/16" flat washers (23) and 5/16" flange nuts (17).
3. Install foam seal (35) along the inside of both outer door cover angles (41) and along the top of the door frame weldment (46) where the door meets the frame.

Figure 7-13 *Installing the outer door cover angles*

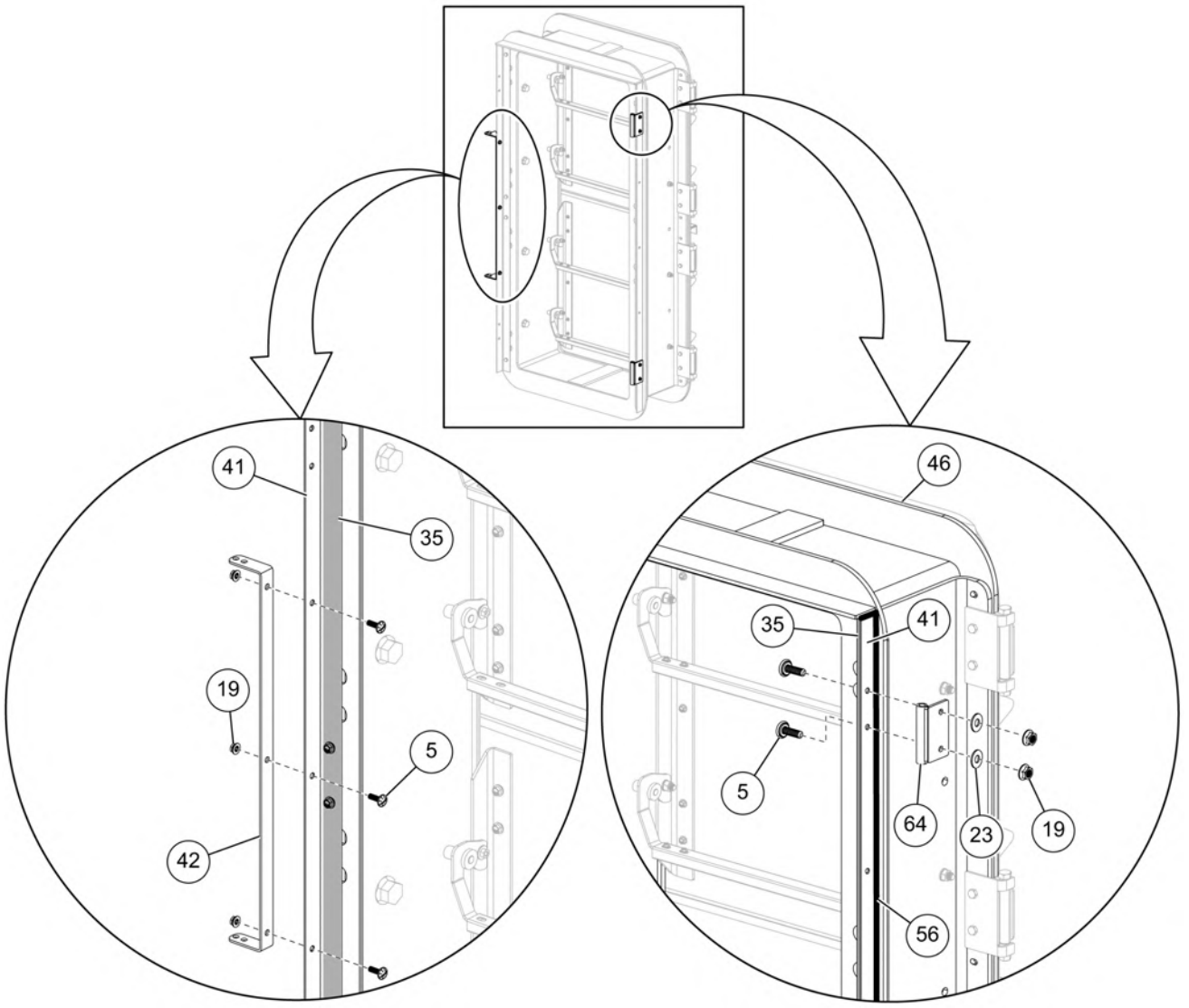


5	5/16" x 1" MS screw with sealing washer (S-10267)	35	Foam seal (S-8610)
17	5/16" flange nut (S-3611)	41	Outer door cover angle (NCWT0205)
23	5/16" flat washer (S-845)	46	Door frame weldment

4. Install the cover hinge weldments (64) to the outside of the right outer door cover angle (41) using four 5/16" x 1" MS screws (5), 5/16" flat washers (23) and 5/16" flange nuts (19).
5. Install the door latch mounting bracket (42) to the outside of the left outer door cover angle (41) using four 5/16" x 1" MS screws (5) and 5/16" flange nuts (19).

   NOTE: *Align the door latch mounting bracket (42) to the center of the outer door cover angle (41) and install MS screws (5) with the screw head on the inside.*

Figure 7-14 *Installing the door latch mounting brackets and outer door cover angles*



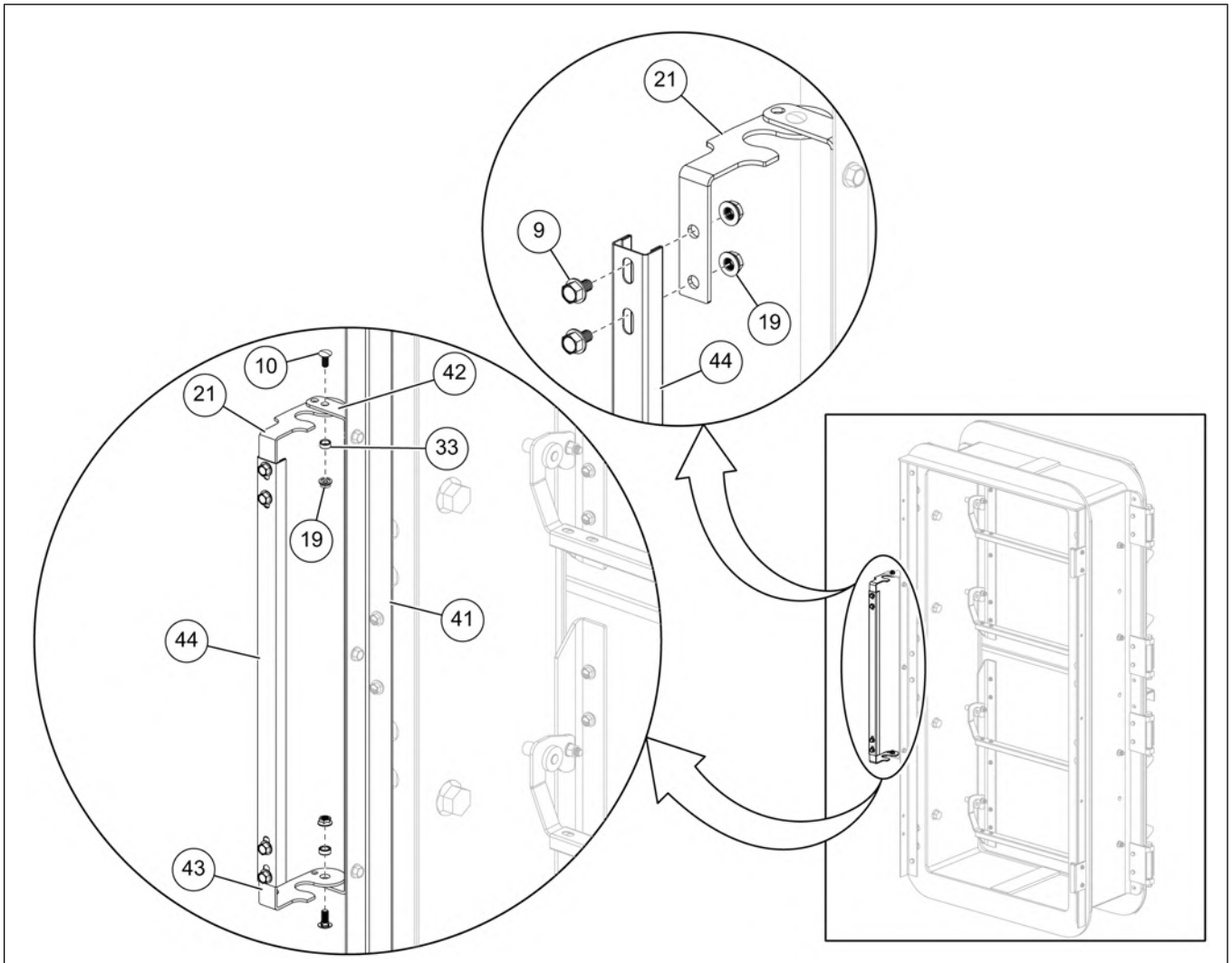
5	5/16" x 1" MS screw with sealing washer (S-10267)	42	Door latch mounting bracket (WD-6286)
19	5/16" flange nut (S-10268)	46	Door frame weldment
23	5/16" flat washer (S-845)	56	Tube caulking
35	Foam seal (S-8610)	64	Cover hinge weldment (NCWT0165)
41	Outer door cover angle (NCWT0205)		

6. Install the top and bottom outer door latch brackets (21 and 43) to the door latch mounting bracket (42) using a 5/16" x 3/4" truss head bolts (10), latch bushing (33), and 5/16" flange nuts (19).

   NOTE: *Make sure the holes in the outer door latch brackets (21 and 43) align with the holes in the door latch mounting bracket to allow the door to be locked.*

7. Install the latch bar (44) to the top and bottom door latches (21 and 43) using 5/16" x 1/2" flange bolts (9) and 5/16" flange nuts (19).

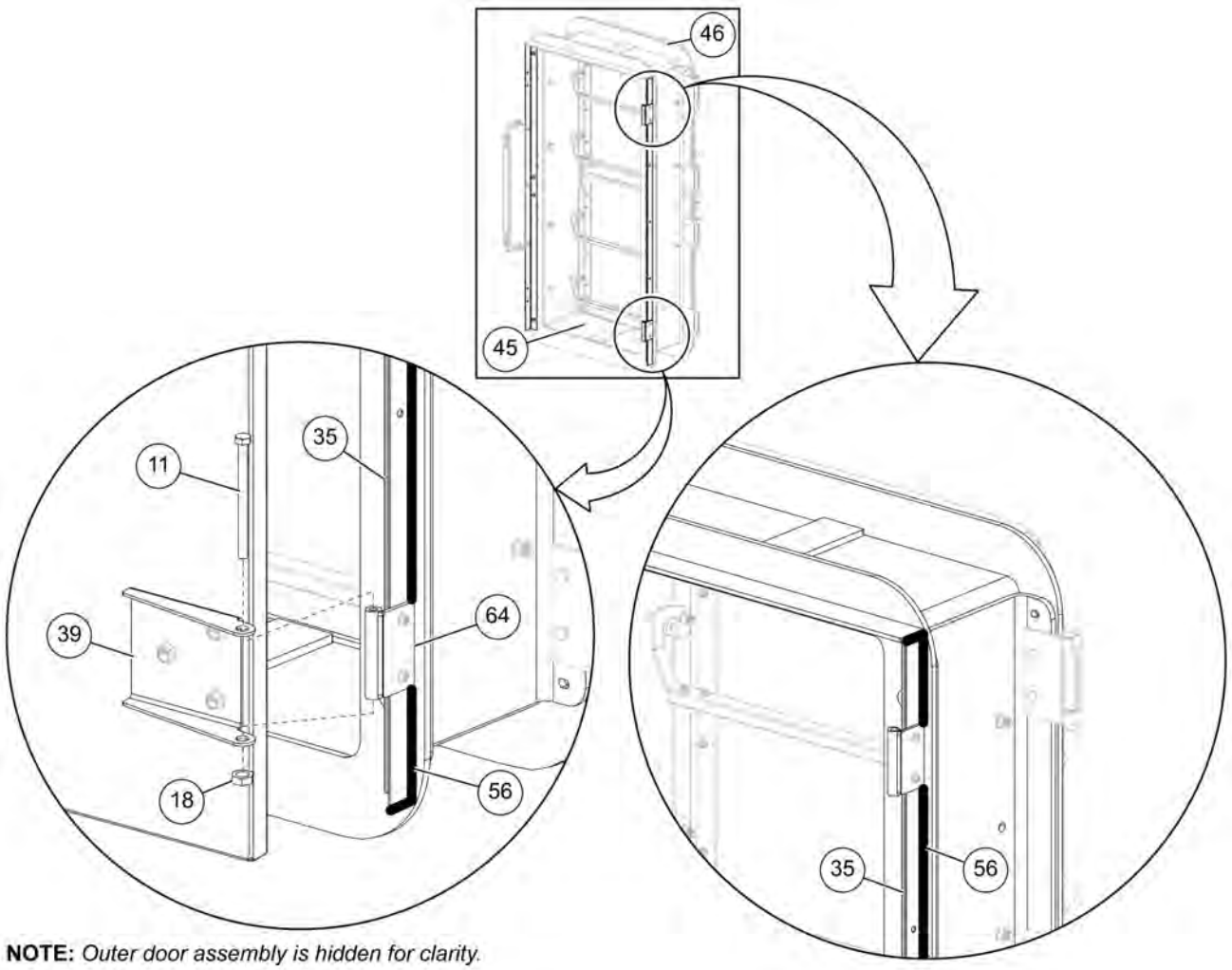
Figure 7-15 *Installing the door latch*



9	5/16" x 1/2" flange bolt (S-10579)	41	Outer door cover angle (NCWT0205)
10	5/16" x 3/4" truss head bolt (S-4302)	42	Door latch mounting bracket (WD-6286)
19	5/16" flange nut (S-10268)	43	Bottom outer door latch (WD-6278)
21	Top outer door latch (WD-6279)	44	Latch bar (NCWT0229)
33	Latch bushing (WD-6040)		

8. Align the cover hinge brackets (39) on the outer cover assembly with the set of cover hinge weldments (64) and install using two 3/8" x 4-1/2" HHCS bolts (11) and 3/8" lock nuts (18).
9. Apply tube caulk (56) along the outer cover angles and where they meet the door frame weldment (46).
10. Drill two holes (45) in the bottom of the door frame weldment (46) to allow moisture to escape.

Figure 7-16 *Installing the outer door cover to the door frame weldment*

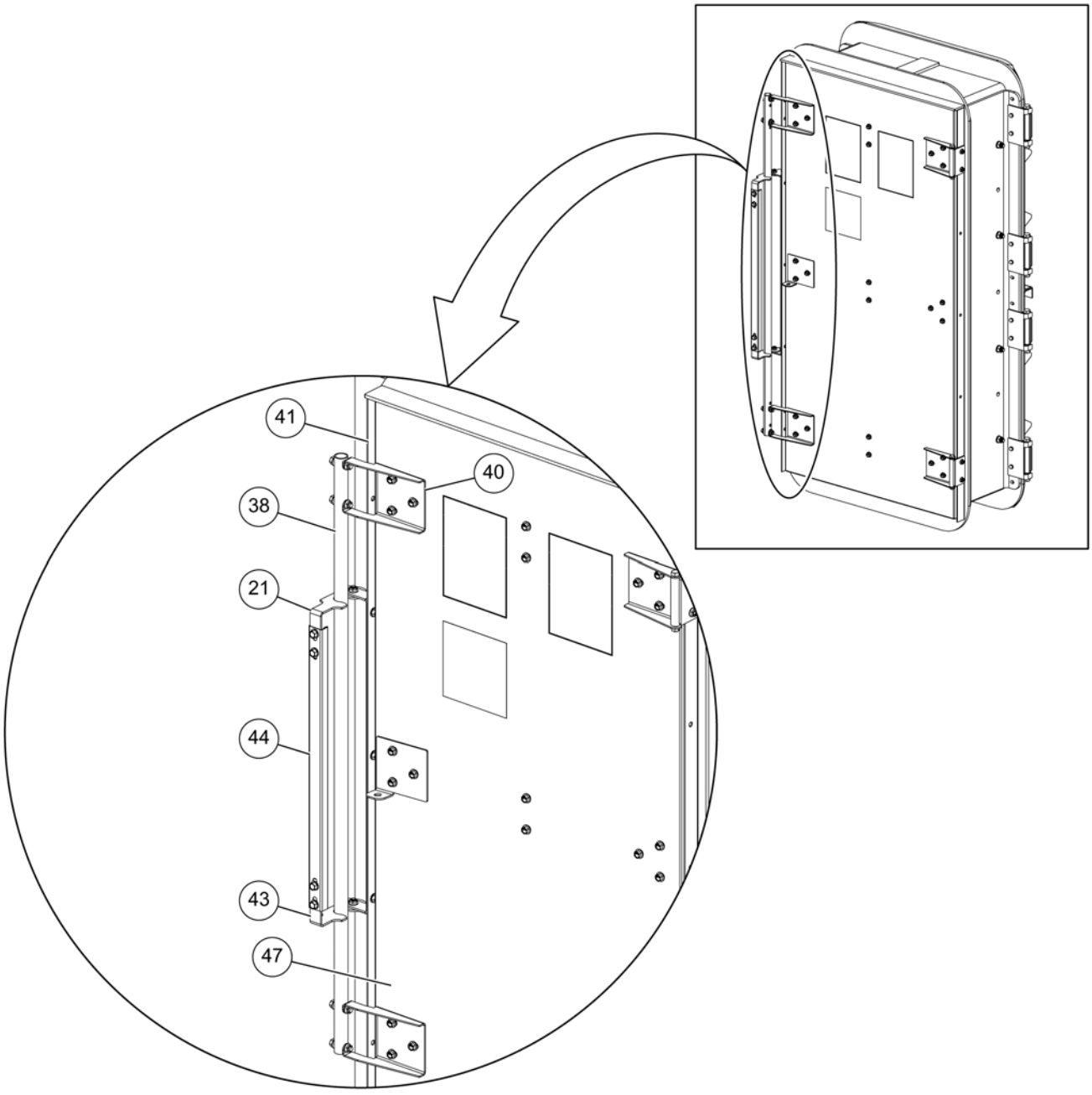


NOTE: *Outer door assembly is hidden for clarity.*

11	3/8" x 4-1/2" HHCS bolt (S-1443)	45	Drain holes
18	3/8" lock nut (S-8235)	46	Door frame weldment
35	Foam seal (S-8610)	56	Tube caulking
39	Cover hinge bracket (NCWT0170)	64	Cover hinge weldment (NCWT0165)

11. Make sure the door cover assembly (47) operates smoothly and the slots in the top and bottom door latches (21 and 43) align with the door latch rod (38) to firmly close the door against the frame.

Figure 7-17 *Aligning the latches with the latch rod*



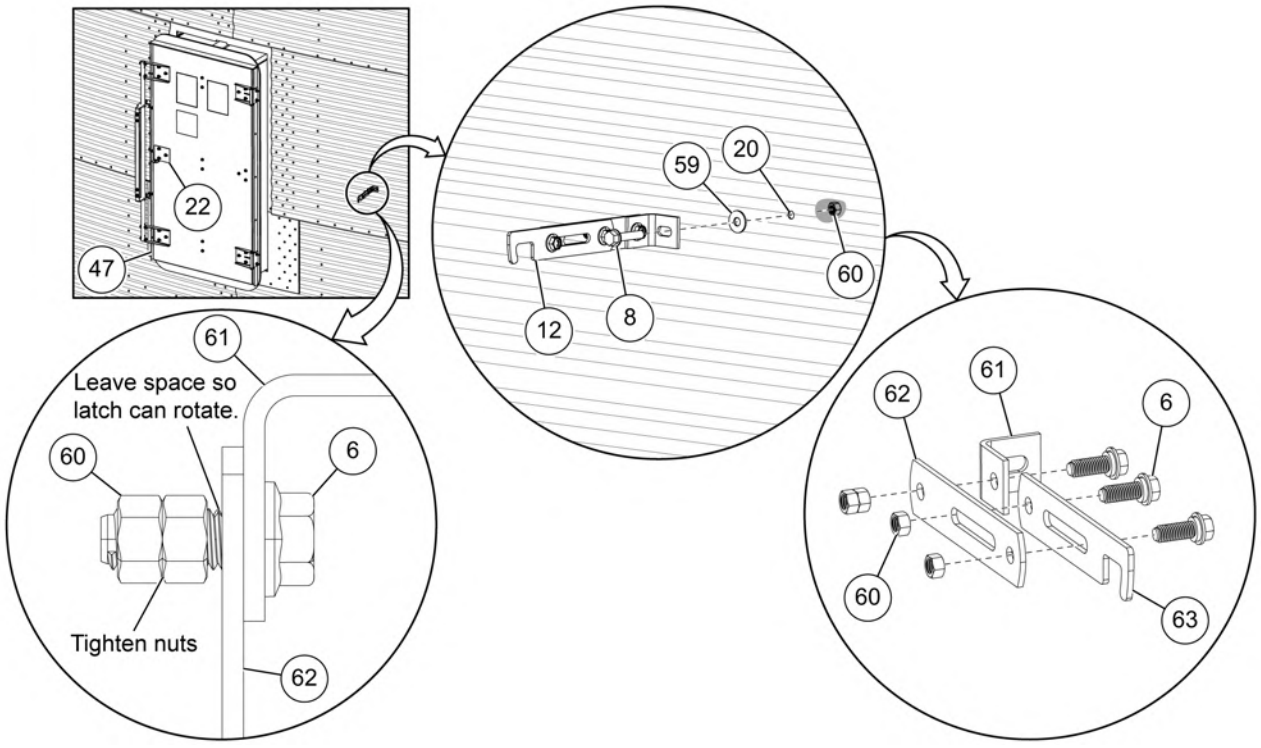
21	Top outer door latch (WD-6279)	43	Bottom outer door latch (WD-6278)
38	Door latch rod (WD-6284)	44	Latch bar (NCWT0229)
40	Handle mounting bracket (WD-6287)	47	Outer cover assembly
41	Outer door cover angle (NCWT0205)		

Installing the Door Cover Hold-Back

1. Assemble the latch bracket (63) to the adjustment bracket (62) loosely, using two 5/16" x 1" flange bolts (6) and 5/16" hex nuts (60). Make sure each bolt (6) goes through a hole and a slot to allow for sliding adjustment.
2. Attach the door holder bracket (61) to the adjustment bracket (62) using one 5/16" x 1" flange bolts (6) and two 5/16" hex nuts (60). Leave a small space between the first nut (60) and the adjustment bracket (62) to allow the bracket to rotate. Tighten the second nut (60) firmly against the first nut (60).
3. Swing the door cover assembly (47) open as far as possible, then insert the latch assembly (12) into the hold-back plate (22).
4. Adjust the latch assembly (12) until it is against a hill on the sidewall, mark the location and drill a 3/8" hole (20) in the sidewall.
5. Install the latch assembly (12) using a 5/16" x 1-1/2" flange bolt (8), 5/16" sealing washer (59) and 5/16" hex nut (60). Make sure the 5/16" sealing washer (59) is installed between the sidewall and the door holder bracket (61) of the latch assembly (12).

   NOTE: *After installing, open the door and make sure the latch bracket (63) fits into the hold-back plate (22), then tighten the adjustment bolts (8) and nuts (60) on the latch assembly (12).*

Figure 7-18 *Installing the door hold-back*



6	5/16" x 1" flange bolt with sealing washer (S-10260)	59	5/16" sealing washer (S-1463)
8	5/16" x 1-1/2" flange bolt (S-10185)	60	5/16" hex nut (S-396)
12	Latch assembly	61	Holder bracket (WD-1302)
20	3/8" field drill hole	62	Adjustment bracket (NCWT0717)
22	Hold-back plate (NCWT0699)	63	Latch bracket (NCWT0716)
47	Outer cover assembly		

Parts List

Figure 7-19 *Two ring door assembly (WD-6309) parts*

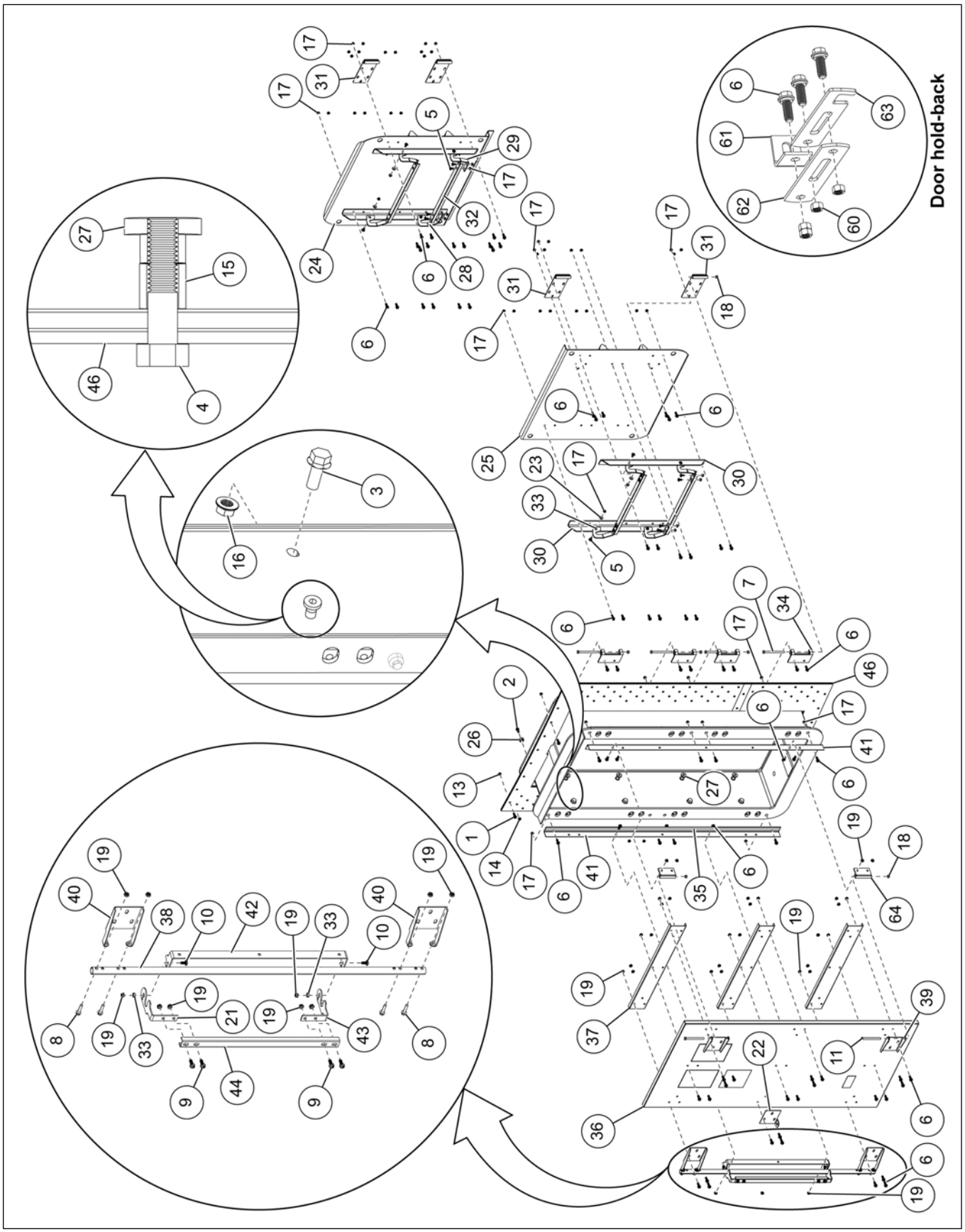


Figure 7-20 *Two ring door assembly (WD-6311) parts*

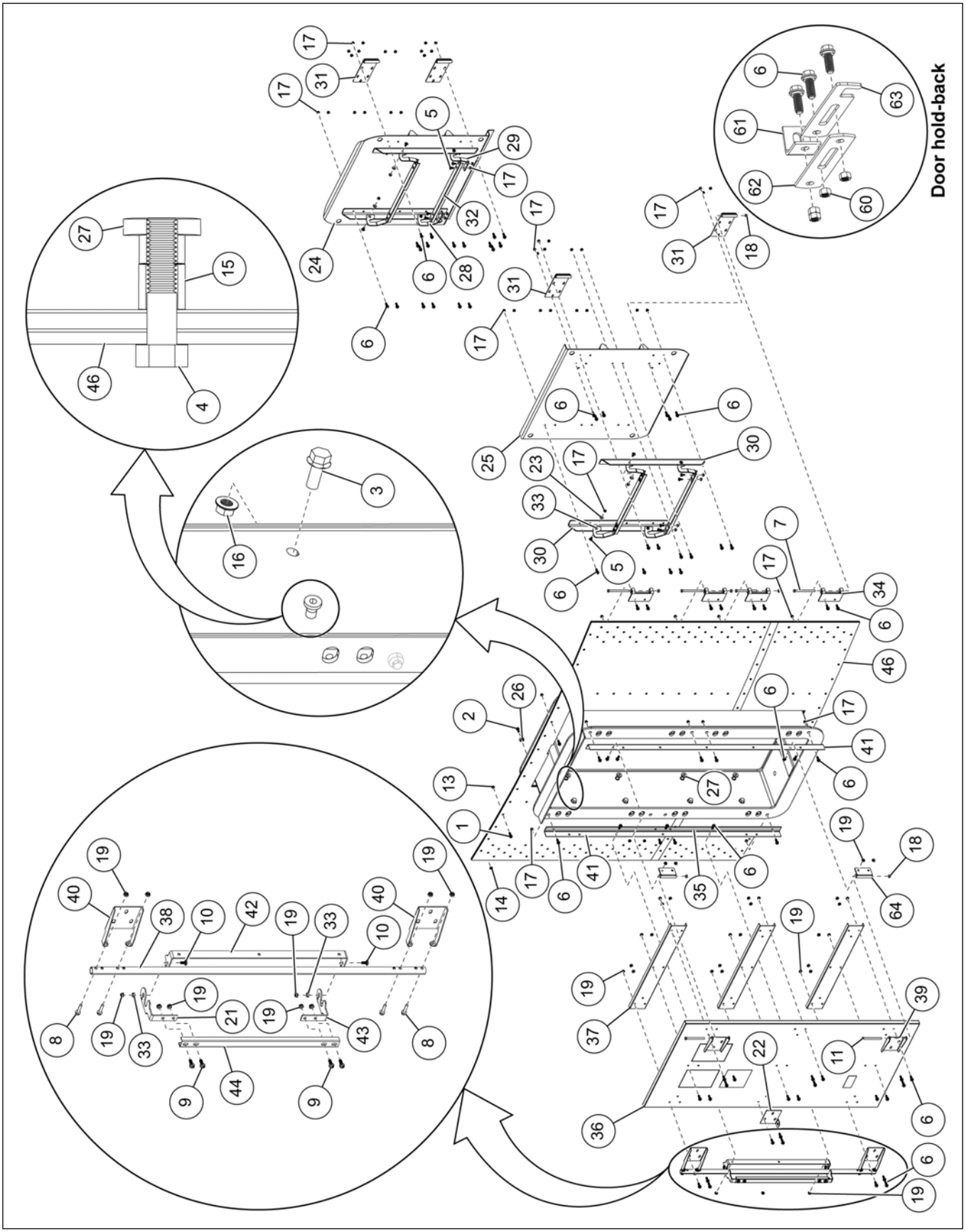


Table 7-2 *Two ring door assembly (WD-6309 and WD-6311) parts list*

Ref #	Part No	Description
1	S-10780	M10 x 40 flange bolt with sealing washer
2	S-7877	5/16" x 2" HHCS bolt
3	S-9062	1/2" x 1-1/4" flange bolt
4	S-7894	1/2" x 2-1/4" HHCS bolt
5	S-10267	5/16" x 3/4" MS screw with sealing washer
6	S-10260	5/16" x 1" flange bolt with sealing washer
7	S-7248	3/8" x 6" HHCS bolt
8	S-10185	5/16" x 1-1/2" flange bolt
9	S-10579	5/16" x 1/2" flange bolt
10	S-4302	5/16" x 3/4" truss head bolt
11	S-1443	3/8" x 4-1/2" HHCS bolt
13	S-10784	M10 flange nut
14	S-5220	5/16" lock nut
15	S-10920	Latch bar sleeve
16	S-10253	1/2" flange nut
17	S-3611	5/16" flange nut
18	S-8235	3/8" lock nut
19	S-10268	5/16" flange nut
21	WD-6279	Top outer door latch
22	NCWT0699	Hold-back plate
23	S-845	5/16" flat washer
24	NCWT0193	Top inner door assembly
25	NCWT0195	Bottom inner door assembly
26	WD-6224	Bearing pins
27	WD-6234	Latch bar holder
28	WD-6038	Left inner door latch
29	WD-6037	Right inner door latch
30	NCWT0298	Reinforcement angle
31	NCWT0202	Hinge strap
32	NCWT0299	Latch bar
33	WD-6040	Latch bushing
34	NCWT0200	Cover hinge weldment
35	S-8610	Foam seal
36	NCWT0203	Outer door cover
37	NCWT0204	Reinforcement channel
38	WD-6284	Door latch rod
39	NCWT0170	Cover hinge bracket
40	WD-6287	Handle mounting bracket
41	NCWT0205	Outer door cover angle
42	WD-6286	Door latch mounting bracket
43	WD-6278	Bottom outer door latch
44	NCWT0229	Latch bar
46	WD-6309	Door frame weldment (2-post)
	WD-6311	Door frame weldment (3-post)
60	S-396	5/16" hex nut
61	WD-1302	Holder bracket
62	NCWT0717	Adjustment bracket
63	NCWT0716	Latch bracket
64	NCWT0165	Cover hinge weldment

Door Assembly Instructions (NCWT0701 and NCWT0719)

Two Ring Door Layout

Figure 7-21 *Two ring door placement - 2 post (NCWT0701)*

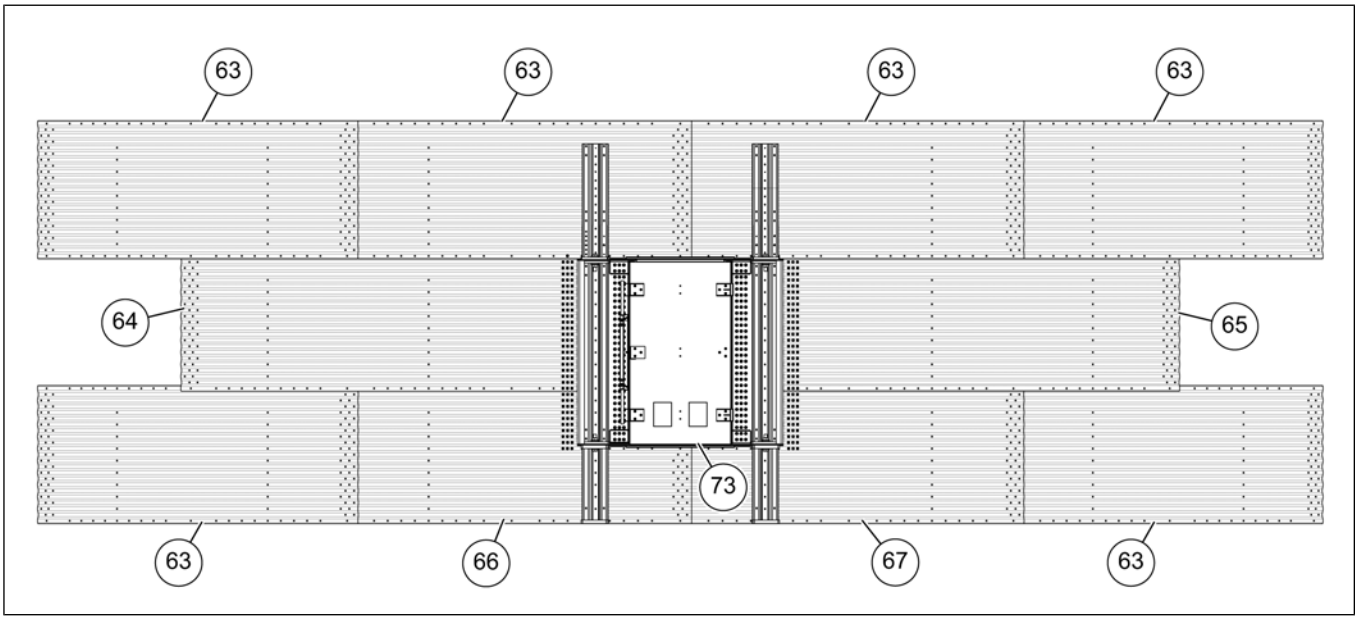
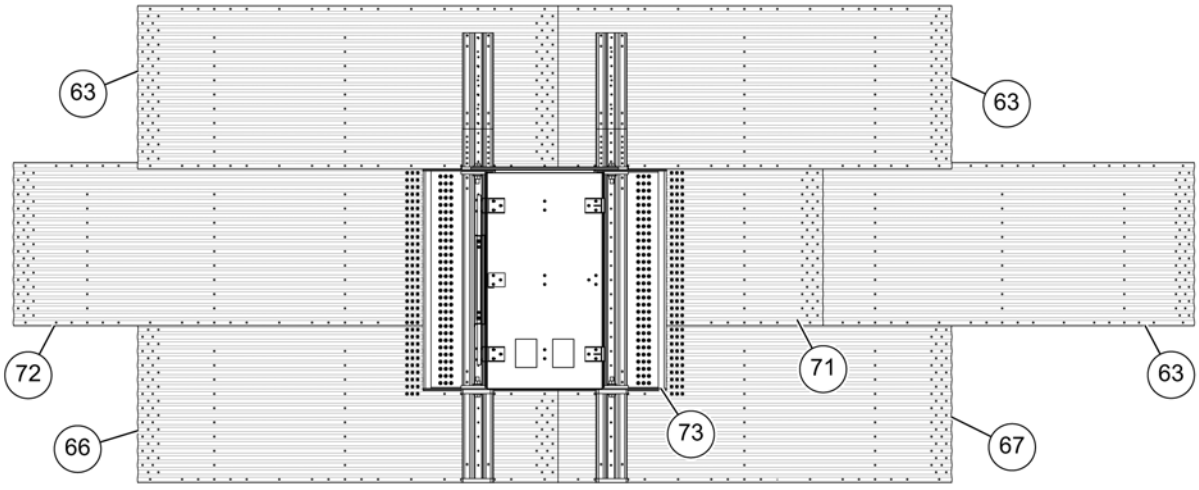


Figure 7-22 *Two ring door placement - 3 post (NCWT0719)*



63	Standard sidewall sheet	67	Right notch door sheet
64	Left door sheet (2-post)	71	Short door sheet (3-post)
65	Right door sheet (2-post)	72	Special door sheet (3-post)
66	Left notch door sheet	73	Door assembly

Installing the Door Weldment

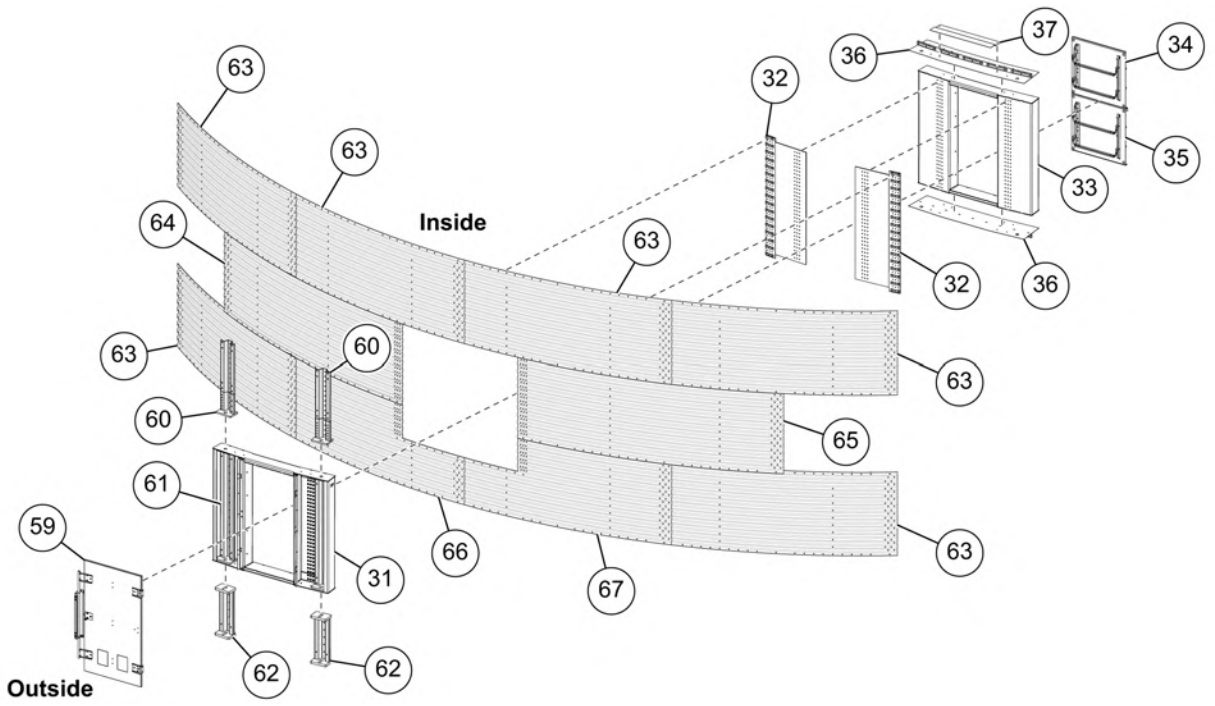
The two ring door is installed in the last two rings, after all the other rings have been assembled and lifted. There are special door sheets (64 and 65), notched door sheets (66 and 67) and short door sheet (71) that must be installed around the door weldments (31 and 33) to ensure the correct installation.

1. Install the door at the same time as you install the third ring from the bottom. The door consists of outer frame weldment (31), jamb plate weldments (32), inner frame weldment (33), seal weldment (36), upper cover (37), top inner door panel (34), bottom inner door panel (35), outer cover assembly (59), base stiffeners (60), door stiffeners (61) and stiffener support weldment (62).

   NOTE: *The upper and lower seal weldments (36) must be installed into the opening in the sidewall before the frames (31 and 33) and jamb plate weldments (32). Install the upper and lower seal weldments (36) from the inside of the sidewall, and move each one up or down to its respective position within the sidewall opening, then install the front and rear frames and jamb plate weldments.*

2. Install the door sheets (64 and 65) and notched door sheets (66 and 67) along with standard sidewall sheets (63) as shown below.

Figure 7-23 *Two ring door installation - 2 post*



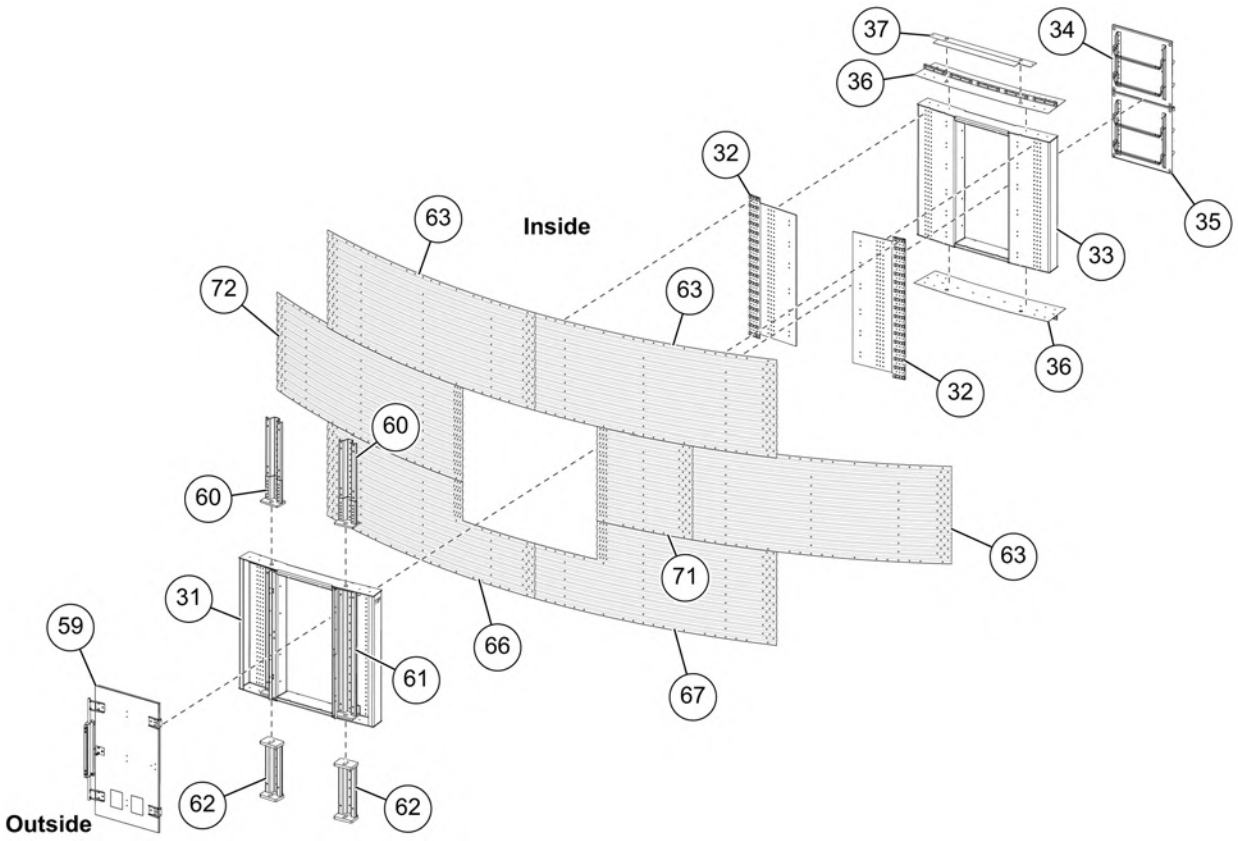
31	Outer door frame weldment (NCWT0710)	60	Base stiffener
32	Jamb plate weldment (NCWT0708-BS)	61	Door stiffener (NCWT0482-BS)
33	Inner door frame weldment (NCWT0715-BS)	62	Stiffener support weldment (NCWT0481-BS)
34	Top inner door panel (NCWT0465)	63	Standard sidewall sheet
35	Bottom inner door panel (NCWT0462)	64	Left door sheet
36	Seal weldment (NCTW0705)	65	Right door sheet
37	Upper cover (NCWT0714)	66	Left notch door sheet
59	Outer cover assembly	67	Right notch door sheet

3. Install the door at the same time as you install the third ring from the bottom. The door consists of outer frame weldment (31), jamb plate weldments (32), inner frame weldment (33), seal weldment (36), upper cover (37), top inner door panel (34), bottom inner door panel (35), outer cover assembly (59), base stiffeners (60), door stiffeners (61) and stiffener support weldment (62).

   NOTE: *The upper and lower seal weldments (36) must be installed into the opening in the sidewall before the frames (31 and 33) and jamb plate weldments (32). Install the upper and lower seal weldments (36) from the inside of the sidewall, and move each one up or down to its respective position within the sidewall opening, then install the front and rear frames and jamb plate weldments.*

4. Install the notched door sheets (66 and 67), short door sheet (71) and special door sheet (72) along with standard sidewall sheets (63) as shown below.

Figure 7-24 *Two ring door installation - 3 post*



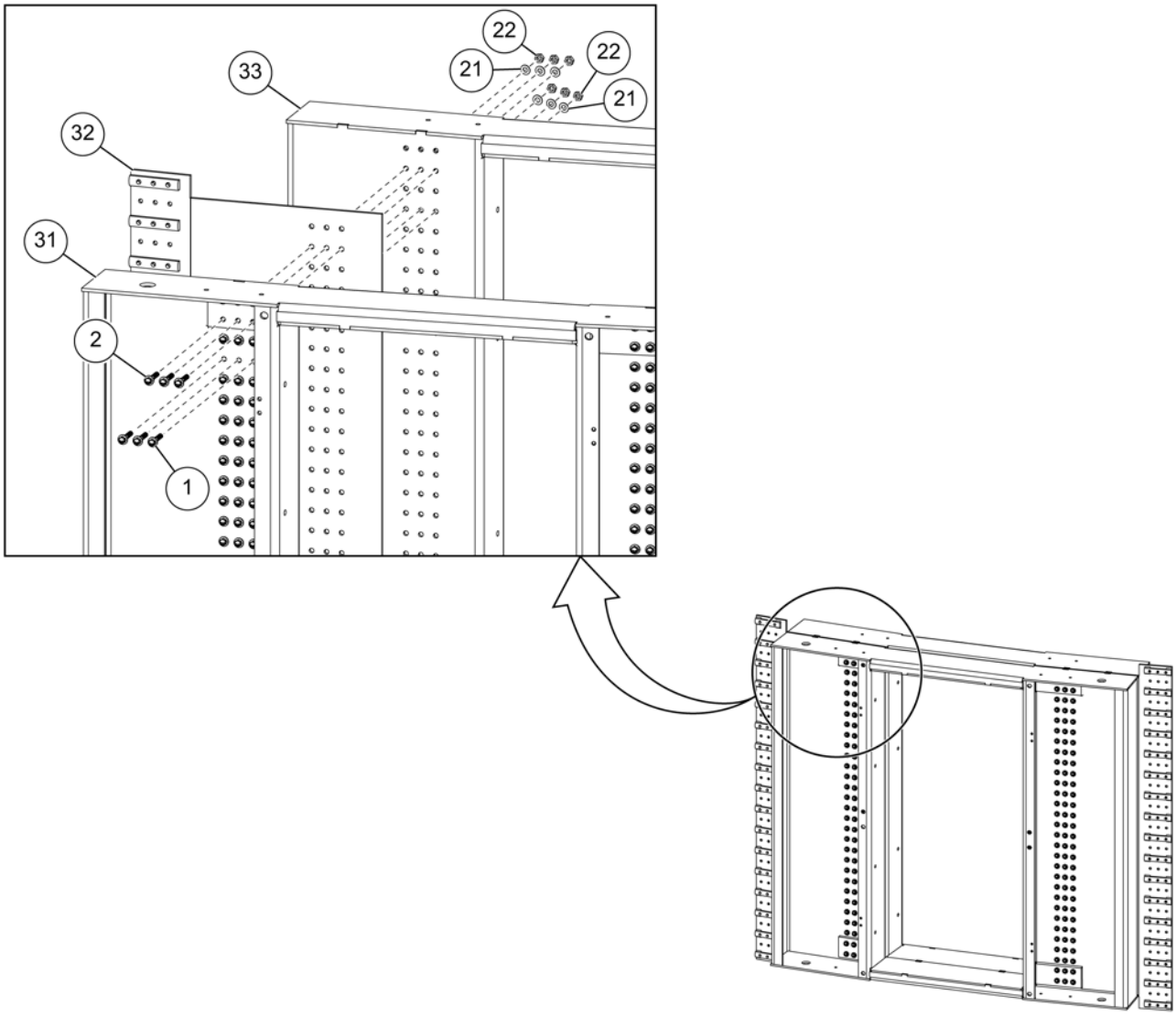
31	Outer door frame weldment (NCWT0725)	60	Base stiffener
32	Jamb plate weldment (NCWT0723-BS)	61	Door stiffener (NCWT0482-BS)
33	Inner door frame weldment (NCWT0720-BS)	62	Stiffener support weldment (NCWT0481-BS)
34	Top inner door panel (NCWT0795)	63	Standard sidewall sheet
35	Bottom inner door panel (NCWT0799)	66	Left notch door sheet
36	Seal weldment (NCTW0728)	67	Right notch door sheet
37	Upper cover (NCWT0730)	71	Short door sheet
59	Outer cover assembly	72	Special door sheet

Assembling the Jamb Plates

Assemble the jamb plate weldments (32) between the outer door frame weldment (31) and the inner door frame weldment (33) using 7/16" x 2" flange bolts (1), 7/16" x 2-1/2" flange bolts (2), 7/16" flat washers (21) and 7/16" hex nuts (22).

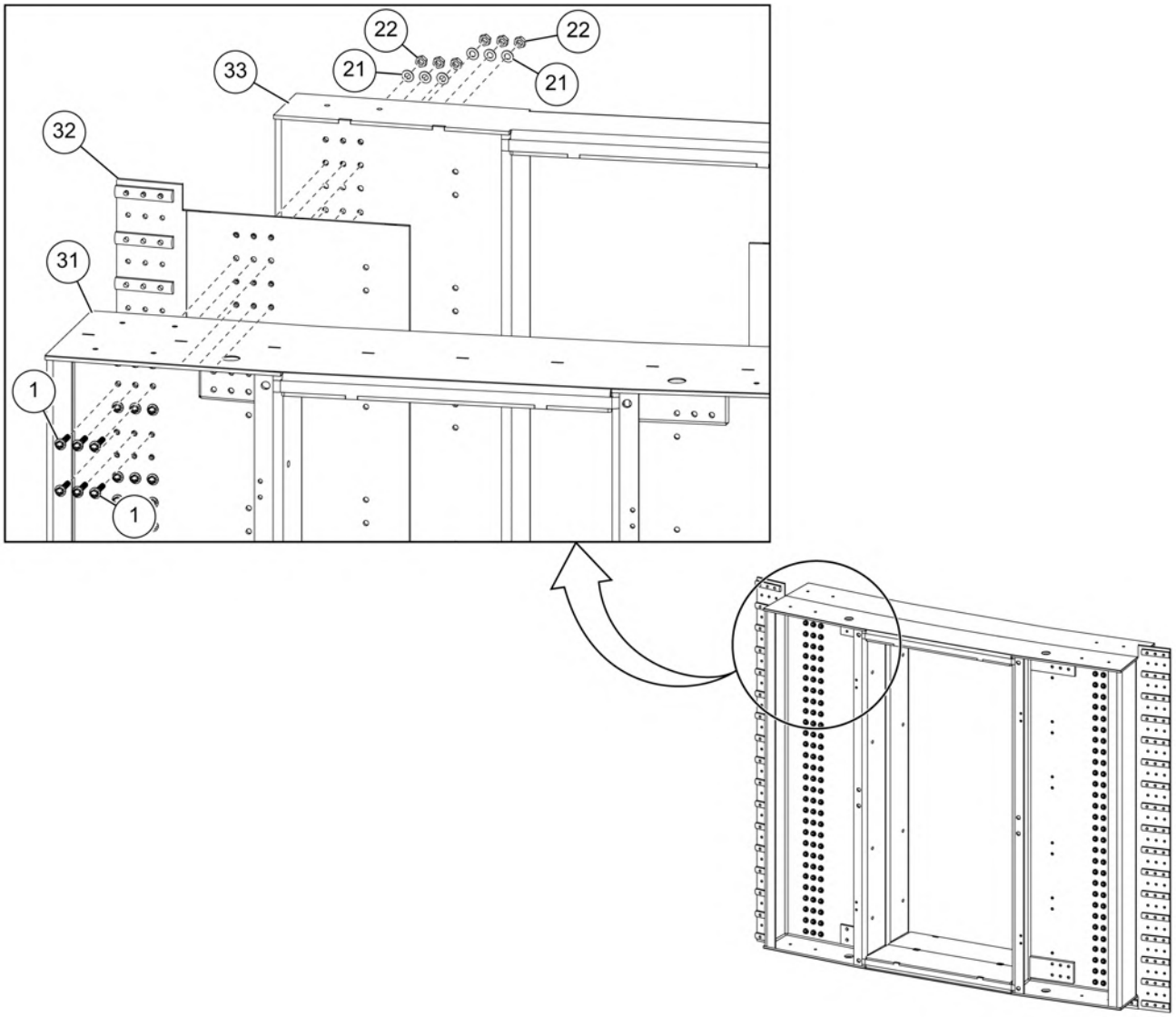
NOTE: *Install flange bolts (1 and 2) with bolt head on the outside of the outer door frame weldment (31).*

Figure 7-25 *Assembling the jamb plate - 2 post*



1	7/16" x 2" flange bolt with sealing washer (S-10328)	31	Outer door frame weldment (NCWT0710)
2	7/16" x 2-1/2" flange bolt with sealing washer (S-10134)	32	Jamb plate weldment (NCWT0708-BS)
21	7/16" flat washer (S-8320)	33	Inner door frame weldment (NCWT0715-BS)
22	7/16" hex nut (S-9281)		

Figure 7-26 *Assembling the jamb plate - 3 post*



1	7/16" x 2" flange bolt with sealing washer (S-10328)	31	Outer door frame weldment (NCWT0725)
21	7/16" flat washer (S-8320)	32	Jamb plate weldment (NCWT0723-BS)
22	7/16" hex nut (S-9281)	33	Inner door frame weldment (NCWT0720-BS)

Installing the Seal Weldment

1. Install the seal weldment (36) and the upper cover (37) to the top of the door frame weldments (31 and 33) as shown using 3/8" x 1-1/2" flange bolts (3), special washers (14) and 3/8" hex nuts (24).

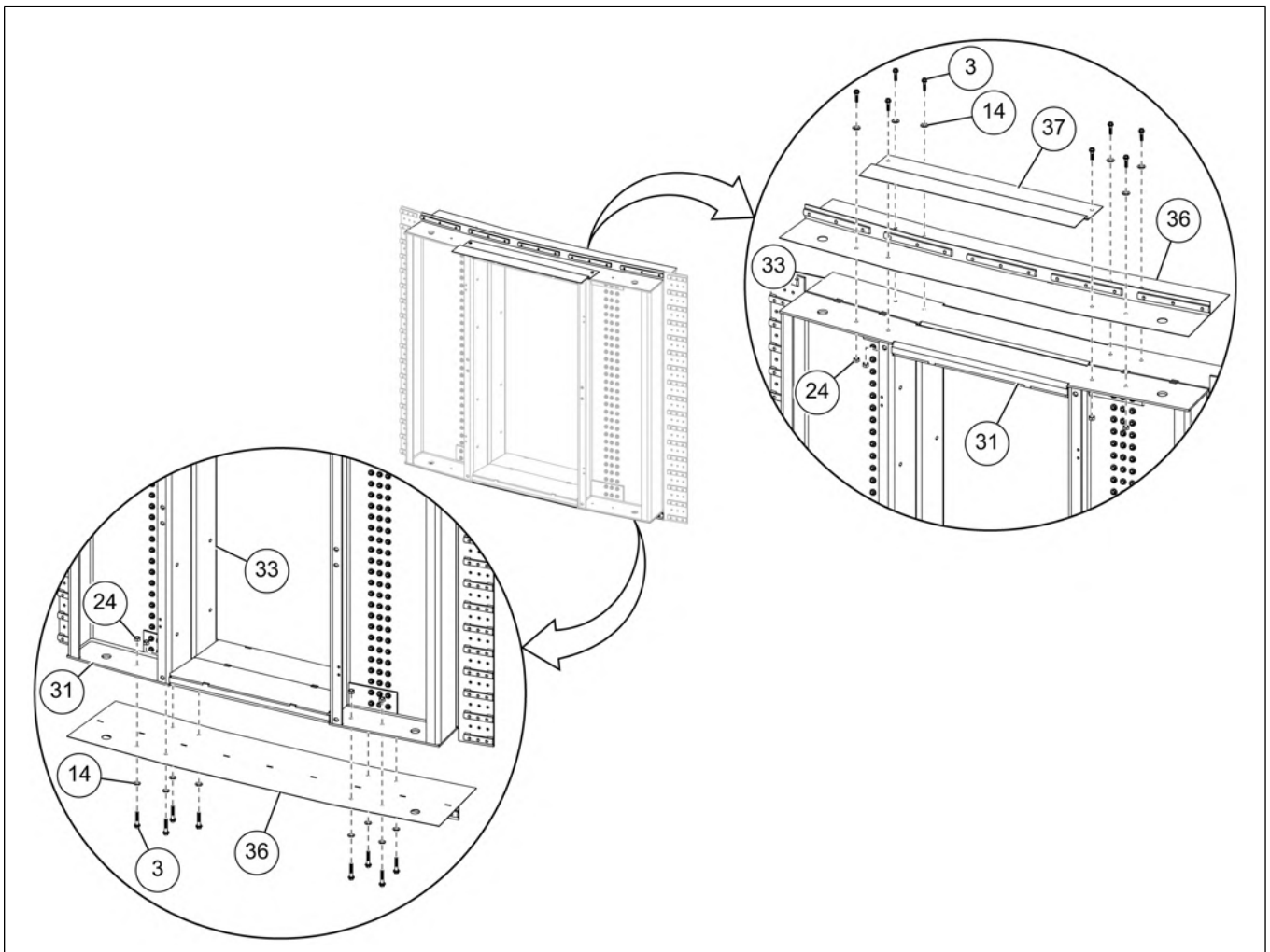
   NOTE: *Install the upper cover (37) to the two holes in the middle of outer door frame weldment (31).*

   NOTE: *Refer to note in Installing the Door Weldment, page 97 for details on the specific order in which these parts must be assembled. (The seal weldments must be installed into the sidewall before the frames and jamb plate weldments.)*

2. Install the seal weldment (36) to the bottom of the door frame weldments (31 and 33) using 3/8" x 1-1/2" flange bolts (3), special washers (14) and 3/8" hex nuts (24).

   NOTE: *Make sure to install the flange bolts (3) with bolt head and washers (14) on the outside of the door frame weldments (31 and 33).*

Figure 7-27 *Installing the seal weldments - 2 post*



3	3/8" x 1-1/2" flange bolt with sealing washer (S-7488)	33	Inner door frame weldment (NCWT0715-BS)
14	Special washer (S-10102)	36	Seal weldment (NCTW0705)
24	3/8" hex nut (S-456)	37	Upper cover (NCWT0714)
31	Outer door frame weldment (NCWT0710)		

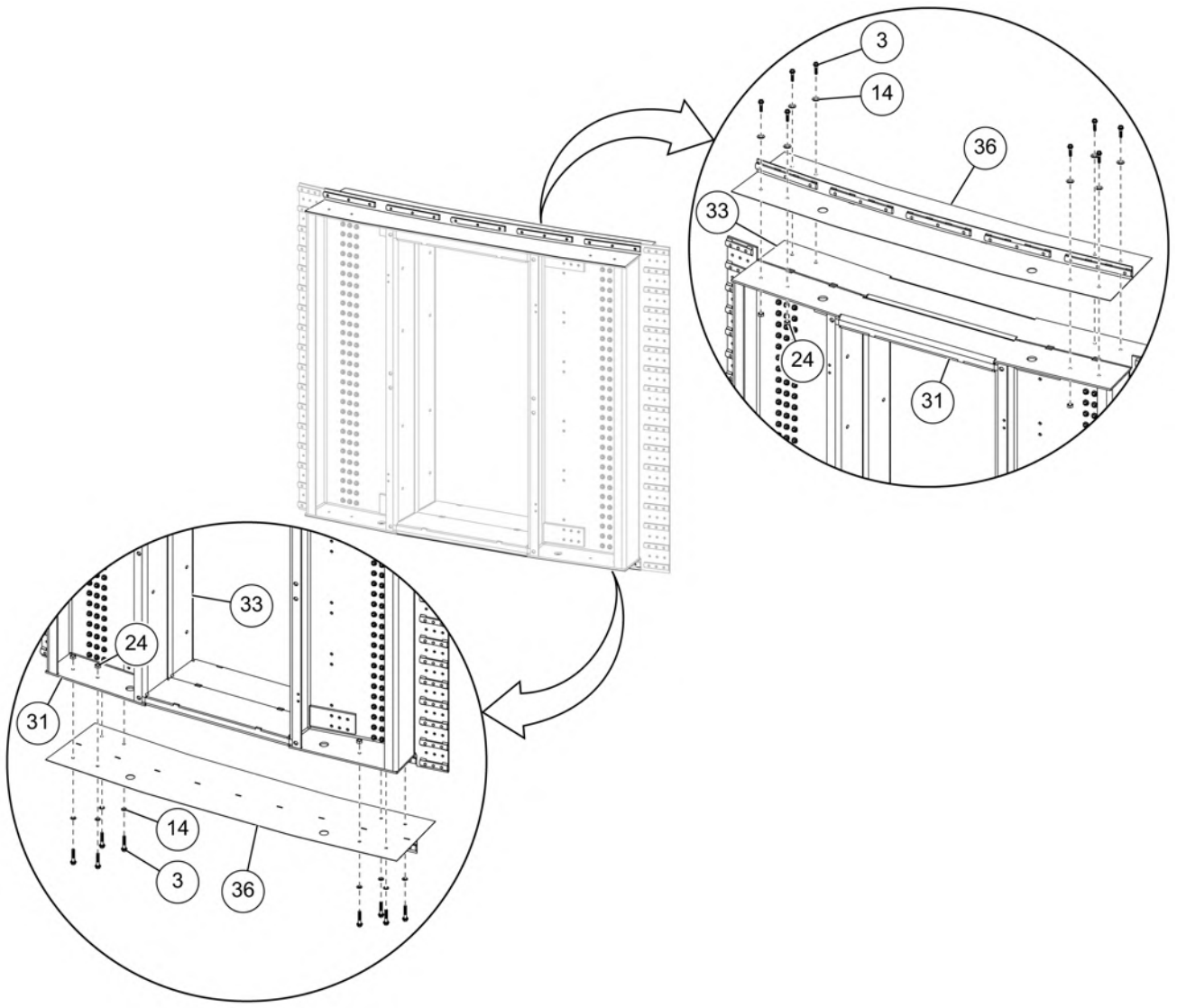
3. Install the seal weldments (36) to the top and bottom of the door frame weldments (31 and 33) using 3/8" x 1-1/2" flange bolts (3), special washers (14) and 3/8" hex nuts (24).

   NOTE: *Refer to note in Installing the Door Weldment, page 97 for details on the specific order in which these parts must be assembled. (The seal weldments must be installed into the sidewall before the frames and jamb plate weldments.)*

   NOTE: *The upper cover (37) will be installed later along with the installation of the door and base stiffeners.*

   NOTE: *Make sure to install the flange bolts (3) with bolt head and washers (14) on the outside of the door frame weldments (31 and 33).*

Figure 7-28 *Installing the seal weldments - 3 post*



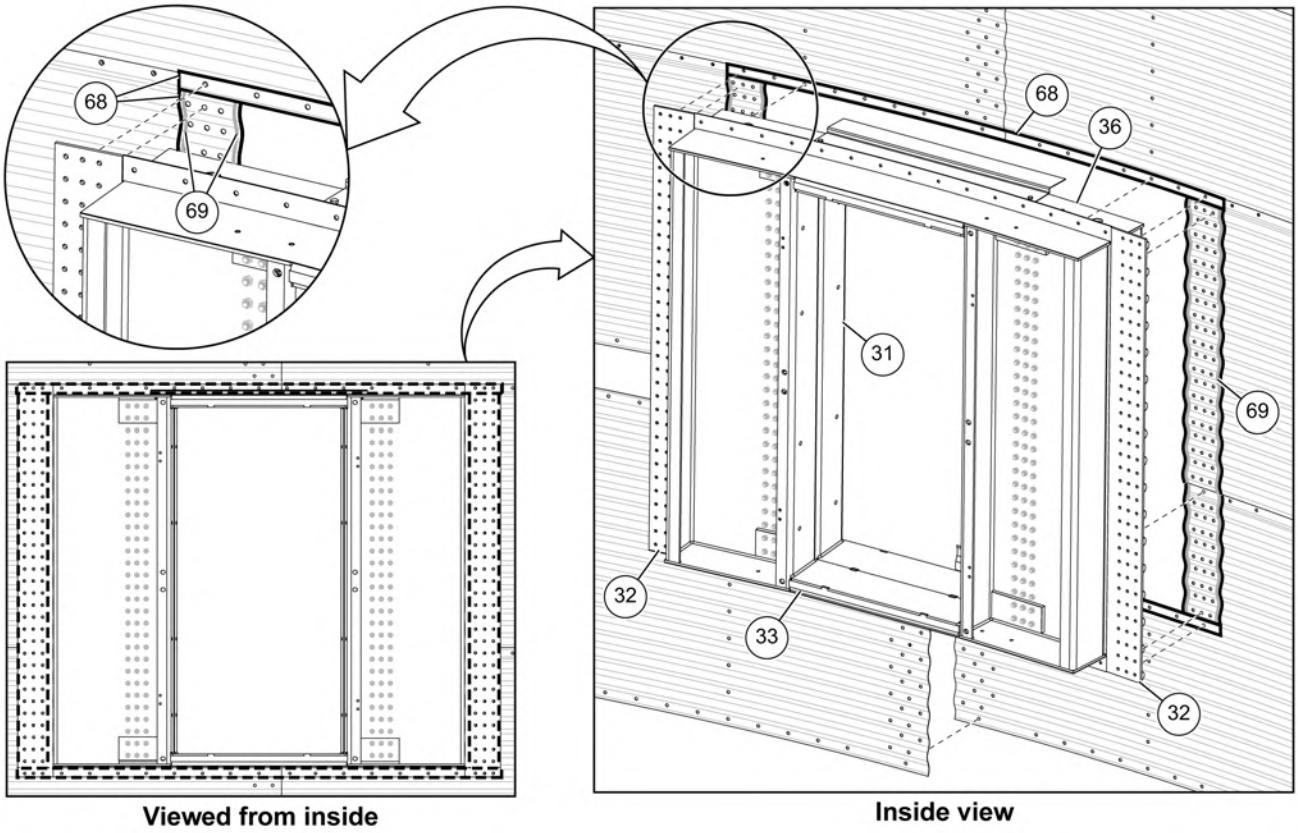
3	3/8" x 1-1/2" flange bolt with sealing washer (S-7488)	31	Outer door frame weldment (NCWT0725)
14	Special washer (S-10102)	33	Inner door frame weldment (NCWT0720-BS)
24	3/8" hex nut (S-456)	36	Seal weldment (NCTW0728)

Installing the Door Frames to the Sidewall

1. Position the jamb plate weldments (32) to the inside of the sidewall with outer door frame weldment (31) to the outside of the bin.
2. Place the corrugated sealing strip (69) between the outer and inner edges of the sidewall to jamb plate weldment (32) connection. Apply rope caulk (68) around the corrugated sealing strip (69).
3. Also, apply rope caulk (68) between the sidewall to seal weldment (36) at the top and bottom of the door frame weldments.

NOTE: *Refer to note in Installing the Door Weldment, page 97 for details on the specific order in which these parts must be assembled. (The seal weldments must be installed into the sidewall before the frames and jamb plate weldments.)*

Figure 7-29 *Caulking the door frame*



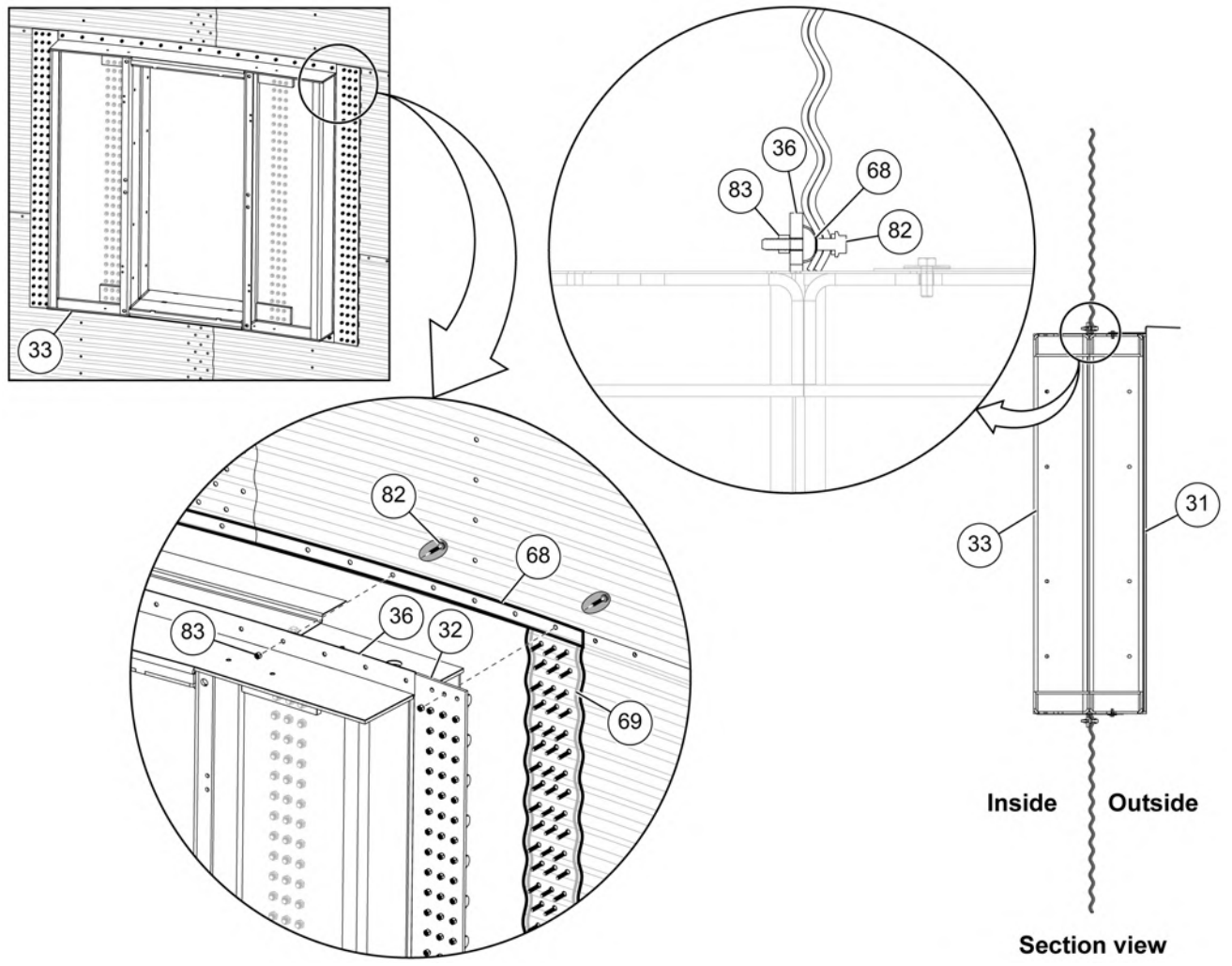
31	Outer door frame weldment (NCWT0710) (2-post)	36	Seal weldment (NCTW0705) (2-post)
	Outer door frame weldment (NCWT0725) (3-post)		Seal weldment (NCTW0728) (3-post)
32	Jamb plate weldment (NCWT0708-BS) (2-post)	68	Rope caulk
	Jamb plate weldment (NCWT0723-BS) (3-post)		
33	Inner door frame weldment (NCWT0715-BS) (2-post)	69	Corrugated sealing strip
	Inner door frame weldment (NCWT0720-BS) (3-post)		

4. Install the jamb plate weldments (32) to the inside of the sidewall using M10 x 40 flange bolts (82) and M10 flange nuts (83).

NOTE: *The seal weldment (36) at the top and bottom must be installed to the inside of the sidewall. Remember to apply rope caulk (68) around the bolt holes between the seal weldment (36) and the sidewall .*

NOTE: *Refer to note in Installing the Door Weldment, page 97 for details on the specific order in which these parts must be assembled. (The seal weldments must be installed into the sidewall before the frames and jamb plate weldments.)*

Figure 7-30 *Installing the door assembly to the sidewall*

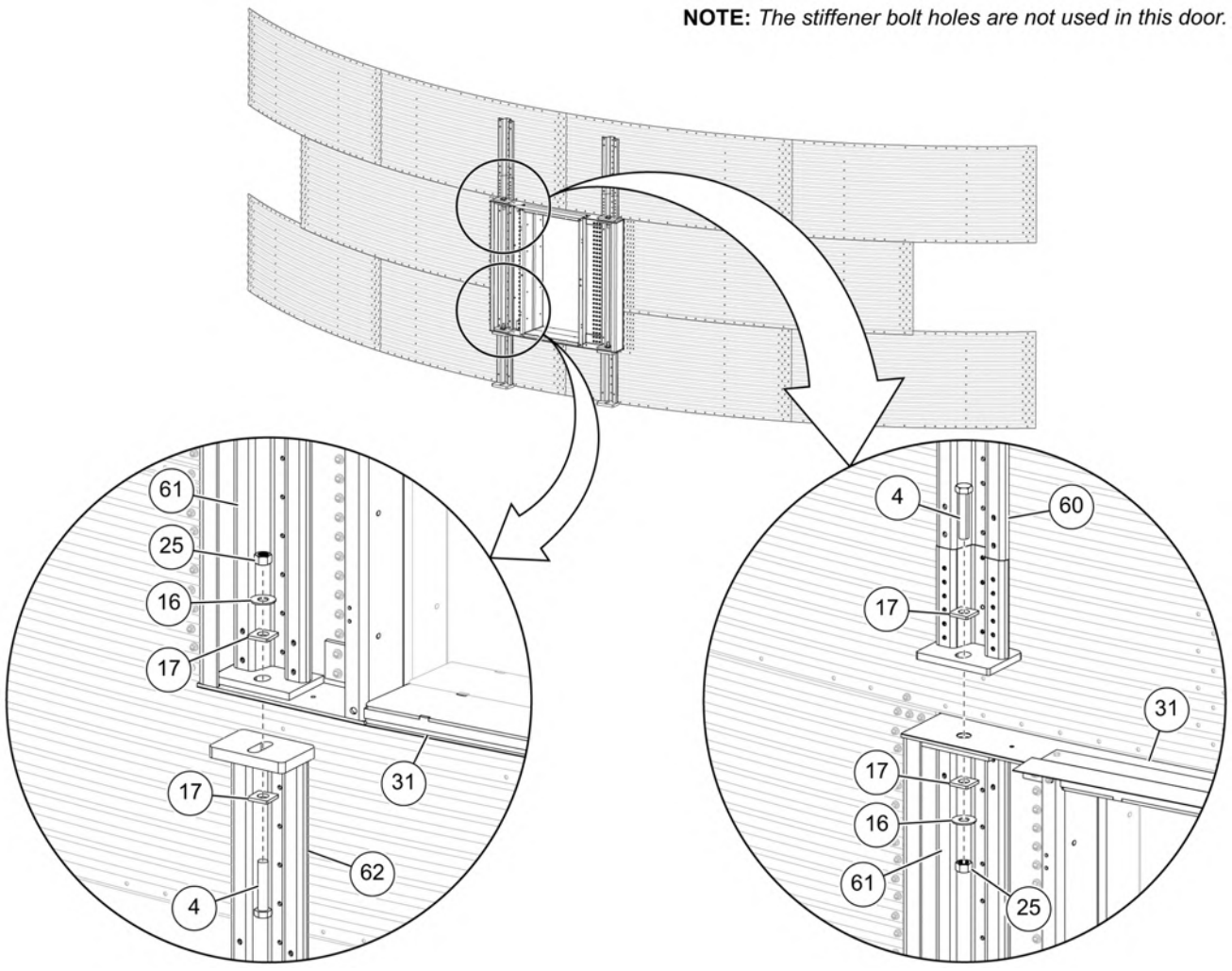


31	Outer door frame weldment (NCWT0710) (2-post)	36	Seal weldment (NCTW0705) (2-post)
	Outer door frame weldment (NCWT0725) (3-post)		Seal weldment (NCTW0728) (3-post)
32	Jamb plate weldment (NCWT0708-BS) (2-post)	68	Rope caulk
	Jamb plate weldment (NCWT0723-BS) (3-post)	69	Corrugated sealing strip
33	Inner door frame weldment (NCWT0715-BS) (2-post)	82	M10 x 40 flange bolt with sealing washer (S-10780)
	Inner door frame weldment (NCWT0720-BS) (3-post)	83	M10 flange nut (S-10784)

Installing the Door Stiffeners

1. Position the door stiffeners (61) under the base stiffener (60) on top of the outer door frame weldment (31) and install using 1" x 4-1/2" HHCS bolts (4), 1" flat washers (16) , 1" square washers (17) and 1" hex nuts (25).
2. Attach the door stiffener (61) to the stiffener support weldment (62) at the bottom of the outer door frame weldment (31) using 1" x 4-1/2" HHCS bolts (4), 1" square washers (17), 1" flat washers (16) and 1" hex nuts (25).
3. Make sure to add the flat washer (16) to the nut side and square washer (17) to both nut side and bolt side. Install the HHCS bolts (4) with bolt head on the outside of the door frame weldment (31).

Figure 7-31 *Installing the door stiffeners - 2 post*



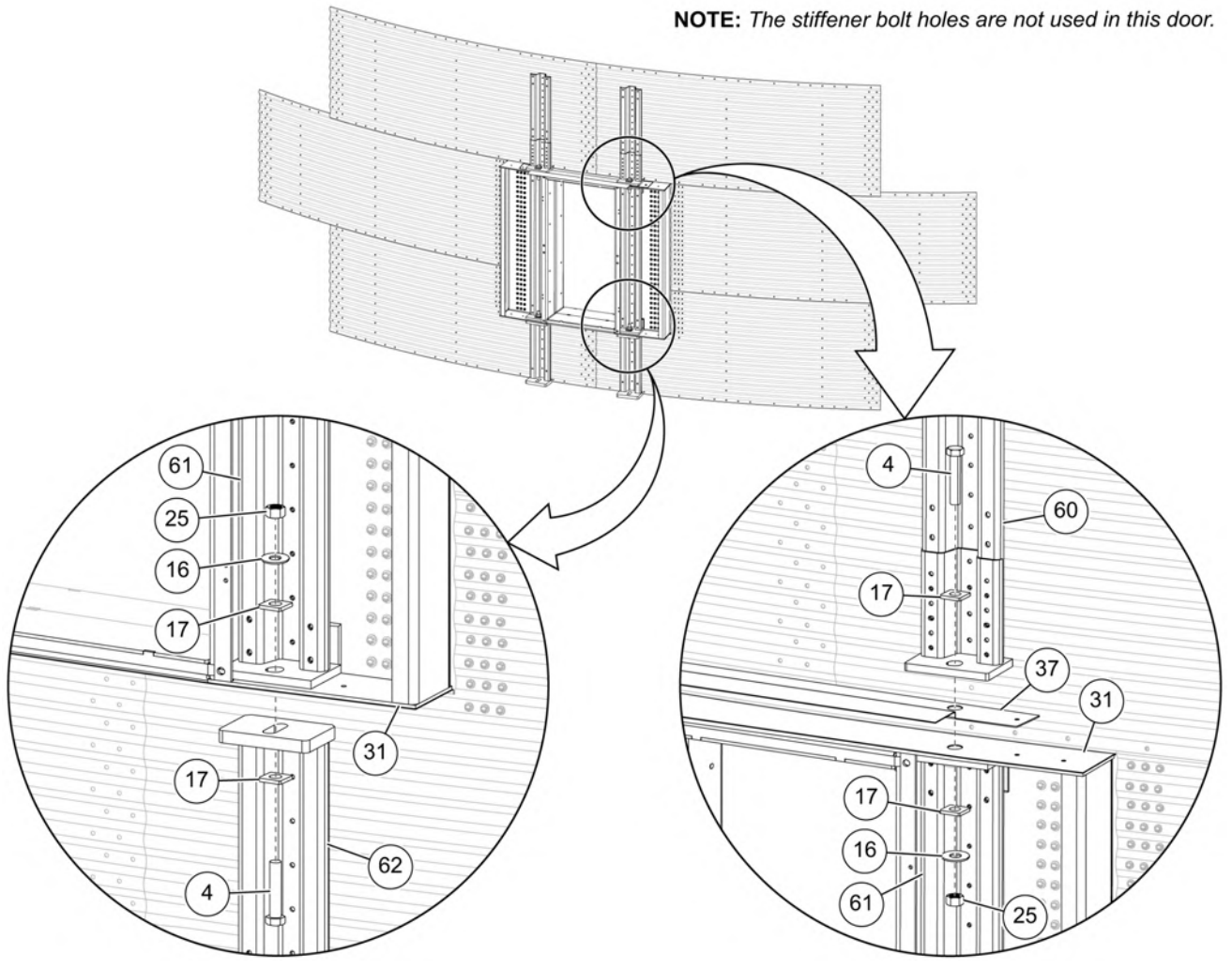
4	1" x 4-1/2" HHCS bolt (S-8273)	31	Outer door frame weldment (NCWT0710)
16	1" flat washer (S-7835)	60	Base stiffener
17	1" square washer (B-6756-BS)	61	Door stiffener (NCWT0482-BS)
25	1" hex nut (S-240)	62	Stiffener support weldment (NCWT0481-BS)

4. Position the door stiffeners (61) under the base stiffener (60) on top of the outer door frame weldment (31) and install using 1" x 4-1/2" HHCS bolts (4), 1" flat washers (16), 1" square washers (17) and 1" hex nuts (25).

   NOTE: *Make sure to place the upper cover (37) between the base stiffener (60) and the outer door frame weldment (31) before installing the HHCS bolts (4).*

5. Repeat steps 2 and 3 to attach the door stiffeners (61) to the stiffener support weldment (62).

Figure 7-32 *Installing the door stiffeners - 3 post*



4	1" x 4-1/2" HHCS bolt (S-8273)	37	Upper cover (NCWT0730)
16	1" flat washer (S-7835)	60	Base stiffener
17	1" square washer (B-6756-BS)	61	Door stiffener (NCWT0482-BS)
25	1" hex nut (S-240)	62	Stiffener support weldment (NCWT0481-BS)
31	Outer door frame weldment (NCWT0725)		

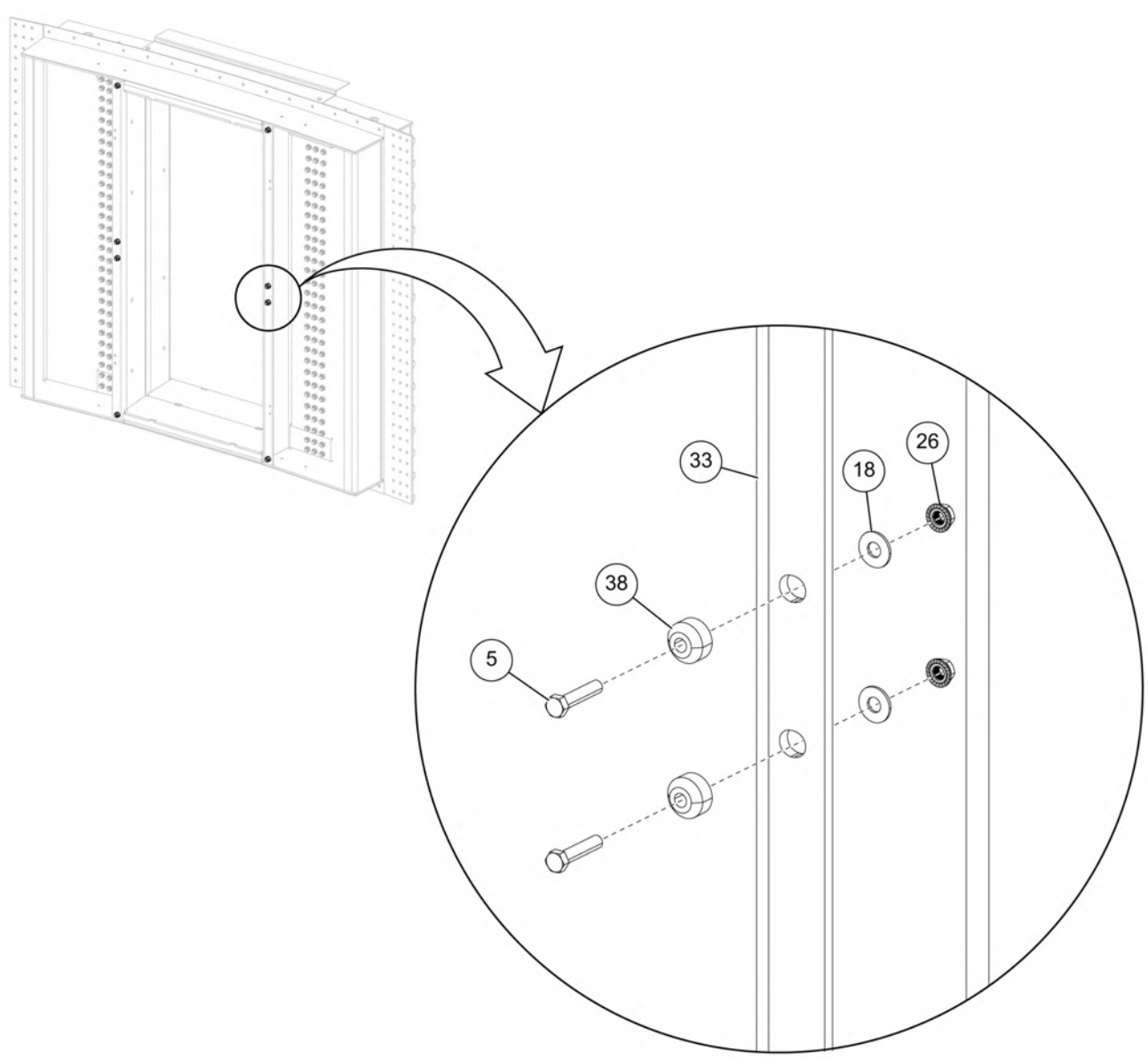
Installing the Bearing Pins

The bearing pins (38) are used to align the inside panels correctly with the door frame weldment.

Install eight bearing pins (38) to the inner door frame weldment (33) using 5/16" x 1-1/2" HHCS bolts (5), 5/16" flat washers (18) and 5/16" flange nuts (26).

NOTE: *Do not fully tighten bearing pins (38) until the inside doors are installed and adjusted.*

Figure 7-33 *Installing the bearing pins*



5	5/16" x 1-1/2" HHCS bolt (S-2741)	33	Inner door frame weldment (NCWT0715-BS) (2-post)
18	5/16" flat washer (S-845)		Inner door frame weldment (NCWT0720-BS) (3-post)
26	5/16" flange nut (S-3611)	38	Bearing pins (WD-6224)

Installing the Latch Bar Holders

The door latch bar (39) holders are used to secure the inner doors tightly against the door frame weldment.

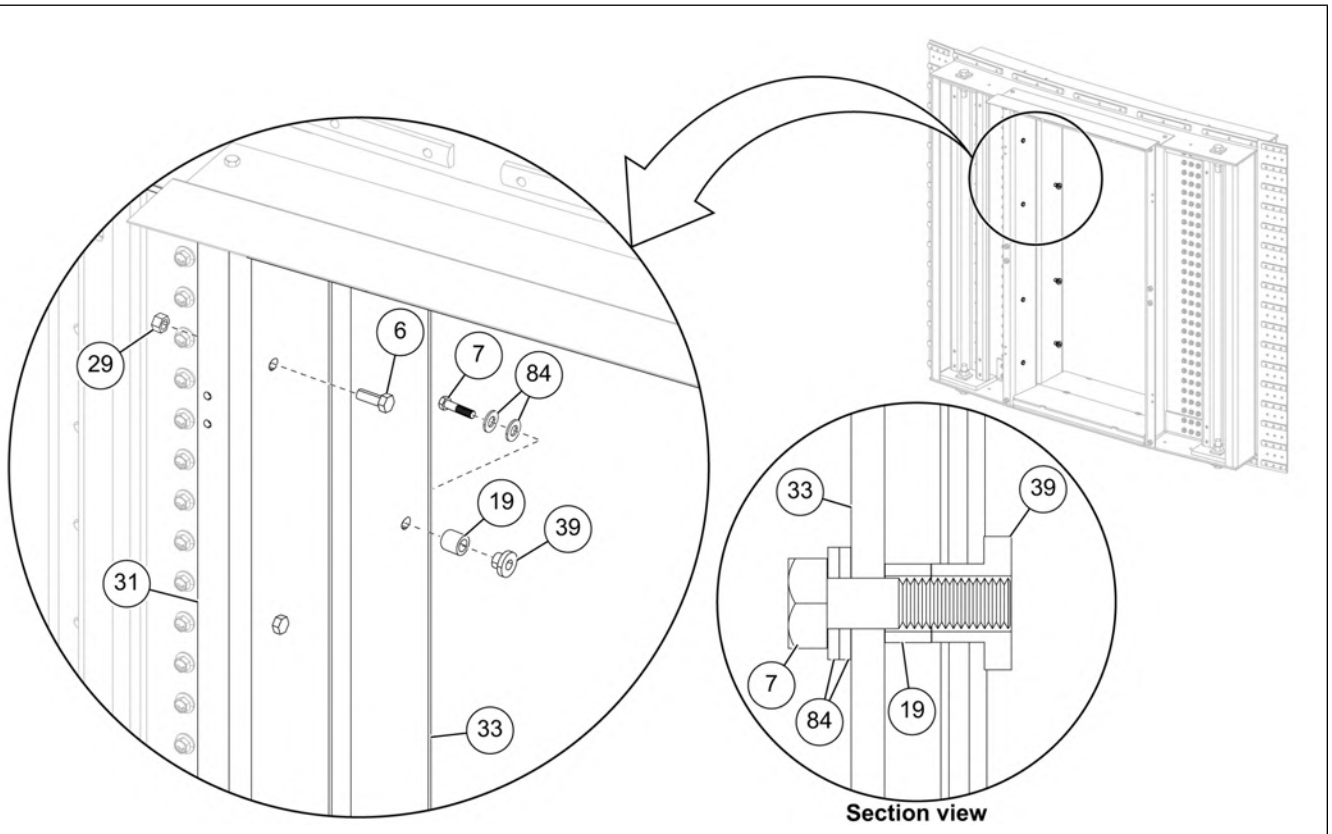
1. Install eight 1/2" x 1-1/4" HHTB bolts (6) and 1/2" flange nuts (29) to fill in the holes inside of the outer door frame weldment (31).

   NOTE: *Install the HHTB bolts (6) with bolt head on the inside of the door frame weldment (31).*

2. Install eight latch bar holders (39) to the inside of the inner door frame weldment (33) using 1/2" x 2" HHCS bolts (7), 1/2" flat washer (84) and latch bar sleeve (19).

   NOTE: *Install the HHCS bolts (7) and flat washers (84) to the outside and latch bar sleeve (19) to the inside of the inner door frame weldment (33). Use flat washers (84) and a latch bar sleeve (19) to adjust the depth of the latch bar holders (39) in the door frame weldment (33). Do not fully tighten the latch bar holders (39) until the inside doors are installed and adjusted.*

Figure 7-34 *Installing the latch bar holders*



6	1/2" x 1-1/4" HHTB bolt (S-9062)	31	Outer door frame weldment (NCWT0725) (3-post)
7	1/2" x 2" HHCS bolt (S-7811)	33	Inner door frame weldment (NCWT0715-BS) (2-post)
19	Latch bar sleeve (S-10920)		Inner door frame weldment (NCWT0720-BS) (3-post)
29	1/2" flange nut (S-10253)	39	Door latch bar holder (WD-6234)
31	Outer door frame weldment (NCWT0710) (2-post)	84	1/2" flat washer (S-2120)

Assembling the Top and Bottom Inner Doors

The inner doors assemble in the same way. Make sure the hinge side of the panels are oriented correctly before starting the assembly.

1. Assemble the latch bars (43) to a set of the right and left latches (42 and 45) using four 5/16" x 1" MS screws (9) and 5/16" flange nuts (26).

   NOTE: *Install MS screws (9) with screw head on top of the latch bar (43).*

2. Install the reinforcement angle (41) to the left side of the inner door panel using six 5/16" x 1" flange bolts (8) and 5/16" flange nuts (26).

   NOTE: *Install the flange bolts (8) with bolt head to the inside of the reinforcement angle (41).*

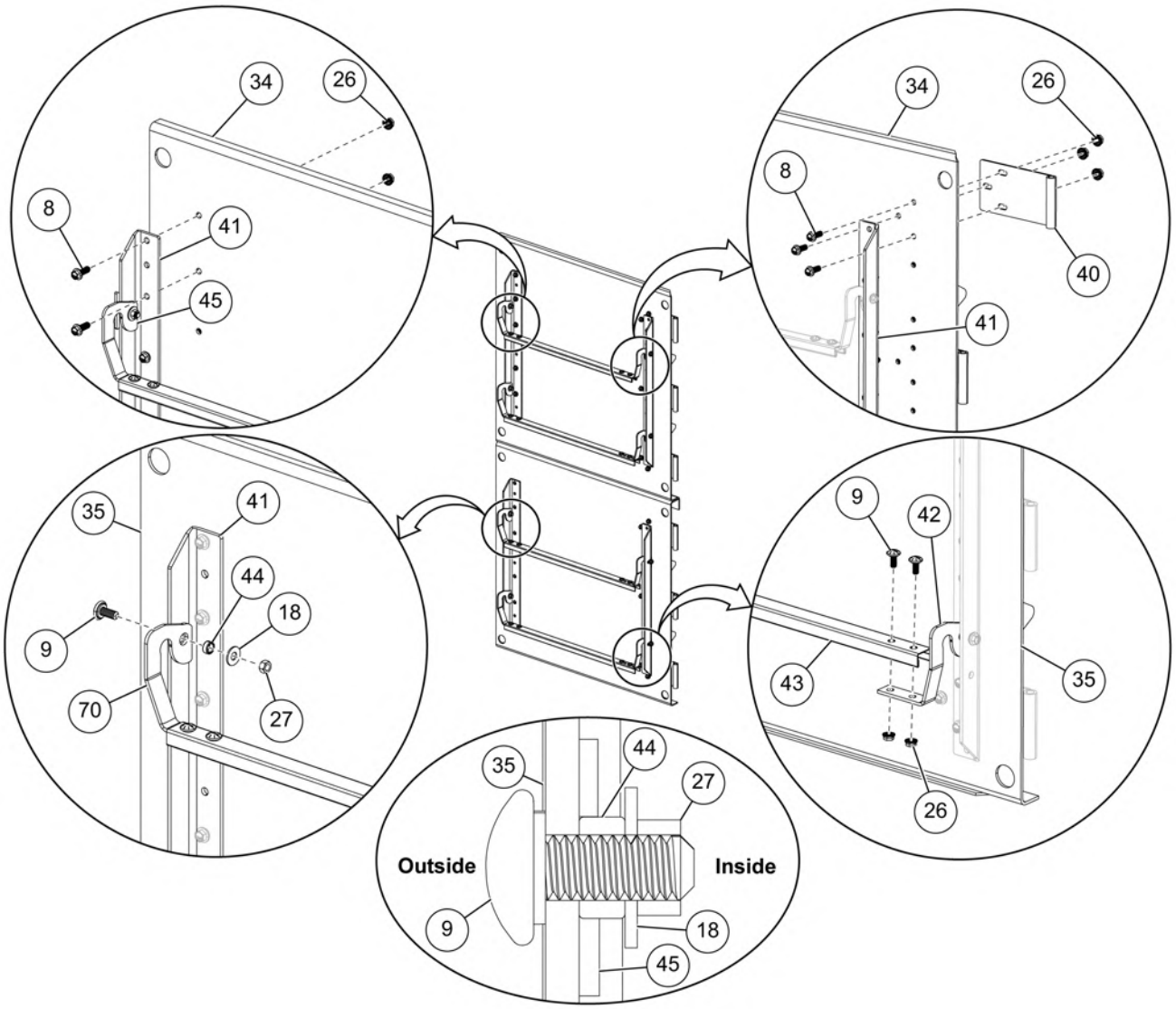
3. Install the reinforcement angle (41) to the right side of the inner door panel at the same time as the hinges weldments (40) using thirteen 5/16" x 1" flange bolts (8) and 5/16" flange nuts (26).

   NOTE: *Install the flange bolts (8) with bolt head to the inside of the reinforcement angle (41).*

4. Attach the latch bar assemblies (70) to the inside of the reinforcement angels (41) using four 5/16" x 1" MS screws (9), latch bushings (44), 5/16" flat washers (18) and 5/16" lock nuts (27).

   NOTE: *Install MS screws (9) with screw head to the outside of the reinforcement angle (41).*

Figure 7-35 *Assembling the top and bottom inner doors*



8	5/16" x 1" flange bolt with sealing washer (S-10260)	40	Inside/outside hinge weldment (NCWT0103)
9	5/16" x 1" MS screw with sealing washer (S-10633)	41	Door reinforcement angle (NCWT0877) (2-post)
18	5/16" flat washer (S-845)		Door reinforcement angle (NCWT0464) (3-post)
26	5/16" flange nut (S-3611)	42	Inside panel right latch (WD-6037)
27	5/16" lock nut (S-5220)	43	Latch bar (NCWT0119)
34	Top inner door panel (NCWT0465) (2-post)	44	Latch bushing (WD-6040)
	Top inner door panel (NCWT0795) (3-post)		
35	Bottom inner door panel (NCWT0462) (2-post)	45	Inside panel left latch (WD-6038)
	Bottom inner door panel (NCWT0799) (3-post)	70	Latch bar assembly

Installing the Inside Door Panels

IMPORTANT: *The inner door panels (34 and 35) must seat on the bearing pins and lock over latch bar holders for the door panels to close correctly. DO NOT fill the bin until the door panels have been installed correctly.*

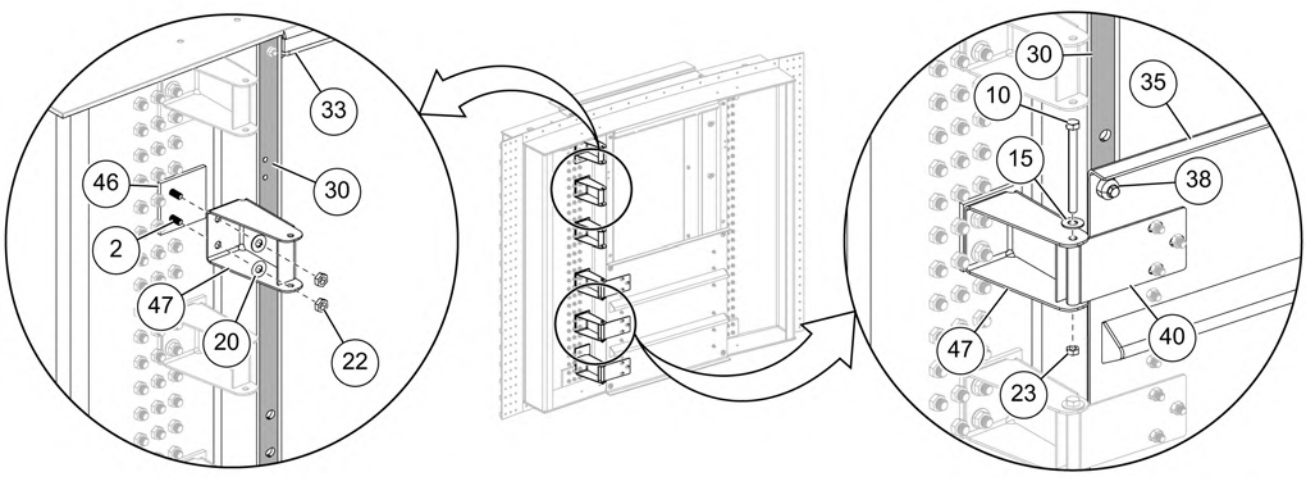
NOTE: *Adjust the panel hinges (40) if needed to align the door on the bearing pins (38).*

1. Install six shims (46) and door frame panel hinges (47) to the left side of the inner door frame weldment (33) using twelve 7/16" x 2-1/2" flange bolts (2), 7/16" flat washers (20) and 7/16" hex nuts (22).

   NOTE: *At hinge locations, replace the 7/16" x 2" flange bolts used when installing the jamb plates.*

2. Align the hinges (40) on the bottom door assembly with the bottom set of panel hinges (47) and install using three 3/8" x 4-1/2" HHCS bolts (10), 3/8" flat washers (15) and 3/8" lock nuts (23).
3. Align the hinges (40) on the top door assembly with the top set of panel hinges (47) and install using three 3/8" x 4-1/2" HHCS bolts (10), 3/8" flat washers (15) and 3/8" lock nuts (23).
4. After the doors are seated on the bearing pins (38) and seal when closed, fully tighten all the bearing pins (38) and latch bar holders.
5. Install foam seal (30) along the outside edge of the inner door frame weldment (33) where the door meets the frame.

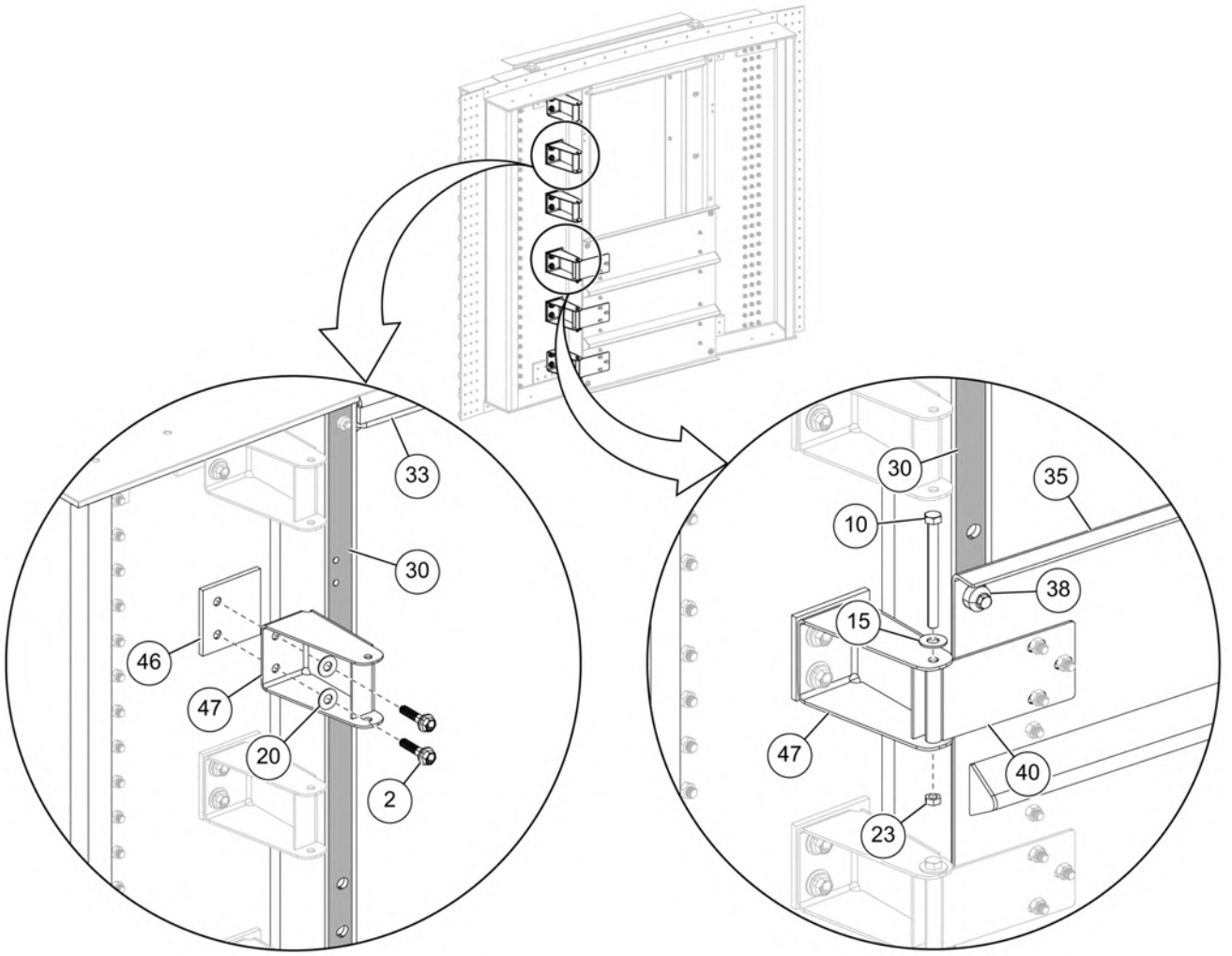
Figure 7-36 *Installing the top and bottom inside door panels - 2 post*



2	7/16" x 2-1/2" flange bolt with sealing washer (S-10134)	33	Inner door frame weldment (NCWT0715-BS)
10	3/8" x 4-1/2" HHCS bolt (S-1443)	35	Bottom inner door panel (NCWT0462)
15	3/8" flat washer (S-248)	38	Bearing pins (WD-6224)
20	7/16" flat washer (S-8612)	40	Inside/outside hinge weldment (NCWT0103)
22	7/16" hex nut (S-9281)	46	Hinge shim (NCWT0495)
23	3/8" lock nut (S-7383)	47	Inner door hinge housing (NCWT0474)
30	Foam seal (S-8610)		

6. Install six shims (46) and door frame panel hinges (47) to the left side of the inner door frame weldment (33) using twelve 7/16" x 2-1/2" flange bolts (2) and 7/16" flat washers (20).
7. Repeat steps 2-5 to install the top and bottom door panel assemblies to the inside door frame weldment (33).

Figure 7-37 *Installing the top and bottom inside door panels - 3 post*



2	7/16" x 2-1/2" flange bolt with sealing washer (S-10134)	33	Inner door frame weldment (NCWT0720-BS)
10	3/8" x 4-1/2" HHCS bolt (S-1443)	35	Bottom inner door panel (NCWT0799)
15	3/8" flat washer (S-248)	38	Bearing pins (WD-6224)
20	7/16" flat washer (S-8612)	40	Inside/outside hinge weldment (NCWT0103)
23	3/8" lock nut (S-7383)	46	Hinge shim (NCWT0495)
30	Foam seal (S-8610)	47	Inner door hinge housing (NCWT0474)

Assembling the Outer Door

The outer door must be assembled before it can be installed to the column weldments.

1. Attach the middle reinforcement channel (51) at the same time as the hold-back plate (76) to the middle of the outer door cover (48) using eight 5/16" x 1" flange bolts (8) and 5/16" flange nuts (26).

   NOTE: *Make sure to install the channel (51) on the inside and hold-back plate (76) on the outside of the outer door cover (48).*

2. Install the top and bottom reinforcement channels (51) at the same time as the handle mounting brackets (49) and cover hinge brackets (50) to the outer door cover (48) using sixteen 5/16" x 1" flange bolts (8) and 5/16" flange nuts (26).

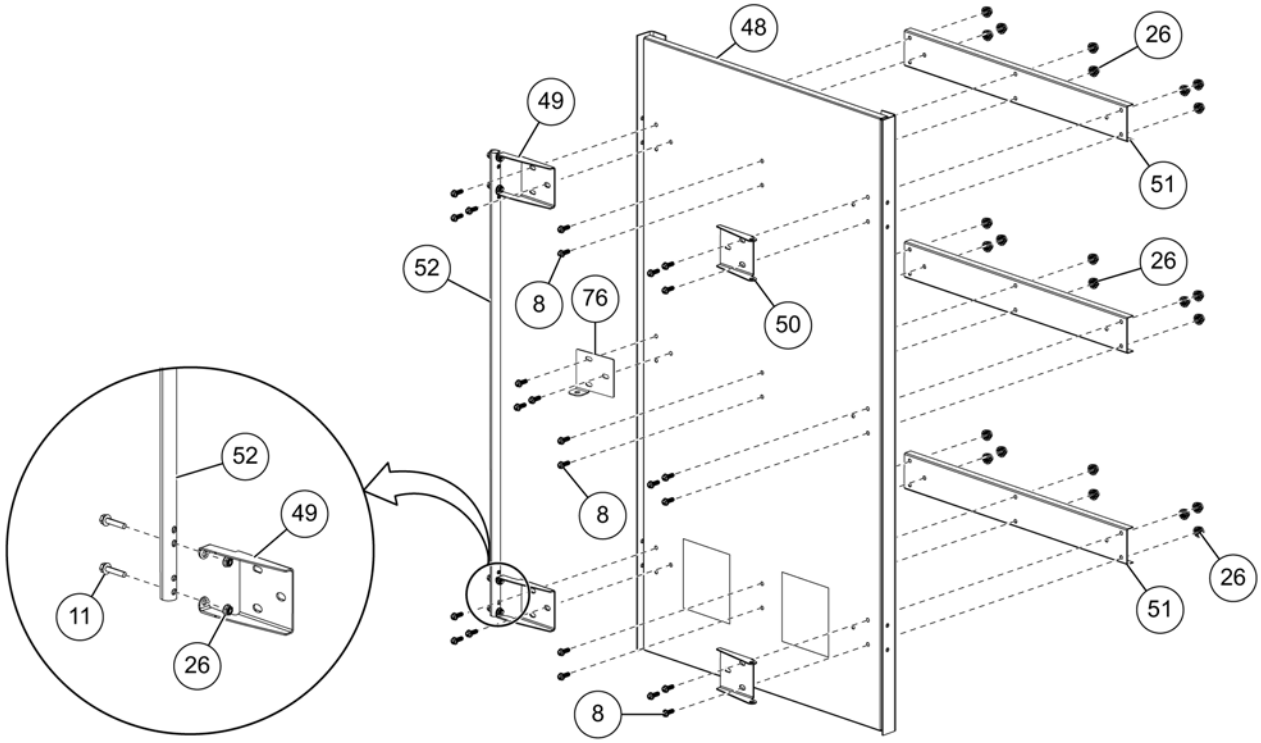
   NOTE: *Make sure to install the channels (51) on the inside and the handle mounting brackets (49) and cover hinge brackets (50) on the outside of the outer door cover (48).*

3. Install the door latch rod (52) to the handle mounting brackets (49) using four 5/16" x 1-1/2" flange bolts (11) and 5/16" flange nuts (26).

   NOTE: *Install the flange bolts (11) with bolt head on the outside of the door latch rod (52).*

4. Apply decals (DC-GBC-2A and DC-GBC-2S) to the outside of the outer door cover (48).

Figure 7-38 *Assembling the outer door cover*

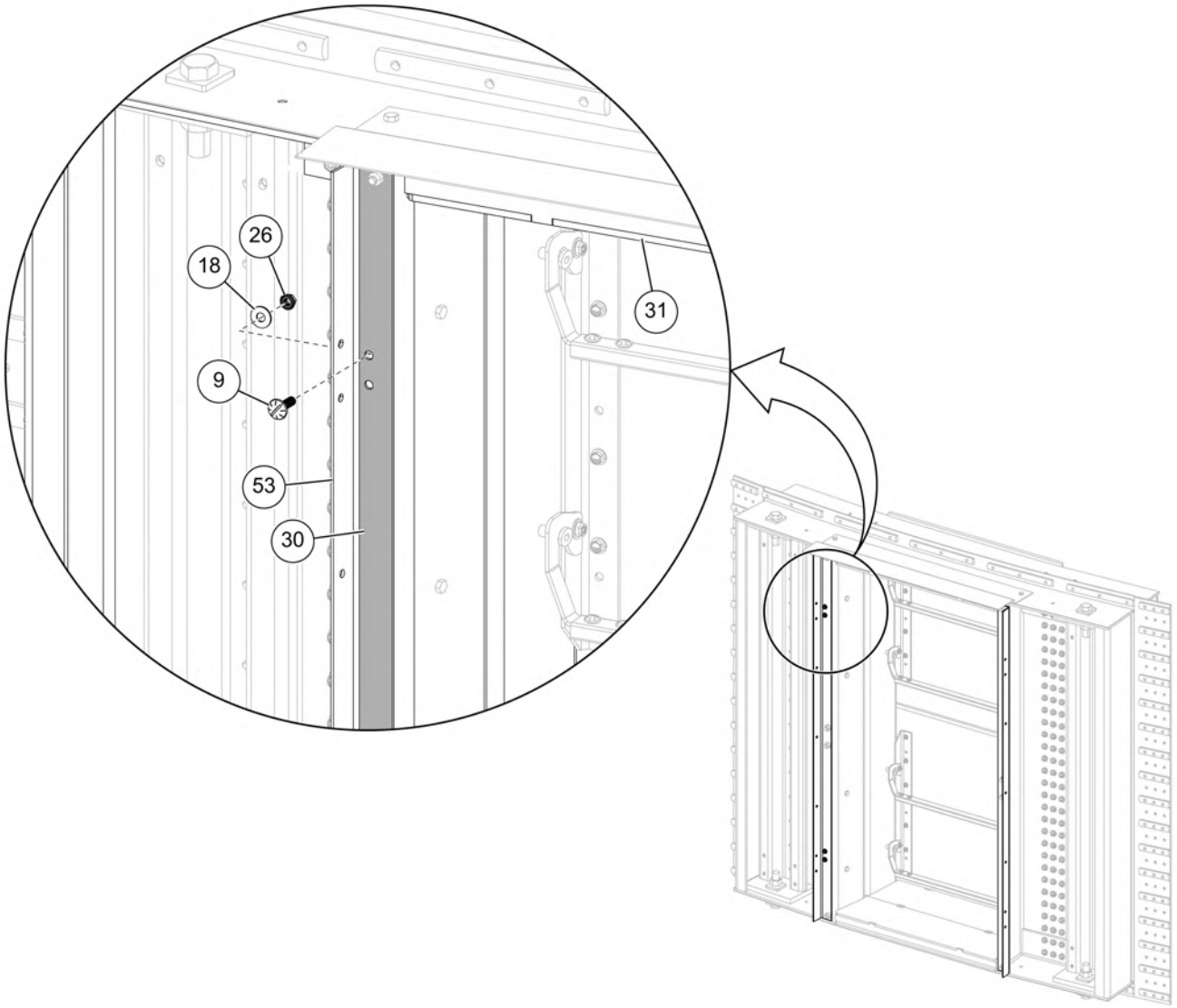


8	5/16" x 1" flange bolt with sealing washer (S-10260)	50	Door cover hinge bracket (NCWT0170)
11	5/16" x 1-1/2" flange bolt (S-10185)	51	Reinforcement channel (NCWT0511)
26	5/16" flange nut (S-3611)	52	Door latch rod (WD-6284)
48	Outer door cover (NCWT0510D)	76	Hold-back plate (NCWT0699)
49	Handle mounting bracket (WD-6287)		

Installing the Outer Door

1. Fill all open holes on the inside of the column weldments with 3/8" x 1" bin bolts.
2. Install the outer door cover angles (53) to the outside of the outer door frame weldment (31) using eight 5/16" x 1" MS screws (9), 5/16" flat washers (18) and 5/16" flange nuts (26).
3. Install foam seal (30) along the inside of both outer door cover angles (53).

Figure 7-39 *Installing the outer door cover angles*

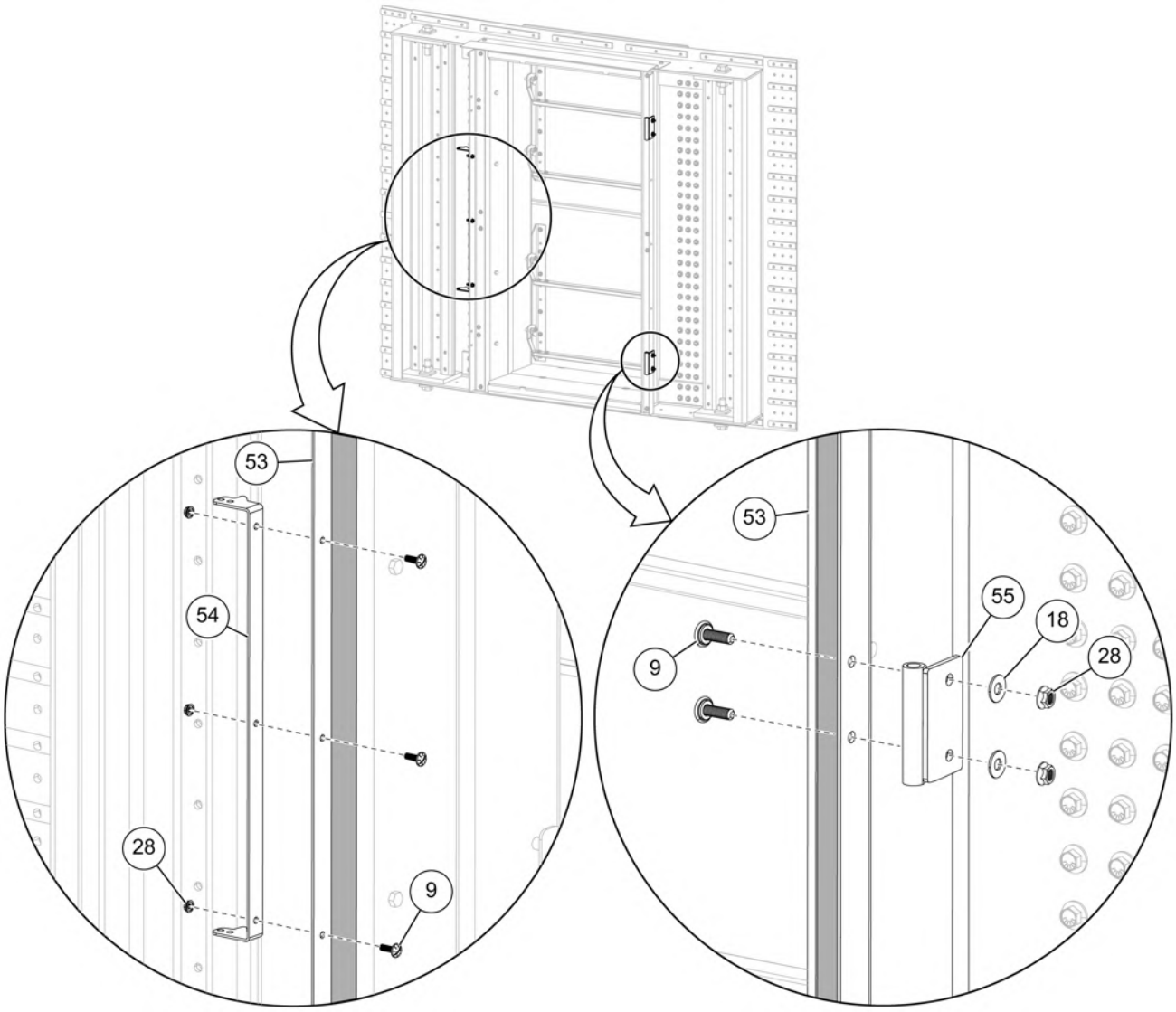


9	5/16" x 1" MS screw with sealing washer (S-10633)	30	Foam seal (S-8610)
18	5/16" flat washer (S-845)	31	Outer door frame weldment (NCWT0710) (2-post)
			Outer door frame weldment (NCWT0725) (3-post)
26	5/16" flange nut (S-3611)	53	Outer door cover angle (NCWT0509)

4. Install the cover hinge weldments (55) to the outside of the right outer door cover angle (53) using four 5/16" x 1" MS screws (9), 5/16" flat washers (18) and 5/16" flange nuts (28).
5. Install the door latch mounting bracket (54) to the outside of the left outer door cover angle (53) using two 5/16" x 1" MS screws (9) and 5/16" flange nuts (28).

   NOTE: *Align the door latch mounting bracket (54) to the center of the outer door cover angle (53) and install with the bolt heads on the inside.*

Figure 7-40 *Installing the door latch mounting bracket and outer cover hinge weldments*



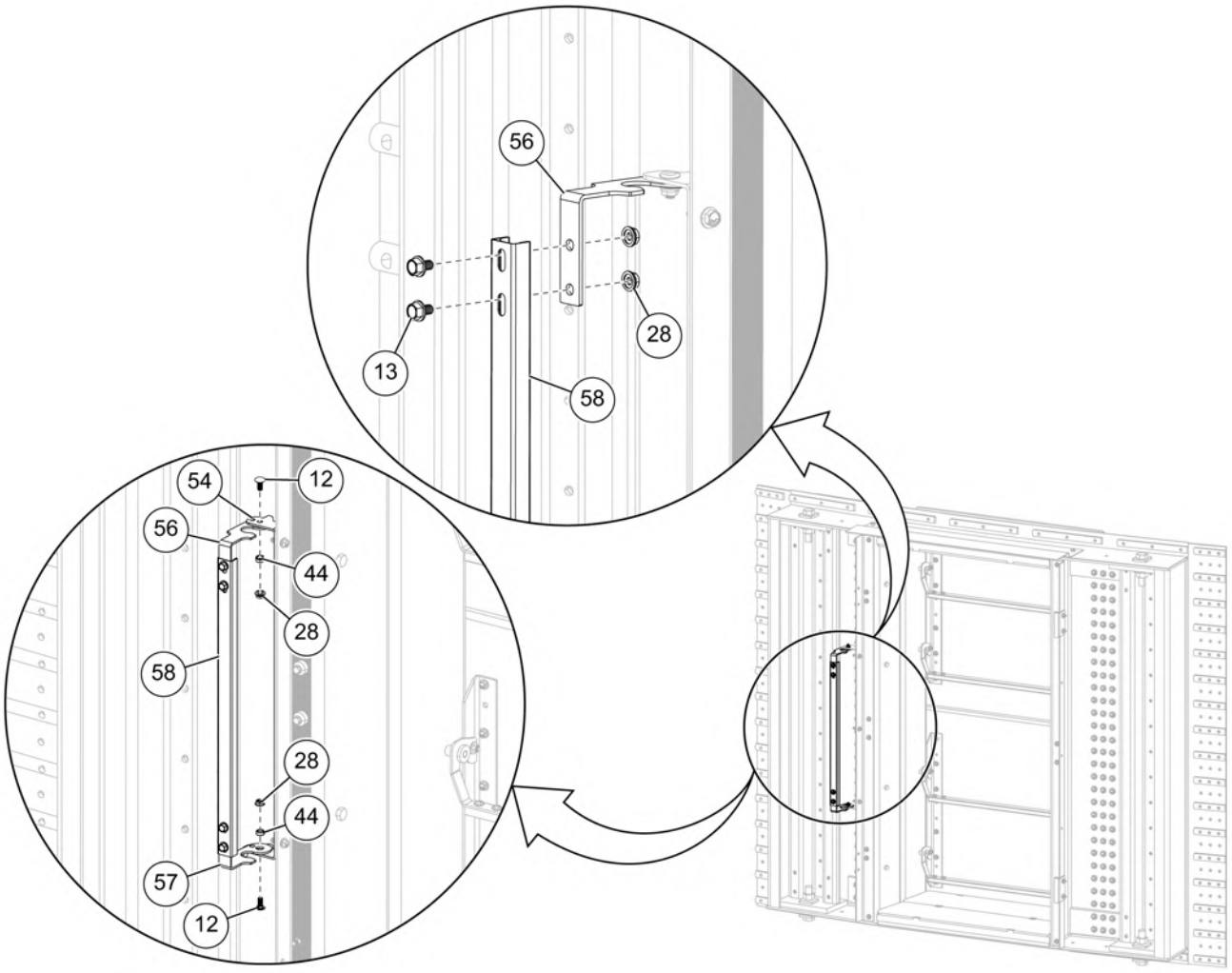
9	5/16" x 1" MS screw with sealing washer (S-10633)	53	Outer door cover angle (NCWT0509)
18	5/16" flat washer (S-845)	54	Door latch mounting bracket (WD-6286)
28	5/16" flange nut (S-10268)	55	Cover hinge weldment (NCWT0165)

6. Install the top and bottom outer door latches (56 and 57) to the door latch mounting bracket (54) using 5/16" x 3/4" carriage bolts (12), latch bushing (44) and 5/16" flange nuts (28).

   NOTE: *Make sure the holes in the outer door latches (56 and 57) align with the holes in the door latch mounting bracket (54) to allow the door to be locked.*

7. Install the latch bar (58) to the top and bottom outer door latches (56 and 57) using 5/16" x 1/2" flange bolts (13) and 5/16" flange nuts (28).

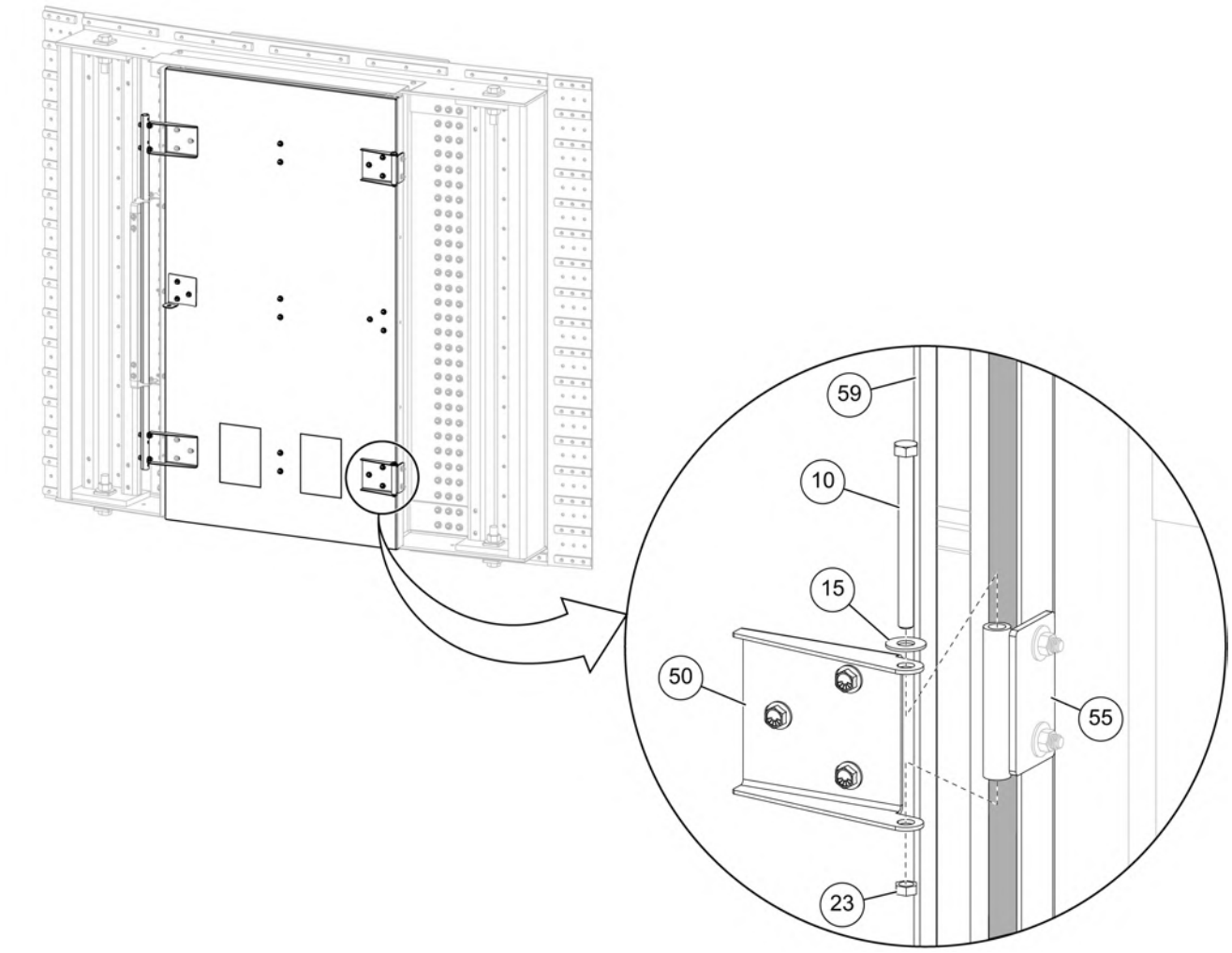
Figure 7-41 *Installing the door latches and latch bar*



12	5/16" x 3/4" carriage bolt (S-6076)	54	Door latch mounting bracket (WD-6286)
13	5/16" x 1/2" flange bolt (S-10579)	56	Top outer door latch (WD-6279)
28	5/16" flange nut (S-10268)	57	Bottom outer door latch (WD-6278)
44	Latch bushing (WD-6040)	58	Latch bar (WD-6039)

8. Align the cover hinge brackets (50) on the outer door cover assembly (59) with the set of cover hinge weldments (55) and install using two 3/8" x 4-1/2" HHCS bolts (10), 3/8" flat washers (15) and 3/8" lock nuts (23).

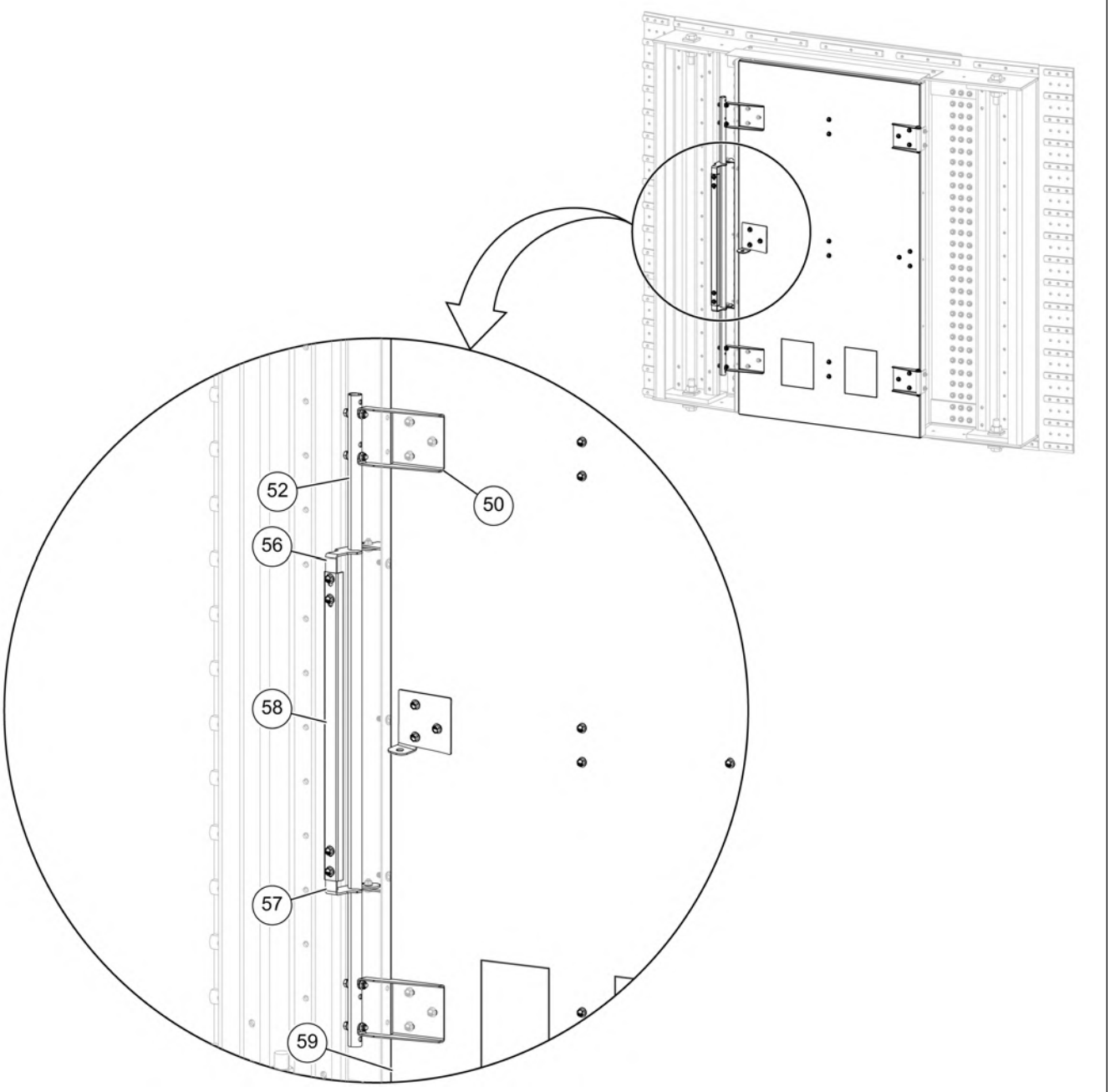
Figure 7-42 *Installing the outer door cover*



10	3/8" x 4-1/2" HHCS bolt (S-1443)	50	Door cover hinge bracket (NCWT0170)
15	3/8" flat washer (S-248)	55	Cover hinge weldment (NCWT0165)
23	3/8" lock nut (S-7383)	59	Outer cover assembly

9. Make sure the outer door cover assembly (59) operates smoothly and the slots in the top and bottom door latches (56 and 57) align with the door latch rod (52) to firmly close the door against the frame.

Figure 7-43 *Aligning the latches with the latch rod*



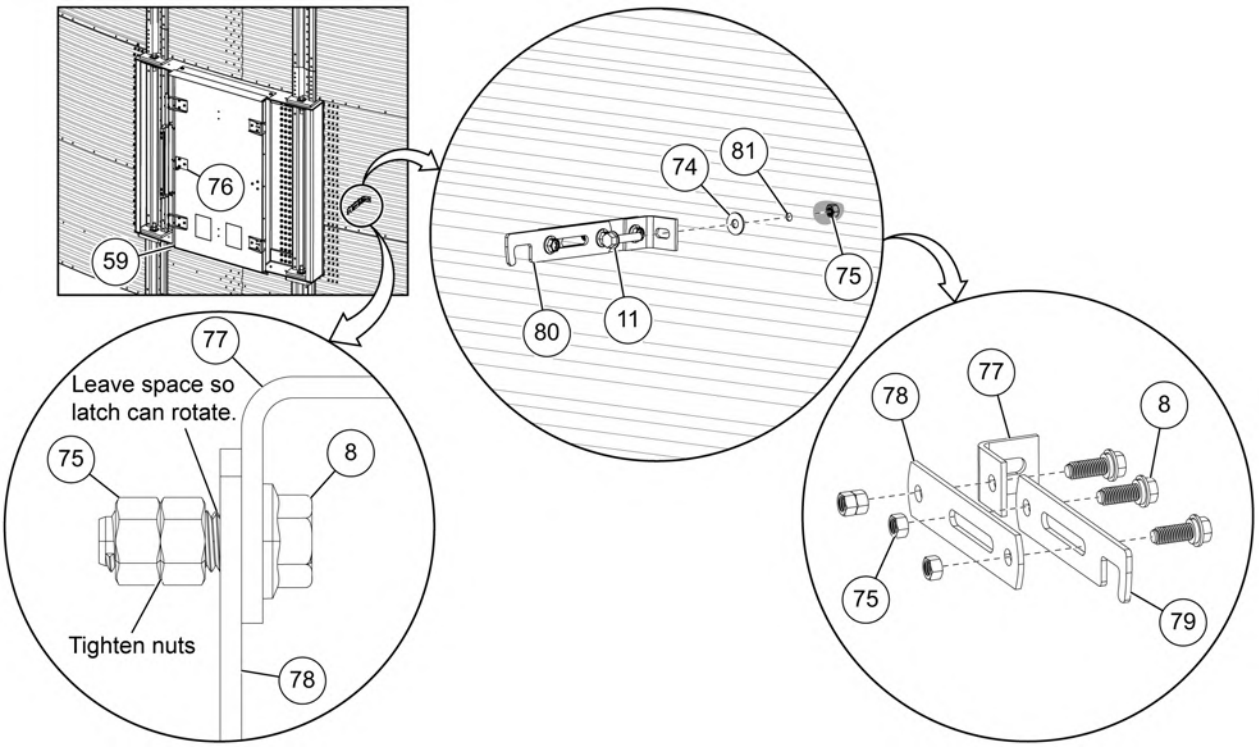
50	Door cover hinge bracket (NCWT0170)	57	Bottom outer door latch (WD-6278)
52	Door latch rod (WD-6284)	58	Latch bar (WD-6039)
56	Top outer door latch (WD-6279)	59	Outer cover assembly

Installing the Door Cover Hold-Back

1. Assemble the latch bracket (79) to the adjustment bracket (78) loosely, using two 5/16" x 1" flange bolts (8) and 5/16" hex nuts (75). Make sure each bolt (8) goes through a hole and a slot to allow for sliding adjustment.
2. Attach the door holder bracket (77) to the adjustment bracket (78) using one 5/16" x 1" flange bolts (8) and two 5/16" hex nuts (75). Leave a small space between the first nut (75) and the adjustment bracket (78) to allow the bracket to rotate. Tighten the second nut (75) firmly against the first nut (75).
3. Swing the door cover assembly (59) open as far as possible, then insert the latch assembly (80) into the hold-back plate (76).
4. Adjust the latch assembly (80) until it is against a hill on the sidewall, mark the location and drill a 3/8" hole (81) in the sidewall.
5. Install the latch assembly (80) using a 5/16" x 1-1/2" flange bolt (11), 5/16" sealing washer (74) and 5/16" hex nut (75). Make sure the 5/16" sealing washer (74) is installed between the sidewall and the door holder bracket (77) of the latch assembly (80).

NOTE: *After installing, open the door and make sure the latch bracket (79) fits into the hold-back plate (76), then tighten the adjustment bolts (8) and nuts (75) on the latch assembly (80).*

Figure 7-44 *Installing the door hold-back*



8	5/16" x 1" flange bolt with sealing washer (S-10260)	77	Holder bracket (WD-1302)
11	5/16" x 1-1/2" flange bolt (S-10185)	78	Adjustment bracket (NCWT0717)
59	Outer cover assembly	79	Latch bracket (NCWT0716)
74	5/16" sealing washer (S-1463)	80	Latch assembly
75	5/16" hex nut (S-396)	81	3/8" field drill hole
76	Hold-back plate (NCWT0699)		

Parts List

Figure 7-45 *Two ring door assembly (NCWT0701) parts*

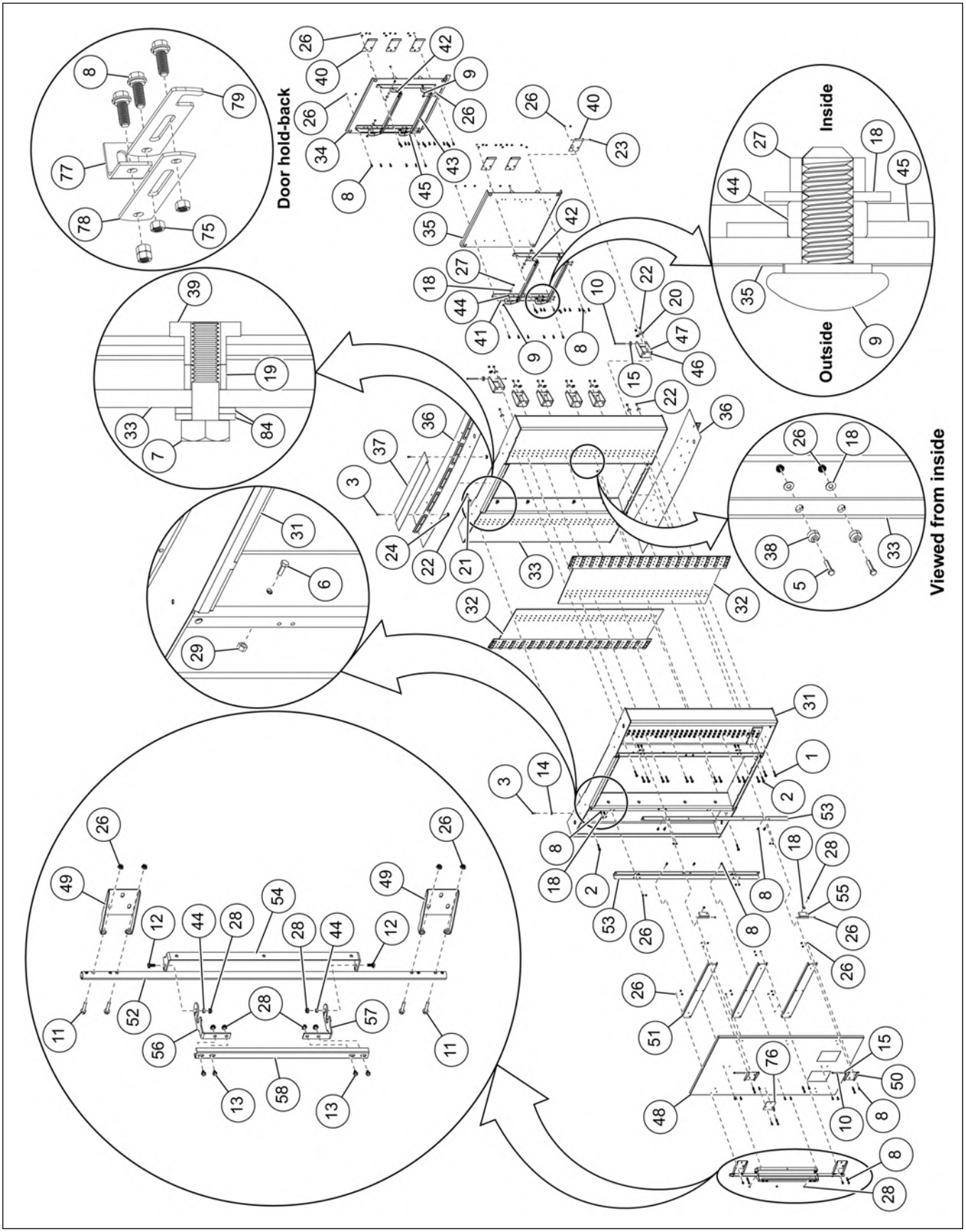


Figure 7-46 *Two ring door assembly (NCWT0719) parts*

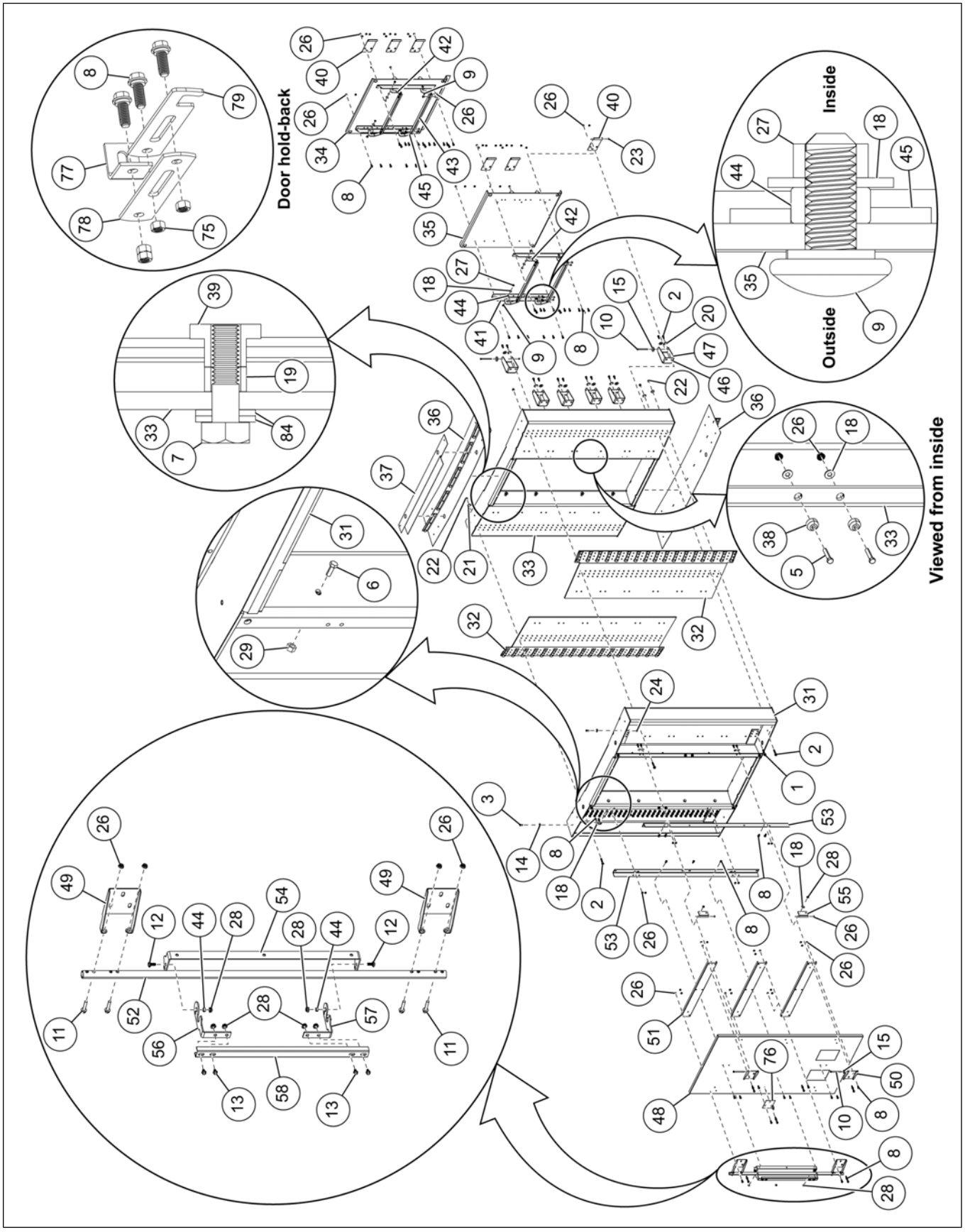


Table 7-3 *Two ring door assembly (NCWT0701 and NCWT0719) parts list*

Ref #	Part Number	Description
1	S-10328	7/16" x 2" flange bolt with sealing washer
2	S-10134	7/16" x 2-1/2" flange bolt with sealing washer
3	S-7488	3/8" x 1-1/2" flange bolt with sealing washer
5	S-2741	5/16" x 1-1/2" HHCS bolt
6	S-9062	1/2" x 1-1/4" HHTB bolt
7	S-7811	1/2" x 2" HHCS bolt
8	S-10260	5/16" x 1" flange bolt with sealing washer
9	S-10633	5/16" x 1" MS screw with sealing washer
10	S-1443	3/8" x 4-1/2" HHCS bolt
11	S-10185	5/16" x 1-1/2" flange bolt
12	S-6076	5/16" x 3/4" carriage bolt
13	S-10579	5/16" x 1/2" flange bolt
14	S-10102	Special washer
15	S-248	3/8" flat washer
18	S-845	5/16" flat washer
19	S-10920	Latch bar sleeve
20	S-8612	7/16" flat washer
21	S-8320	7/16" flat washer
22	S-9281	7/16" hex nut
23	S-7383	3/8" lock nut
24	S-456	3/8" hex nut
26	S-3611	5/16" flange nut
27	S-5220	5/16" lock nut
28	S-10268	5/16" flange nut
29	S-10253	1/2" flange nut
31	NCWT0710	Outer door frame weldment (2-post)
	NCWT0725	Outer door frame weldment (3-post)
32	NCWT0708-BS	Jamb plate weldment (2-post)
	NCWT0723-BS	Jamb plate weldment (3-post)
33	NCWT0715-BS	Inner door frame weldment (2-post)
	NCWT0720-BS	Inner door frame weldment (3-post)
34	NCWT0465	Top inner door panel (2-post)
	NCWT0795	Top inner door panel (3-post)
35	NCWT0462	Bottom inner door panel (2-post)
	NCWT0799	Bottom inner door panel (3-post)
36	NCTW0705	Seal weldment (2-post)
	NCTW0728	Seal weldment (3-post)
37	NCWT0714	Upper cover (2-post)
	NCWT0730	Upper cover (3-post)
38	WD-6224	Bearing pins
39	WD-6234	Door latch bar holder
40	NCWT0103	Inside/outside hinge weldment
41	NCWT0877	Door reinforcement angle (2-post)
	NCWT0464	Door reinforcement angle (3-post)
42	WD-6037	Inside panel latch - R.H.
43	NCWT0119	Latch bar
44	WD-6040	Latch bushing
45	WD-6038	Inside panel latch - L.H.
46	NCWT0495	Hinge shim
47	NCWT0474	Inner door hinge housing
48	NCWT0510D	Outer door cover
49	WD-6287	Handle mounting bracket
50	NCWT0170	Door cover hinge bracket
51	NCWT0511	Reinforcement channel
52	WD-6284	Door latch rod
53	NCWT0509	Outer door cover angle
54	WD-6286	Door latch mounting bracket
55	NCWT0165	Cover hinge weldment
56	WD-6279	Top outer door latch
57	WD-6278	Bottom outer door latch
58	WD-6039	Latch bar
75	S-396	5/16" hex nut
76	NCWT0699	Hold-back plate
77	WD-1302	Holder bracket
78	NCWT0717	Adjustment bracket
79	NCWT0716	Latch bracket
84	S-2120	1/2" flat washer
NS	S-10780	M10 x 40 flange bolt with sealing washer
NS	S-10784	M10 flange nut
NS	S-8273	1" x 4-1/2" HHCS bolt
NS	S-7835	1" flat washer
NS	B-6756-BS	1" square washer
NS	S-240	1" hex nut
NS	S-8610	Foam seal
NS	NCWT0482-BS	Door stiffener
NS	NCWT0481-BS	Stiffener support weldment

8 Roof Assembly

Topics Covered in this Chapter

- Attaching the Inside Stiffener to the Top Outside Stiffener
- Attaching the Eave Bracket to the Inside Stiffener
- Attaching the Eave Angle to the Sidewall Sheet
- Connecting the Tension Member to the Eave Bracket
- Attaching the Center Collar Rafter Clips to the Rafter
- About Temperature Cable Brackets and A-Frame Assemblies
- Assembling the Temperature Cable Bracket
- Attachment Locations of Purlins to Rafters
- Assembling a Laminated Purlin
- Assembling the Purlin Number 4
- Assembling the Purlin Number 3
- Assembling the Purlin Number 2
- Assembling the Purlin Number 1
- Assembling the Outer Center Collar
- Assembling the Lower Stand-Off Brackets to the Outer Center Collar
- Center Collar Placement
- Guidelines for Assembling and Lifting the A-Frame Rafter Sections
- Attaching the A-Frame to the Center Collar
- Attaching the A-Frame to the Eave Bracket
- Installing the Intermediate Purlins
- Attaching the Roof Panels
- Installing the Roof Flashing
- Assembling the Center Collar Brackets to the Inner Center Collar
- Installing the Inner Center Collar to the Outer Center Collar
- Installing the Top Panels
- Installing the Upper Stand-Off Support Brackets and Stand-Off Plates
- Installing the Center Cap Plate
- Installing the Flashing Lock

Attaching the Inside Stiffener to the Top Outside Stiffener

The inside stiffener supports the eave bracket and installed at the same time as the top outside stiffener. The inside stiffeners are only installed at the eave bracket locations in the sidewall sheet.

What You Should Know

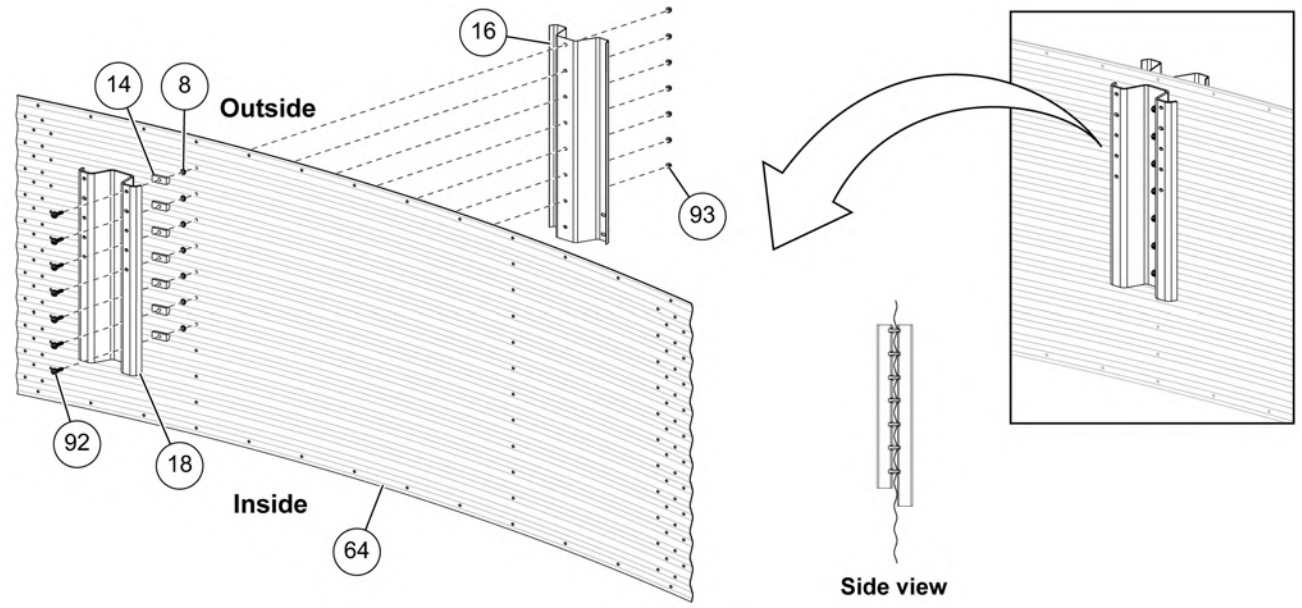
NOTE: *Do not tighten the nuts until all the bolts to connect the inside stiffener with sidewall and outside stiffener has been installed.*

1. On the inside of the sidewall (64), align the top hole in the inside stiffener (18) with hole at 4" from the top of the sidewall (64) sheet.

   NOTE: *Make sure to place a corrugation spacer (14) and a sealing washer (8) between the inside stiffener (18) and the sidewall (64) sheet at all places, where the holes are aligned.*

2. On the outside of the sidewall (64), align the first hole in the top outside stiffener (16) to the same hole in the sidewall (64) sheet, where the inside stiffener (18) will be installed.
3. Install M10 x 40 flange bolts (92) through the inside stiffener (18), corrugation spacer (14), sealing washer (8), sidewall (64) and top outside stiffener (16). Once all the M10 x 40 flange bolts (92) are installed, secure with M10 flange nuts (93) on the outside.
4. Tighten all the hardware to the recommended torque specifications, see *Bolt Torque Specifications, page 26*.

Figure 8-1 *Installing the inside stiffener and top outside stiffener to the sidewall*



8	Sealing washer (S-3558)	64	Sidewall
14	Corrugation spacer (S-7041)	92	M10 x 40 flange bolt with sealing washer (S-10780)
16	Top outside stiffener (CTS-4016XX)	93	M10 flange nut (S-10784)
18	Inside stiffener (CTS-4012XX)		

After You Finish

Repeat this process to install the remaining inside stiffeners to the sidewall sheet.

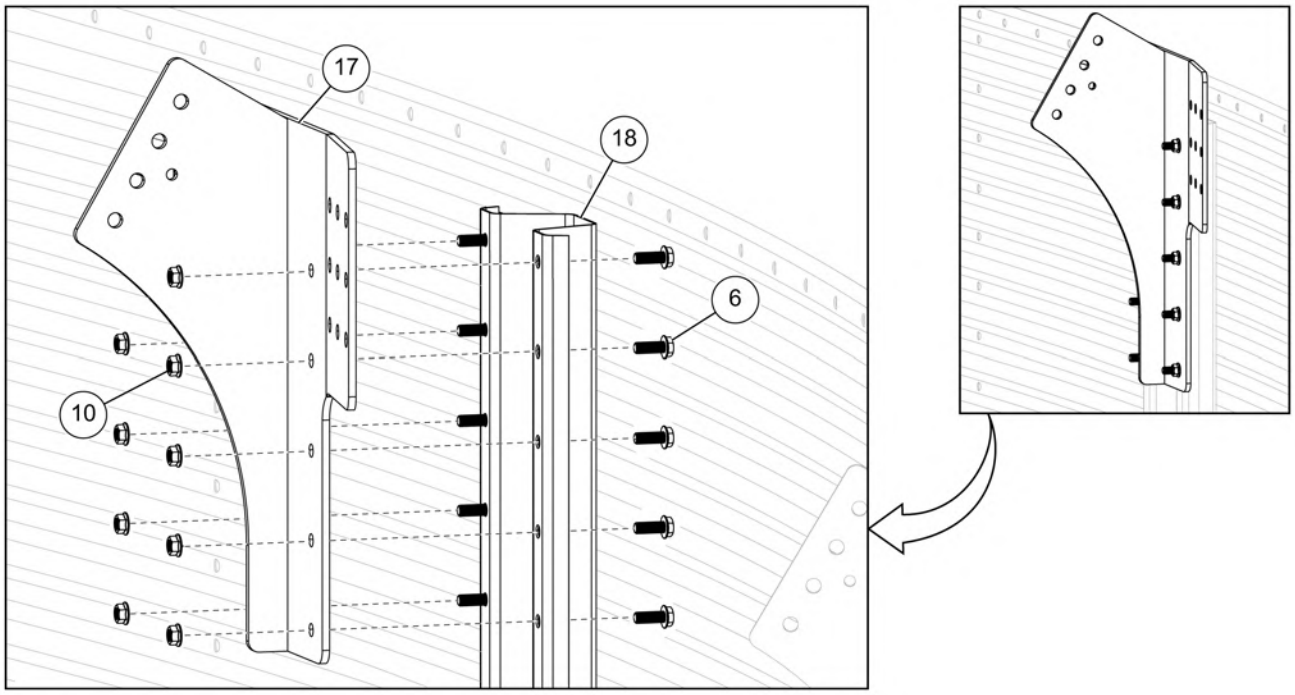
Attaching the Eave Bracket to the Inside Stiffener

Eave brackets secure the roof rafter to the sidewall.

Before You Begin
Make sure all the inside stiffeners are installed to the sidewall.

1. Install the eave bracket (17) to the inside stiffener (18) flanges using 3/8" x 1" flange bolts (6) and 3/8" flange nuts (10).
2. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Figure 8-2 *Installing the eave bracket to the inside stiffener*



6	3/8" x 1" flange bolt (S-7485)	17	Eave bracket (CTR-0498-BS)
10	3/8" flange nut (S-9426)	18	Inside stiffener (CTS-4012XX)

After You Finish
Repeat this process to install the remaining eave brackets.

Attaching the Eave Angle to the Sidewall Sheet

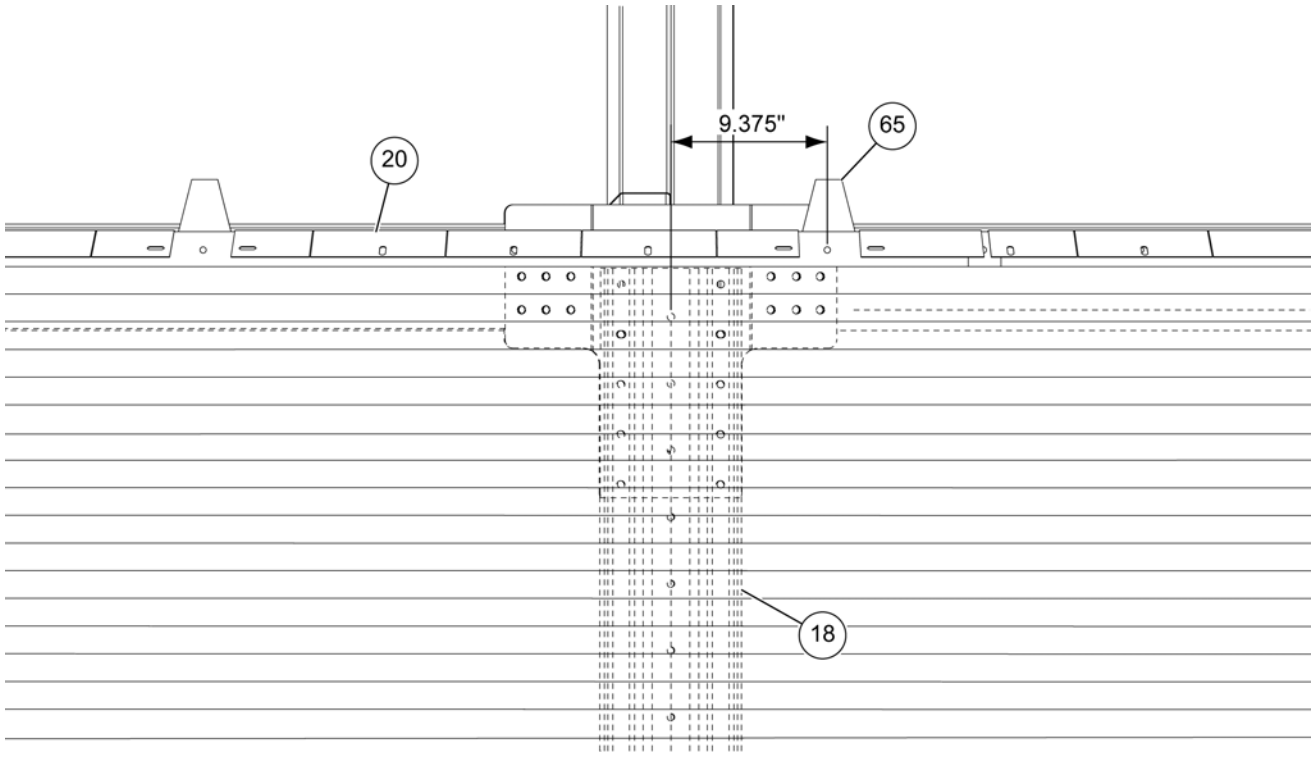
The eave angle secures the bottom of the roof panels to the bin eave.

What You Should Know
Each eave angle section will overlap the previously installed eave angle and installed to the inside of the sidewall.

1. Locate the top inside stiffener (18) and align the holes of the first eave angle (20) to horizontal seam holes in the sidewall sheet.

   IMPORTANT: *Make sure to align the center of the eave angle tab (65) a distance of **9.375"** from the center of the top inside stiffener (18) when assembling to the sidewall sheet. This is very important so that the roof panels align properly with the rafters.*

Figure 8-3 *Aligning the eave angle*



18	Top inside stiffener (CTS-4012XX)	65	Eave angle tab
20	First eave angle (CTR-0720)		

2. Install 5/16" x 1" flange bolts (2) and 5/16" flange nuts (11), leaving the end holes open.

   NOTE: *The quantity of flange bolts (2) and flange nuts (11) may vary, depending on the sidewall punch pattern.*

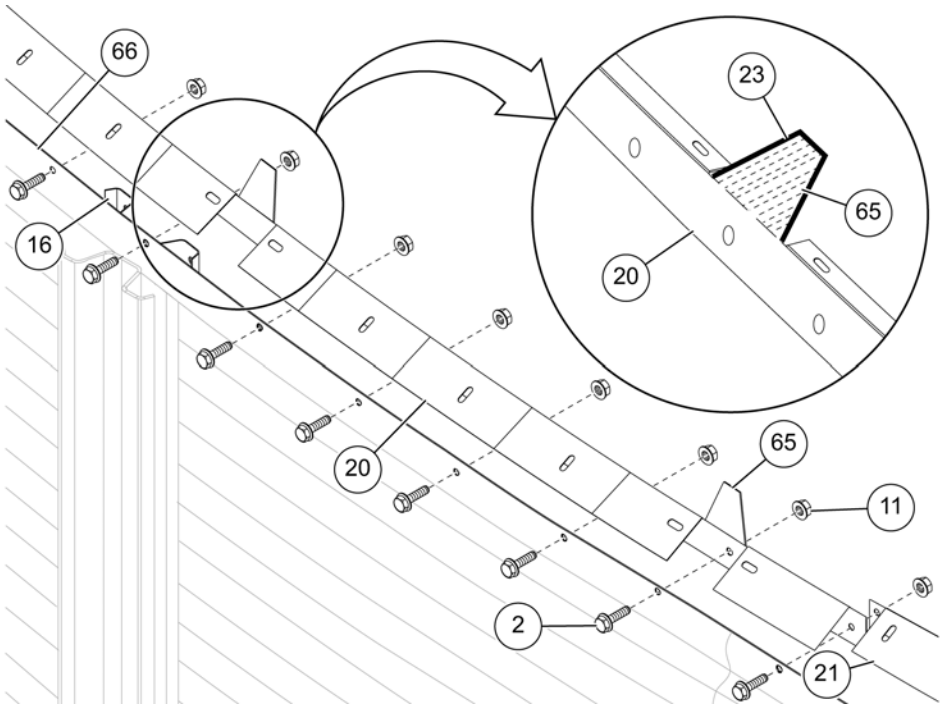
3. Position the second eave angle (21) overlapping the first eave angle (20) and align the eave angle holes with the holes in the sidewall sheet (66).

4. Install 5/16" x 1" flange bolts (2) and 5/16" flange nuts (11), leaving the end hole open for the next eave angle to be installed.

   NOTE: *The quantity of flange bolts (2) and flange nuts (11) may vary, depending on the sidewall punch pattern.*

5. Bend the eave angle tabs (65) upward to conform with each roof panel rib.
6. Install the optional tab seal (23) to the tabs of the eave angle (20) as shown from the inside of the bin.
7. Tighten all the hardware to the recommended torque specification. See *Bolt Torque Specifications, page 26*.

Figure 8-4 *Installing the eave angle to the sidewall*



2	5/16" x 1" flange bolt with sealing washer (S-10260)	21	Second eave angle (CTR-0720)
11	5/16" flange nut (S-3611)	23	Optional tab seal (CRP-4802)
16	Top outside stiffener (CTS-4016XX)	65	Eave angle tab
20	First eave angle (CTR-0720)	66	Top sidewall sheet

After You Finish

Continue this process to install the remaining eave angles to the sidewall sheet.

Connecting the Tension Member to the Eave Bracket

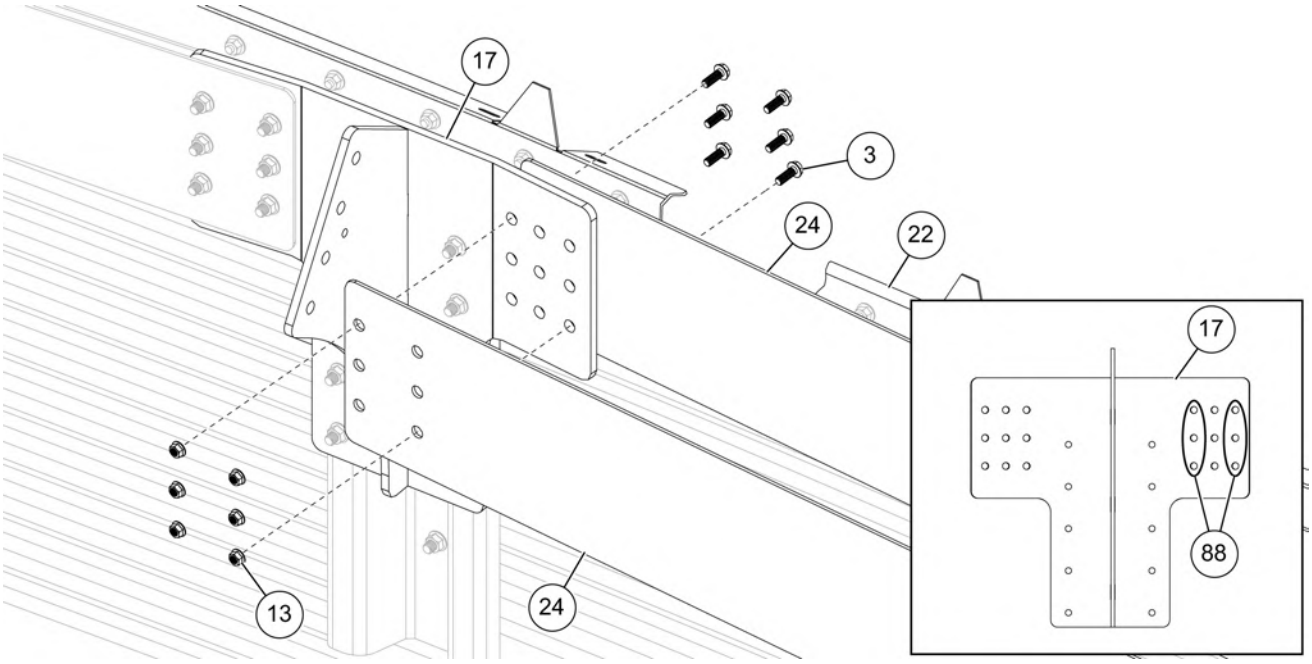
Tension members are installed to the eave bracket around the inside of the bin.

Before You Begin
Make sure all the eave brackets and eave angles are installed.
What You Should Know

IMPORTANT: *Install bolts with bolt head on the backside of the eave bracket as shown.*

1. Lift and support the tension member (24) against the outside mating surface of the eave bracket (17).
2. Install 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13) to each end of the tension member (24).
3. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Figure 8-5 *Installing the tension member to the eave bracket*



3	7/16" x 1-1/4" flange bolt (S-10250)	22	Eave angle (CTR-0720)
13	7/16" flange nut (S-10251)	24	Tension member (CTR-0161)
17	Eave bracket (CTR-0498-BS)	88	Tension member bolt holes

After You Finish
Repeat this process to install the remaining tension members to the eave bracket.

Attaching the Center Collar Rafter Clips to the Rafter

Center collar rafter clips secure the A-frame rafter sections to the center collar.

What You Should Know

Each roof rafter receives two center collar rafter clips, identified as the left center collar rafter clip (25) and the right center collar rafter clip (26).

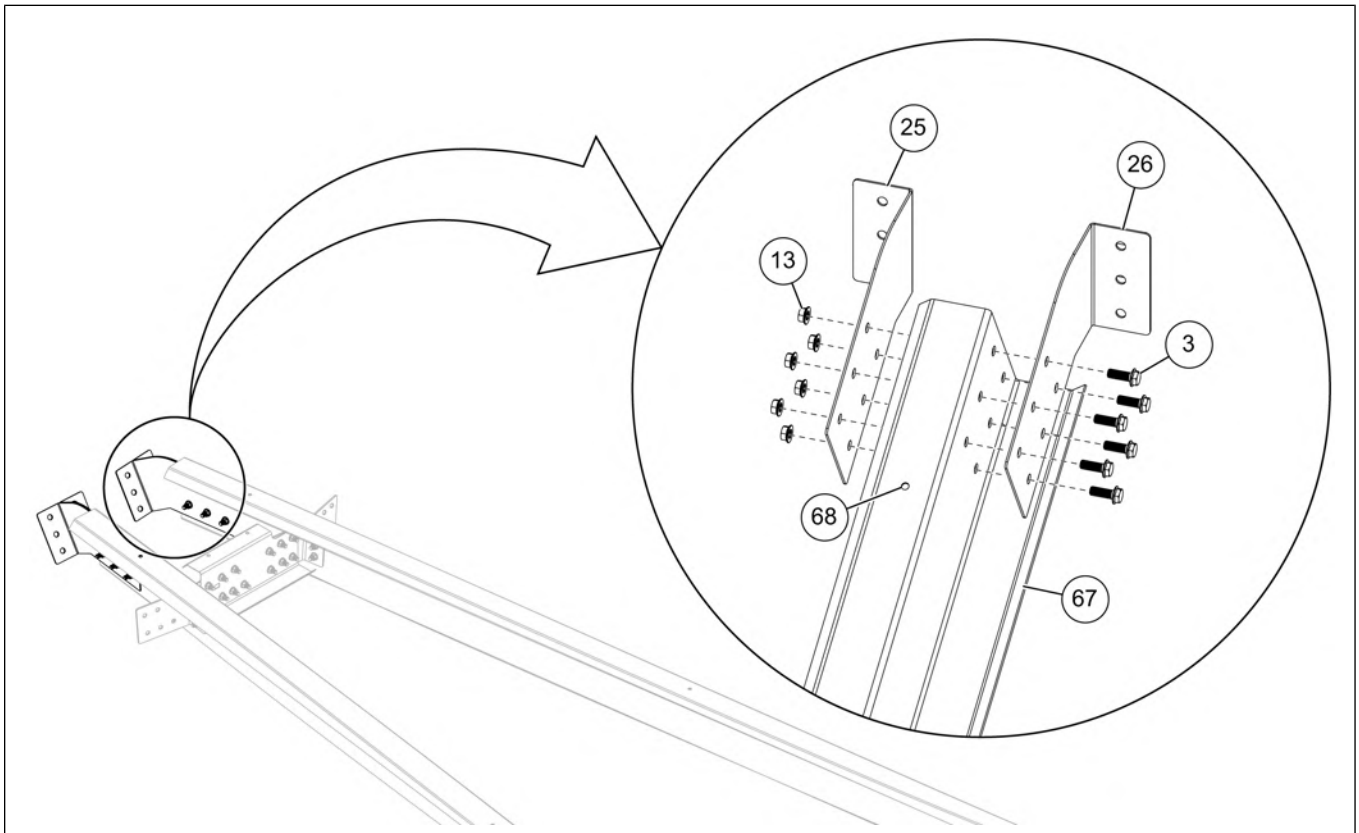
1. Use the rafter (67) end with six holes for installing the center collar rafter clips (25 and 26).

   NOTE: *Make sure that the rafter (67) is properly oriented, so that the roof panels holes (68) in the rafter (67) are at the top before installing the center collar rafter clips (25 and 26).*

2. Install the left center collar rafter clip (25) and right center collar rafter clip (26) to each side of the roof rafter (67) using six 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13).

3. Tighten all the hardware to the recommended torque specification. See *Bolt Torque Specifications, page 26*.

Figure 8-6 *Installing the center collar rafter clips to the rafter*



3	7/16" x 1-1/4" flange bolt (S-10250)	26	Right center collar rafter clip (CTR-0492)
13	7/16" flange nut (S-10251)	67	Roof rafter
25	Left center collar rafter clip (CTR-0491)	68	Roof panel hole

After You Finish

Repeat this process to install the center collar rafter clips to the remaining roof rafters.

About Temperature Cable Brackets and A-Frame Assemblies

Temperature cable bracket installation locations must be considered prior to assembling the A-frames.

Installation Locations for Temperature Cable Brackets

Before assembling the A-frames, you must know the installation locations of the temperature cable brackets within the A-frame assemblies. Temperature cable brackets are installed at the same time as the purlin clips are installed.

This information is provided solely for the purpose of facilitating proper support bracket placement. It is fully the responsibility of the dealer, customer, contractor, or said agent of such parties to confirm the details of the system to be used. GSI is not responsible for the effectiveness or performance of any temperature cable monitoring system or layout.

IMPORTANT: *Temperature cable brackets must be installed at the specified locations as shown below. Any variation from this pattern or cable quantity shown must be reviewed by GSI engineering. This must be reviewed well in advance of the bin order.*

Lifting Sequence for the A-Frame Assemblies

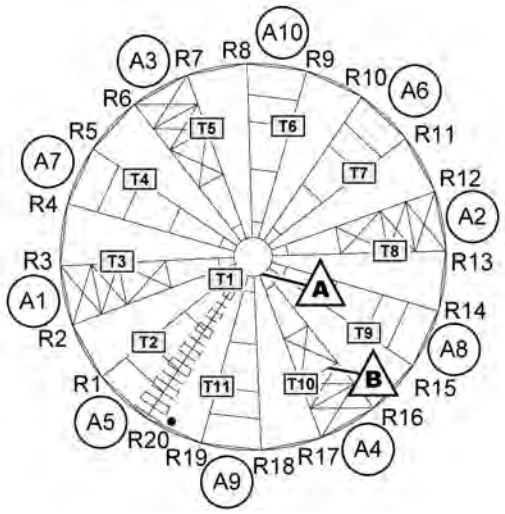
The roof structure layout consists of standard A-frame assemblies and A-frame assemblies with X-bracing that are installed in a specific sequence to evenly distribute the weight as they are being installed.

The A-frames with X-bracing are strategically spaced around the diameter of the bin and are the first A-frames to be installed. The A-frame assemblies can be installed in the order as shown in the figure below. A-frames are installed across from each other to keep the weight distributed evenly during installation.

Tip

During the A-frame assembly, label each A-frame assembly according to the order it is to be installed.

Figure 8-7 *A-frame installation sequence and temperature cable locations for 60' diameter bin*



A	3' radius location (center collar)	B	20' radius location

Table 8-1 *A-frame installation sequence and temperature cable locations for 60' diameter bin*

A-frame number	Rafter Number	Temp Cable Number	Radius Location
A1	R2	—	—
	R3	T3	20'
A2	R12	—	—
	R13	T8	20'
A3	R6	—	—
	R7	T5	20'
A4	R16	—	—
	R17	T10	20'
A5	R1	T2	20'
	R20	—	—
A6	R10	—	—
	R11	T7	20'
A7	R4	—	—
	R5	T4	20'
A8	R14	—	—
	R15	T9	20'
A9	R18	—	—
	R19	T11	20'
A10	R8	—	—
	R9	T6	20'
NA	Attach to center collar	T1	3'

NOTE: *A-frames labeled as "A1" through "A4" have X-bracing and are installed first. A-frames labeled as "A5" through "A10" are standard A-frames. The empty spaces that are not labeled must have purlins installed between the rafters after all the A-frames are secured. The numbers reflect the recommended installation sequence of the A-frame assemblies.*

Table 8-2 *Starting lengths for temperature cables for 60' diameter bins*

Length from the center collar	179.80" (434.06 cm)
Length from 20' diameter location	58.1" (147.57 cm)

The temperature cable lengths in the chart above are the distances from where the temperature cable attaches to the rafter or the center collar to the top ring. To calculate the correct temperature cable length, add 32" for each bin ring to the starting length. All temperature cables must end above any unload equipment and should be secured properly with twines. DO NOT allow the cables to become tangled in the unload equipment.

Assembling the Temperature Cable Bracket

The temperature cable brackets are installed to the roof rafters and support the temperature cables.

Before You Begin

Determine the correct location of the temperature cable brackets within the A-frame Assembly. See *About Temperature Cable Brackets and A-Frame Assemblies, page 130*.

What You Should Know

The A-frame assembly consists of two roof rafters, purlin clips, purlins and possibly X-bracing. The temperature cable brackets should be installed when the A-frames are assembled.

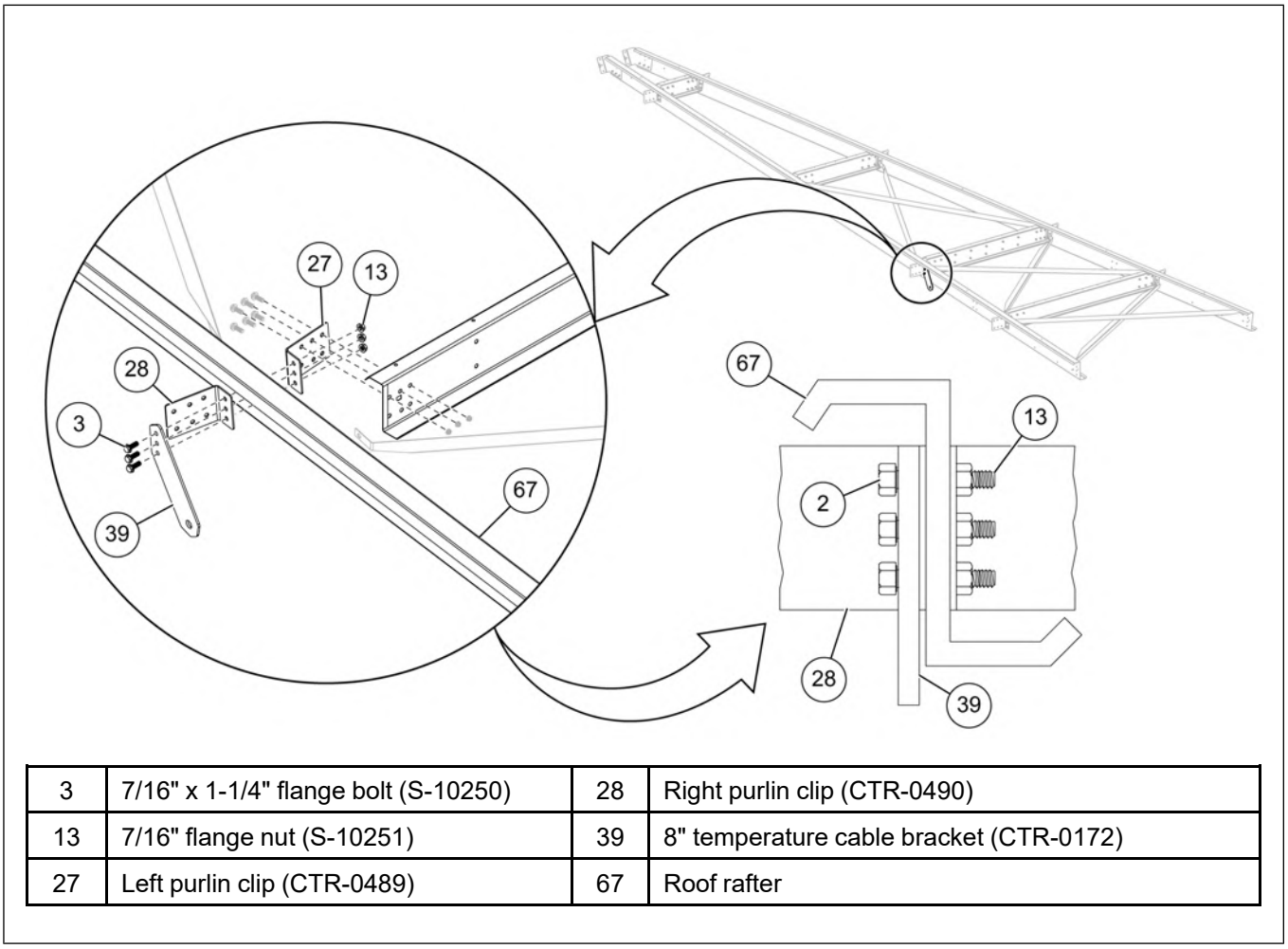
NOTE: *The temperature cable bracket must be installed at specific locations, see About Temperature Cable Brackets and A-Frame Assemblies, page 130.*

1. Attach a right purlin clip (28), a left purlin clip (27) and a temperature cable bracket (39) to the rafter (67) using two 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13).

   NOTE: *If no X-bracing is installed, install three flange bolts (3) and three flange nuts (13).*

2. After all the purlins and X-bracing are installed to the A-frame, tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Figure 8-8 *Installing a temperature cable bracket to the A-frame*

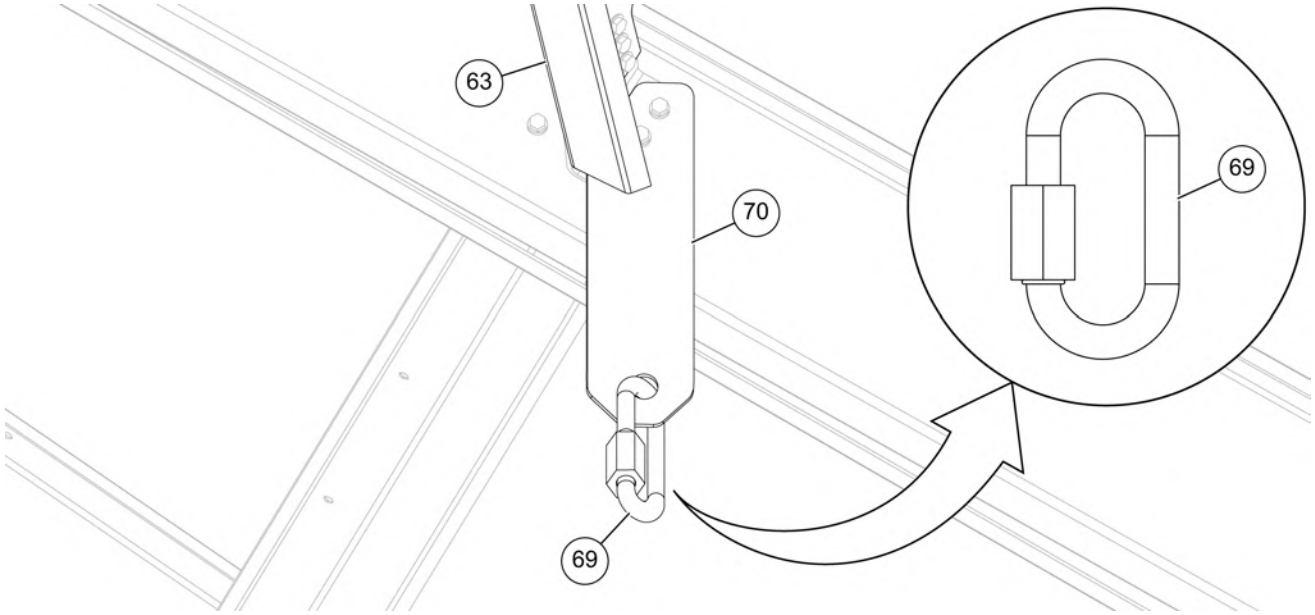


3	7/16" x 1-1/4" flange bolt (S-10250)	28	Right purlin clip (CTR-0490)
13	7/16" flange nut (S-10251)	39	8" temperature cable bracket (CTR-0172)
27	Left purlin clip (CTR-0489)	67	Roof rafter

3. Install a quick link (69) to each temperature cable bracket (70) to support the temperature cables.

IMPORTANT: *Do not attach weights to the temperature cables; secure the bottom of cables to the floor with light twine. No roof rafter shall support more than one cable.*

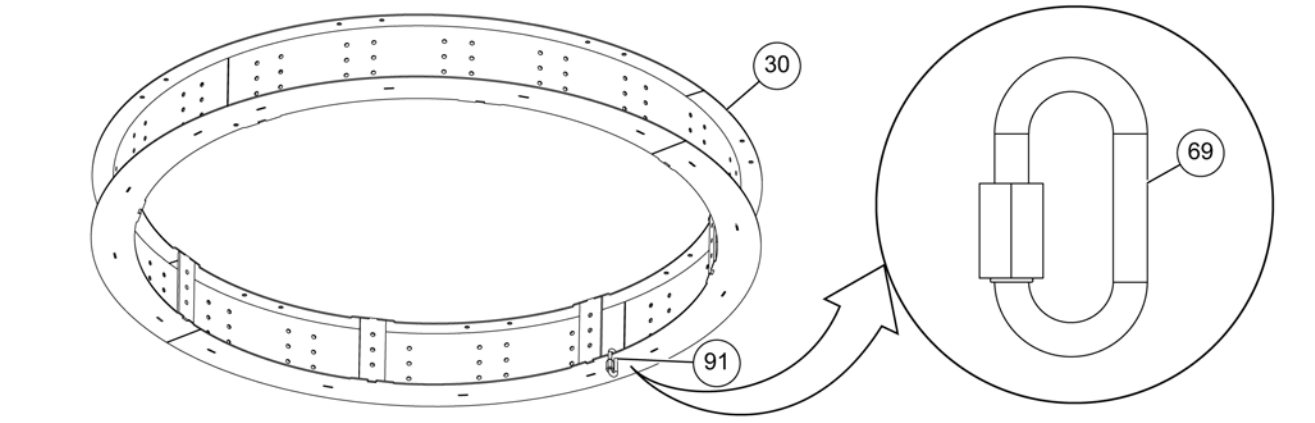
Figure 8-9 *Installing the supplier quick link to the temperature cable bracket*



63	Purlin	70	Temperature cable bracket
69	Supplier quick link		

4. Locate the cable hole (91) in the bottom flange of the center collar assembly (30) and install a supplier quick link (69), allowing for the installation of a temperature cable at this location.

Figure 8-10 *Installing the supplier quick link to the center collar (view from bottom side of the center collar)*



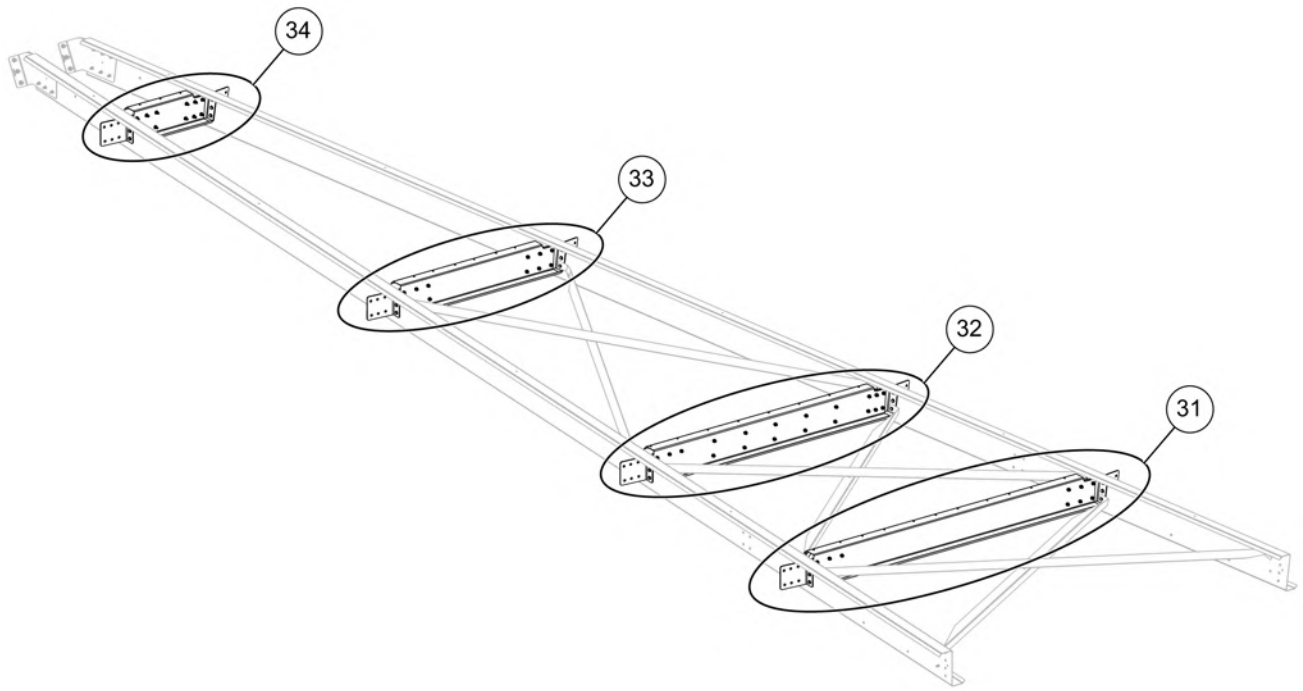
30	Outer center collar (CTR-1540-BS)	91	Temperature cable hole
69	Supplier quick link		

Attachment Locations of Purlins to Rafters

Purlins are horizontal members between the rafters that give support to the roof structure. The length of the purlin determines its location on the A-frame assembly.

The below image represents a completely assembled A-frame section with X-bracing installed. For more information, see the following sections: *Assembling the Purlin Number 4, page 136*, *Assembling the Purlin Number 3, page 138*, *Assembling the Purlin Number 2, page 140* and *Assembling the Purlin Number 1, page 142*.

Figure 8-11 *Location of purlins in A-frame assembly*



31	Purlin number 1 (CTR-1055)	33	Purlin number 3 (CTR-1057)
32	Purlin number 2 (laminated) (CTR-1056 and CTR-1053)	34	Purlin number 4 (CTR-1058)

Assembling a Laminated Purlin

A purlin is assembled with an insert together to give additional strength.

What You Should Know

The laminated purlin must be assembled together before constructing the A-frames. Refer to *Attachment Locations of Purlins to Rafters, page 134* for laminated purlin installation locations in the A-frame.

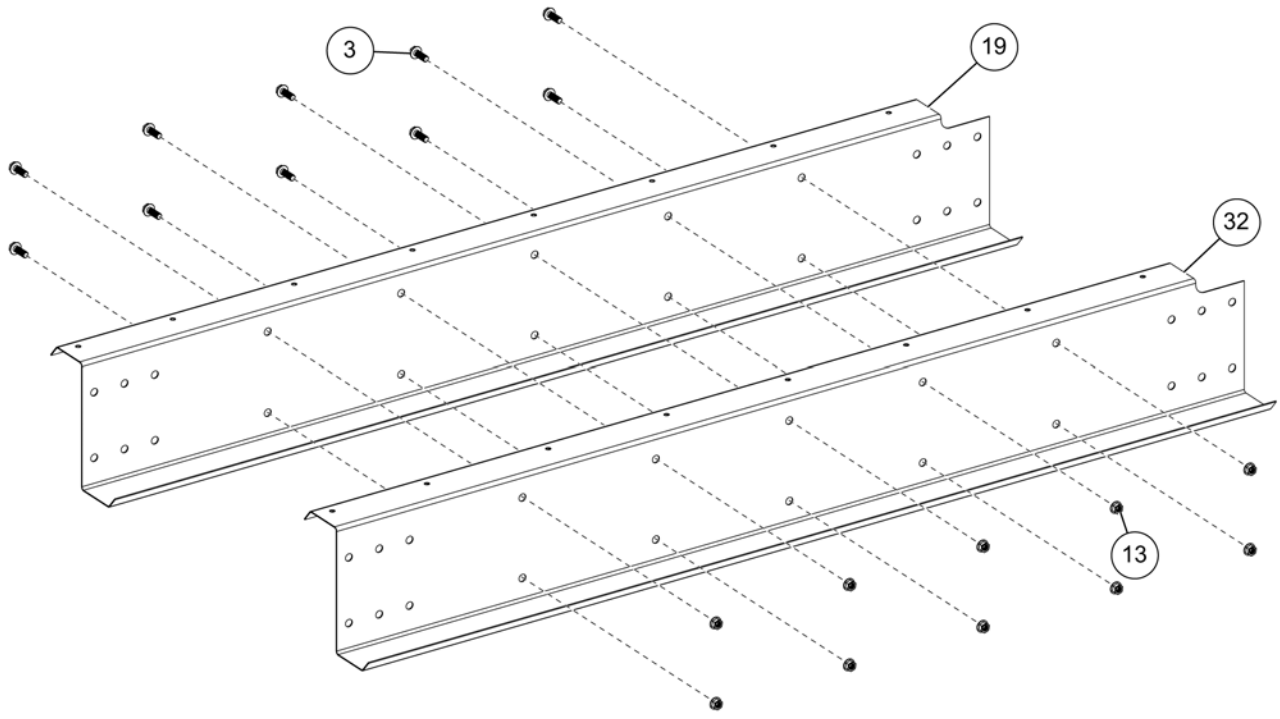
NOTE: *The purlin insert will have a red paint stripe marked on it for identification purposes.*

1. Place the purlin (32) against the mating surface of the purlin insert (19) and install using 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13).

   NOTE: *Make sure to position the top flange of the purlin insert (19) under the top flange of the purlin (32).*

2. Tighten all the hardware to the recommended torque specification. See *Bolt Torque Specifications, page 26*.

Figure 8-12 *Assembling the laminated purlins*



3	7/16" x 1-1/4" flange bolt (S-10250)	19	Purlin insert (CTR-1053)
13	7/16" flange nut (S-10251)	32	Purlin (CTR-1056)

After You Finish

Repeat this process to assemble the purlin inserts to the remaining purlins.

Assembling the Purlin Number 4

Purlin number 4 is located fourth from the eave.

Before You Begin

Place two roof rafters on the ground with roof panel holes facing up.

NOTE: *Temperature cables may also be installed at this location. To determine if the temperature cable brackets will be needed, see About Temperature Cable Brackets and A-Frame Assemblies, page 130.*

What You Should Know

The A-frame roof rafter section consists of two roof rafters identified as the left side roof rafter (35) and the right side roof rafter (36).

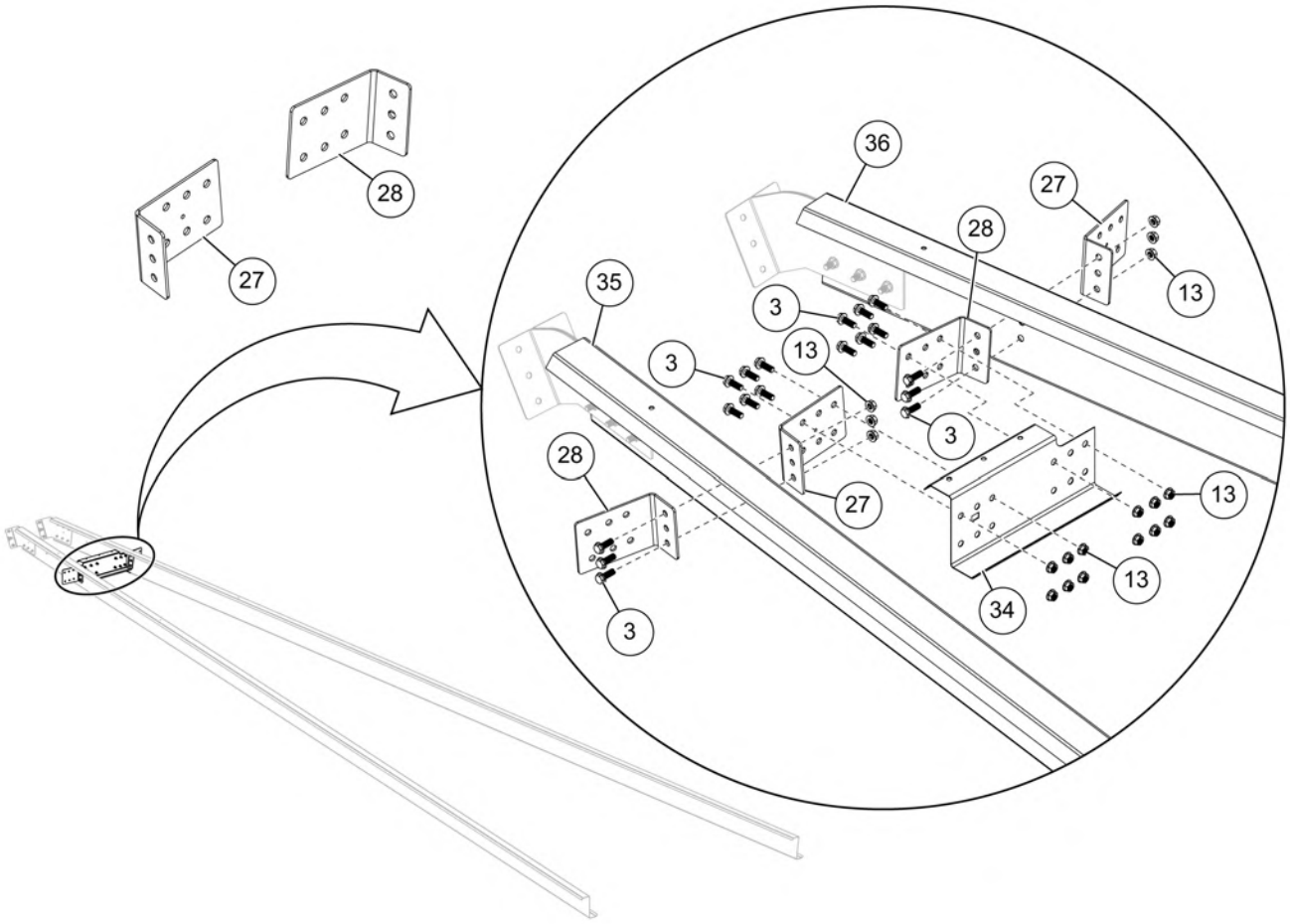
There are also two different purlin clips, a left purlin clip (27) and a right purlin clip (28). The left purlin clip (27) has seven holes when compared to the right, which has six holes along the purlin (34) and purlin clip mating surface.

NOTE: *The seventh hole located in the center of the left purlin clip (27) is for identification purposes only. No hardware is used in this location.*

1. Attach a right purlin clip (28) and a left purlin clip (27) to the right side roof rafter (36) using three 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13).
2. Attach a right purlin clip (28) and a left purlin clip (27) to the left side roof rafter (35) using three 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13).
3. Position the purlin between the roof rafters (35 and 36) and install to the left and right purlin clips (27 and 28) using twelve 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13).

   NOTE: *Make sure that the roof panel holes in the purlin (34) are at the top and the notch in the purlin is facing the right side roof rafter (36).*
4. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Figure 8-13 *Assembling the purlin 4 to the A-frame assembly*



3	7/16" x 1-1/4" flange bolt (S-10250)	34	Purlin (CTR-1058)
13	7/16" flange nut (S-10251)	35	Left side roof rafter (CTR-0931)
27	Left purlin clip (CTR-0489)	36	Right side roof rafter (CTR-0931)
28	Right purlin clip (CTR-0490)		

After You Finish

Repeat this process to install the purlin 4 between the remaining A-frame assemblies.

Assembling the Purlin Number 3

Purlin number 3 is located third from the eave.

Before You Begin

Place two roof rafters on the ground with roof panel holes facing up. Some A-frame assemblies will have X-bracing installed and will be placed at specific locations around the roof. Determine if X-bracing is being installed and note those steps in this procedure.

NOTE: *Temperature cables may also be installed at this location. To determine if the temperature cable brackets will be needed, see* *About Temperature Cable Brackets and A-Frame Assemblies, page 130.*

What You Should Know

The A-frame assembly consists of two roof rafters identified as the left side roof rafter (35) and the right side roof rafter (36). The purlin (33) configuration may not be the same on all A-frames at this location, (number 3), depending if X-bracing is being installed or not.

There are also two different purlin clips, a left purlin clip (27) and a right purlin clip (28). The left purlin clip (27) has seven holes when compared to the right, which has six holes along the purlin (33) and purlin clip mating surface.

NOTE: *The seventh hole located in the center of the left purlin clip (27) is for identification purposes only. No hardware is used in this location.*

1. Position a right purlin clip (28) and a left purlin clip (27) to the right side roof rafter (36) and install two 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13) into the top two holes.

   NOTE: *If no X-bracing is being installed at this location, install three flange bolts (3) and three flange nuts (13) in this step.*

2. Position a right purlin clip (28) and a left purlin clip (27) to the left side roof rafter (35) and install two 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13) into the bottom two holes.

   NOTE: *If no X-bracing is being installed at this location, install three flange bolts (3) and three flange nuts (13) in this step.*

3. Position the purlin (33) between the roof rafters (35 and 36) and install to the left and right purlin clips (27 and 28) using twelve 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13).

   NOTE: *Make sure that the roof panel holes in the purlin (33) are at the top and the notch in the purlin (33) is facing the right side roof rafter (36).*

   NOTE: *If no X-bracing is being installed, proceed to step 8.*

4. Attach one end of the bottom X-brace (41) to the right side roof rafter (36) using a 7/16" x 1-1/4" flange bolt (3) and 7/16" flange nut (13).

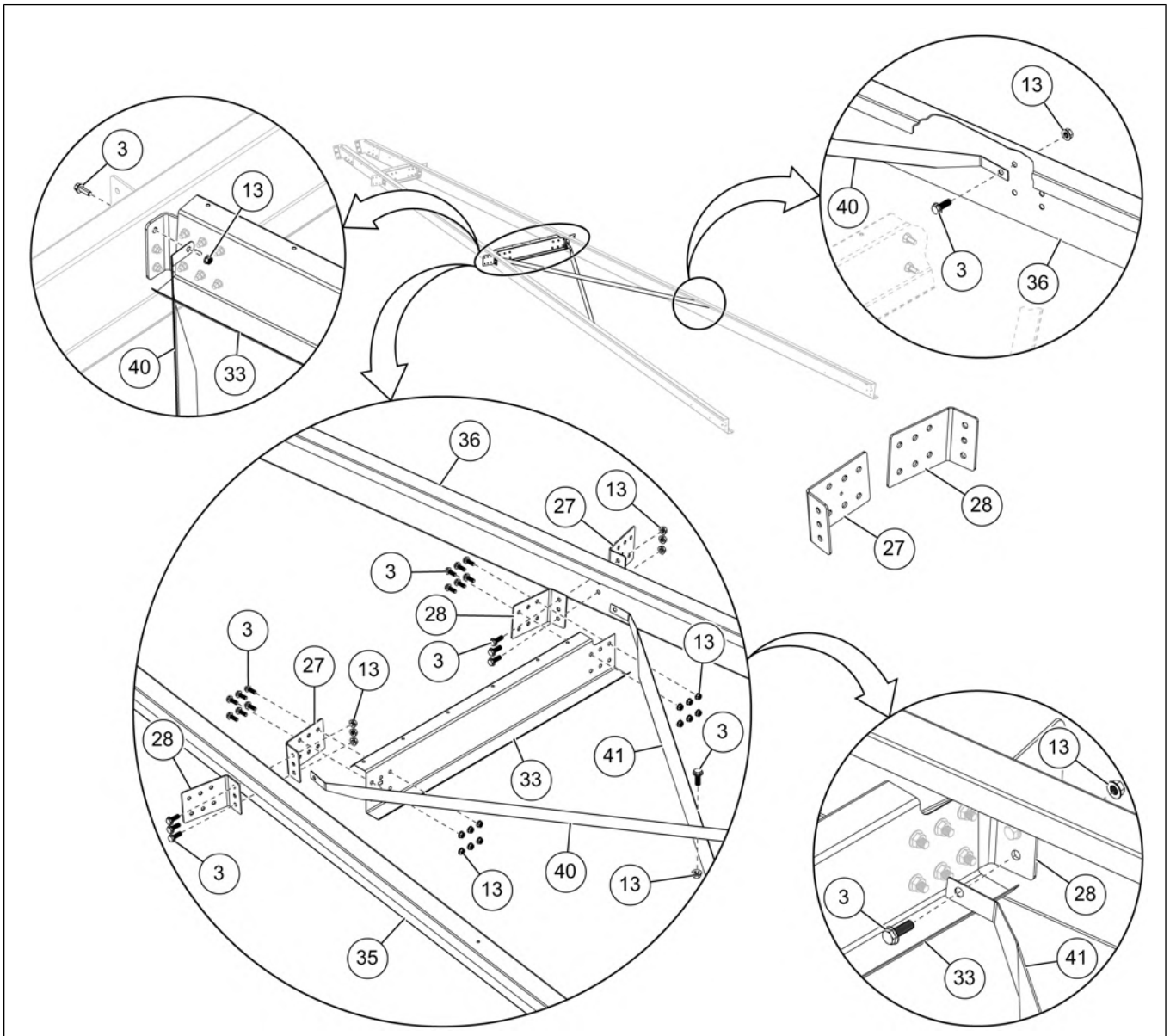
   IMPORTANT: *Use the bottom hole to install the X-brace and do not tighten the flange bolt (3) until the top X-brace (40) has been installed.*

5. Attach one end of the top X-brace (40) to the left side roof rafter (35) by installing a 7/16" x 1-1/4" flange bolt (3) and 7/16" flange nut (13) into the top hole. Do not tighten the flange bolt (3).

6. Secure the free ends of the X-braces (40 and 41) to the rafters (35 and 36) using 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13).

7. Install a 7/16" x 1-1/4" flange bolt (3) and 7/16" flange nut (13) to secure the X-braces (40 and 41) together where they cross.
8. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Figure 8-14 *Assembling the purlin 3 and X-bracings to the A-frame assembly*



3	7/16" x 1-1/4" flange bolt (S-10250)	35	Left side roof rafter (CTR-0931)
13	7/16" flange nut (S-10251)	36	Right side roof rafter (CTR-0931)
27	Left purlin clip (CTR-0489)	40	Top X-brace (CTR-0174)
28	Right purlin clip (CTR-0490)	41	Bottom X-brace (CTR-0174)
33	Purlin (CTR-1057)		

After You Finish

Repeat this process to install the purlin 3 and X-bracing between the remaining rafter assemblies.

Assembling the Purlin Number 2

Purlin number 2 is located second from the eave.

Before You Begin

Place two roof rafters on the ground with roof panel holes facing up. Some A-frame assemblies will have X-bracing installed and will be placed at specific locations around the roof. Determine if X-bracing is being installed and note those steps in this procedure.

NOTE: *Temperature cables may also be installed at this location. To determine if the temperature cable brackets will be needed, see* *About Temperature Cable Brackets and A-Frame Assemblies, page 130.*

What You Should Know

The A-frame assembly consists of two roof rafters identified as the left side roof rafter (35) and the right side roof rafter (36). The purlin (32) configuration may not be the same on all A-frames at this location (number 2), depending if X-bracing is being installed or not.

There are also two different purlin clips, a left purlin clip (27) and a right purlin clip (28). The left purlin clip (27) has seven holes when compared to the right, which has six holes along the purlin (32) and purlin clip mating surface.

NOTE: *The seventh hole located in the center of the left purlin clip (27) is for identification purposes only. No hardware is used in this location.*

1. Position a right purlin clip (28) and a left purlin clip (27) to the right side roof rafter (36) and install two 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13) into the top two holes.

   NOTE: *If no X-bracing is being installed at this location, install three flange bolts (3) and three flange nuts (13) in this step.*

2. Position a right purlin clip (28) and a left purlin clip (27) to the left side roof rafter (35) and install two 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13) into the bottom two holes.

   NOTE: *If no X-bracing is being installed at this location, install three flange bolts (3) and three flange nuts (13) in this step.*

3. Position the purlin (32) between the roof rafters (35 and 36) and install to the left and right purlin clips (27 and 28) using twelve 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13).

   NOTE: *Make sure that the roof panel holes in the purlin (32) are at the top and the notch in the purlin (32) is facing the right side roof rafter (36).*

   NOTE: *If no X-bracing is being installed, proceed to step 8.*

4. Attach one end of the bottom X-brace (43) to the right side roof rafter (36) using a 7/16" x 1-1/4" flange bolt (3) and 7/16" flange nut (13).

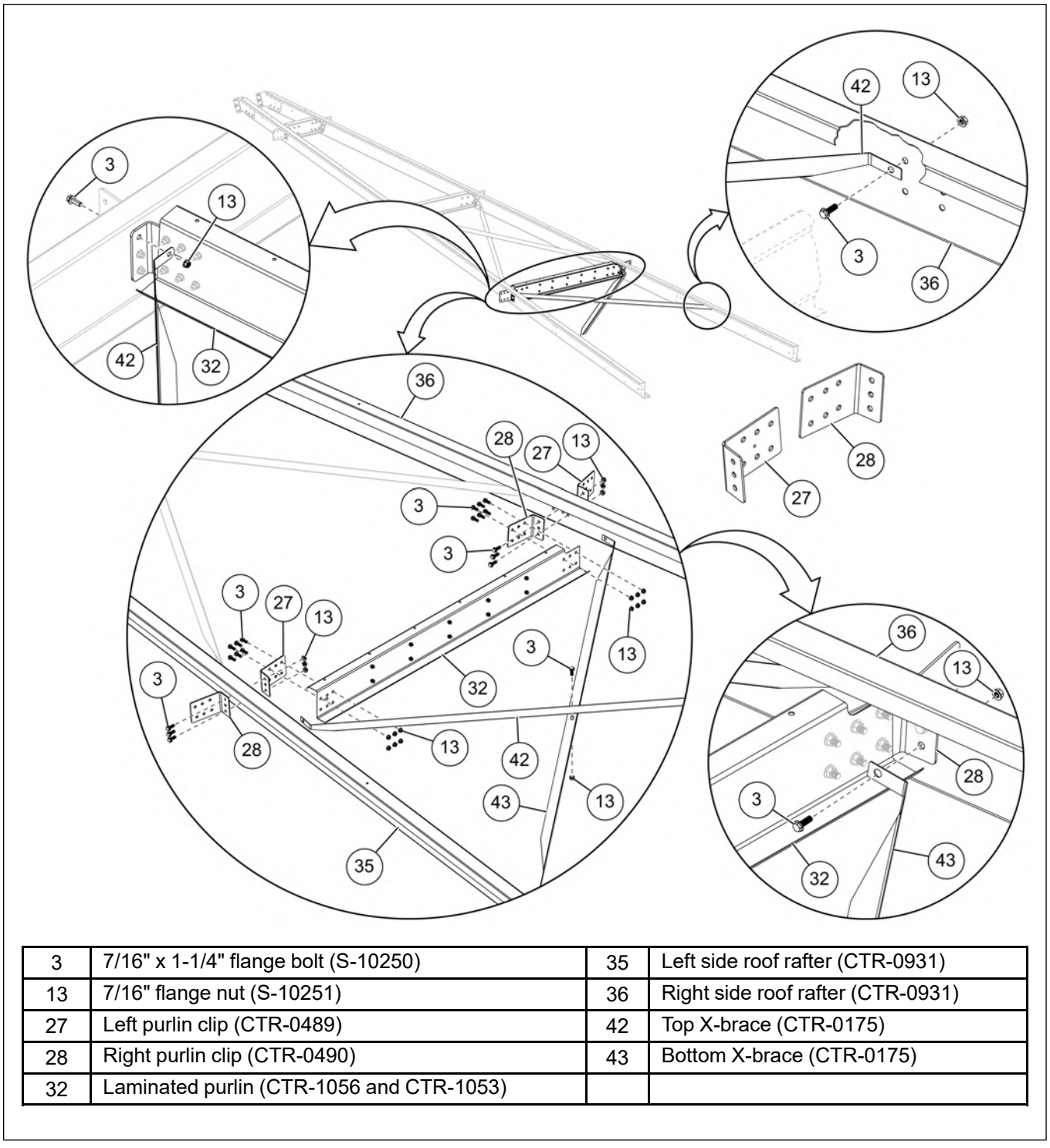
   IMPORTANT: *Use the bottom hole to install the X-brace and do not tighten the flange bolt (3) until the top X-brace (42) has been installed.*

5. Attach one end of the top X-brace (42) to the left side roof rafter (35) by installing a 7/16" x 1-1/4" flange bolt (3) and 7/16" flange nut (13) into the top hole. Do not tighten the flange bolt (3).

6. Secure the free ends of the X-braces (42 and 43) to the rafters (35 and 36) using 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13).

7. Install a 7/16" x 1-1/4" flange bolt (3) and 7/16" flange nut (13) to secure the X-braces (42 and 43) together when they cross.
8. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Figure 8-15 *Assembling the purlin 2 and X-bracings to the A-frame assembly*



3	7/16" x 1-1/4" flange bolt (S-10250)	35	Left side roof rafter (CTR-0931)
13	7/16" flange nut (S-10251)	36	Right side roof rafter (CTR-0931)
27	Left purlin clip (CTR-0489)	42	Top X-brace (CTR-0175)
28	Right purlin clip (CTR-0490)	43	Bottom X-brace (CTR-0175)
32	Laminated purlin (CTR-1056 and CTR-1053)		

After You Finish

Repeat this process to install the purlin 2 and X-bracing between the remaining A-frame assemblies.

Assembling the Purlin Number 1

Purlin number 1 is located closest to the eave.

Before You Begin

Place two roof rafters on the ground with roof panel holes facing up. Some A-frame assemblies will have X-bracing installed and will be placed at specific locations around the roof. Determine if X-bracing is being installed and note those steps in this procedure.

NOTE: *Temperature cables may also be installed at this location. To determine if the temperature cable brackets will be needed, see About Temperature Cable Brackets and A-Frame Assemblies, page 130.*

What You Should Know

The A-frame assembly consists of two roof rafters identified as the left side roof rafter (35) and the right side roof rafter (36). The purlin (31) configuration may not be the same on all A-frames at this location, (number 1), depending if X-bracing is being installed or not.

There are also two different purlin clips, a left purlin clip (27) and a right purlin clip (28). The left purlin clip (27) has seven holes when compared to the right, which has six holes along the purlin (31) and purlin clip mating surface.

NOTE: *The seventh hole located in the center of the left purlin clip (27) is for identification purposes only. No hardware is used in this location.*

1. Position a right purlin clip (28) and a left purlin clip (27) to the right side roof rafter (36) and install two 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13) into the top two holes.

   NOTE: *If no X-bracing is being installed at this location, install three flange bolts (3) and three flange nuts (13) in this step.*

2. Position a right purlin clip (28) and a left purlin clip (27) to the left side roof rafter (35) and install two 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13) into the bottom two holes.

   NOTE: *If no X-bracing is being installed at this location, install three flange bolts (3) and three flange nuts (13) in this step.*

3. Position the purlin (31) between the roof rafters (35 and 36) and install to the left and right purlin clips (27 and 28) using twelve 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13).

   NOTE: *Make sure that the roof panel holes in the purlin (31) are at the top and the notch in the purlin (31) is facing the right side roof rafter (36).*

   NOTE: *If no X-bracing is being installed, proceed to step 8.*

4. Attach one end of the bottom X-brace (45) to the right side roof rafter (36) using a 7/16" x 1-1/4" flange bolt (3) and 7/16" flange nut (13).

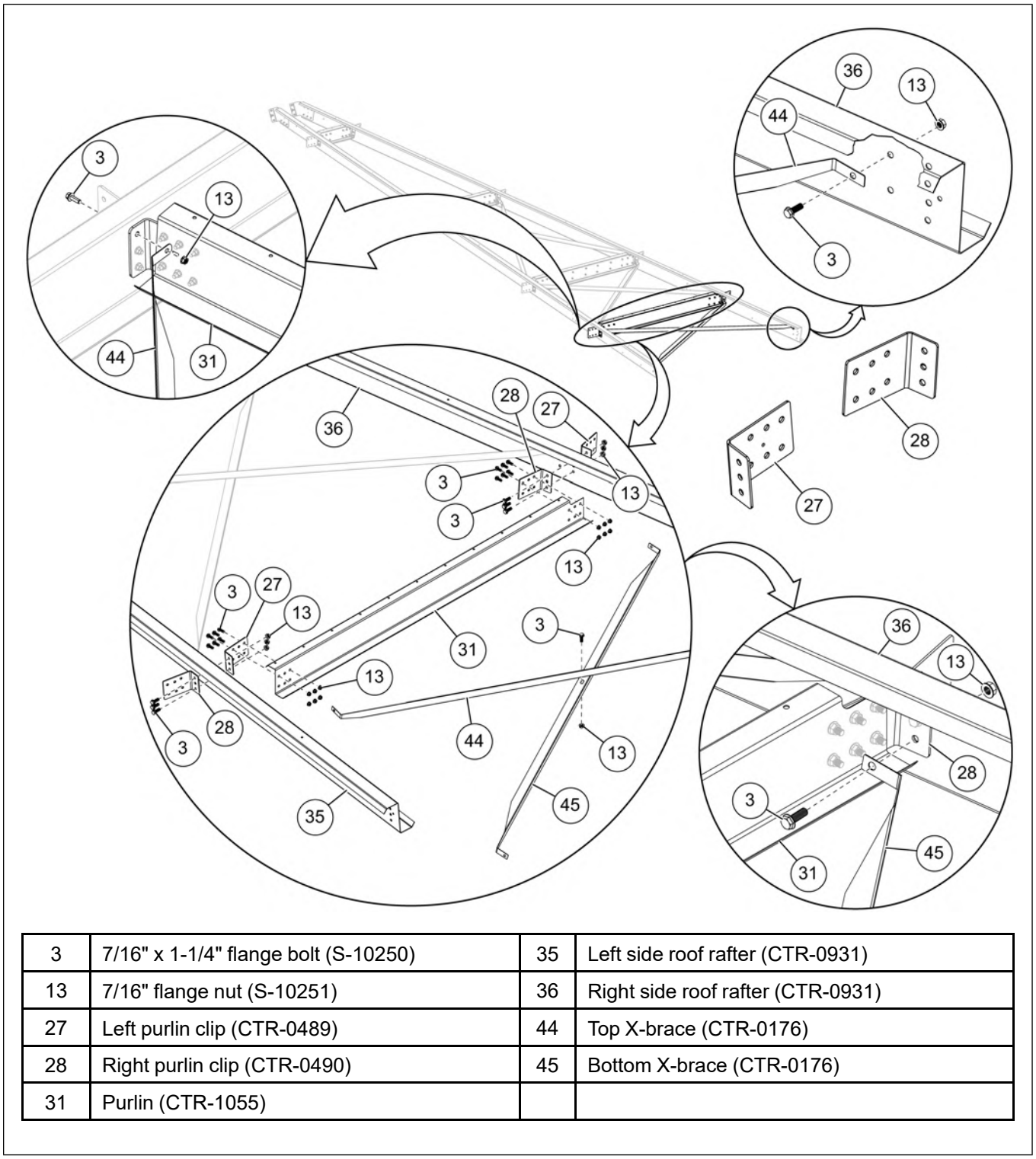
   IMPORTANT: *Use the bottom hole to install the X-brace and do not tighten the flange bolt (3) until the top X-brace (44) has been installed.*

5. Attach one end of the top X-brace (44) to the left side roof rafter (35) by installing a 7/16" x 1-1/4" flange bolt (3) and 7/16" flange nut (13) into the top hole. Do not tighten the flange bolt (3).

6. Secure the free ends of the X-braces (44 and 45) to the rafters (35 and 36) using 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13).

7. Install a 7/16" x 1-1/4" flange bolt (3) and 7/16" flange nut (13) to secure the X-braces (44 and 45) together where they cross.
8. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Figure 8-16 *Assembling the purlin 1 and X-bracings to the A-frame assembly*



3	7/16" x 1-1/4" flange bolt (S-10250)	35	Left side roof rafter (CTR-0931)
13	7/16" flange nut (S-10251)	36	Right side roof rafter (CTR-0931)
27	Left purlin clip (CTR-0489)	44	Top X-brace (CTR-0176)
28	Right purlin clip (CTR-0490)	45	Bottom X-brace (CTR-0176)
31	Purlin (CTR-1055)		

After You Finish

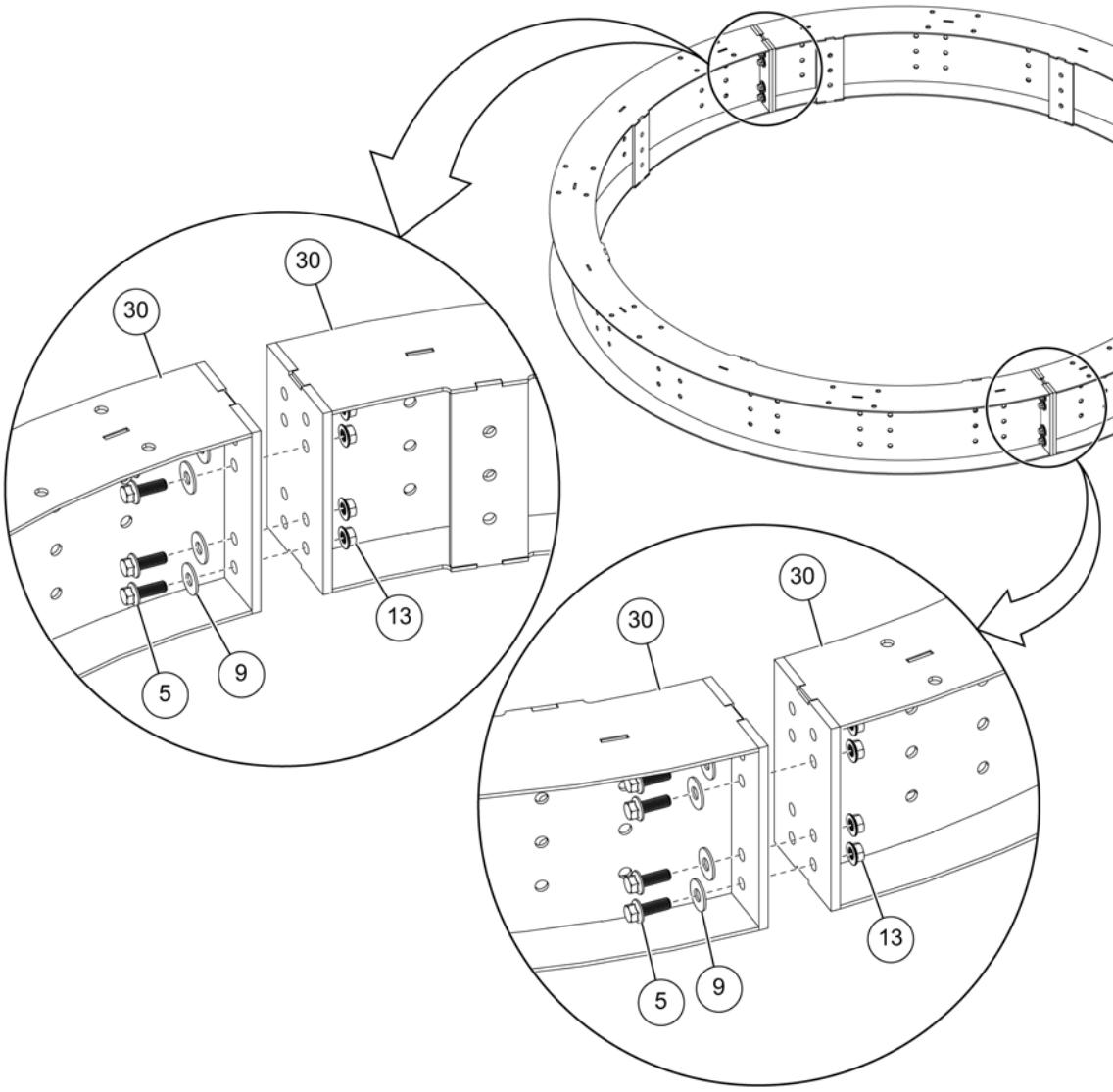
Repeat this process to install the purlin 1 and X-bracing between the remaining A-frame assemblies.

Assembling the Outer Center Collar

Each A-frame section is assembled to the center collar at the top. The outer center collar assembly is a two piece design and will need to be assembled together before installing the lower stand-off support brackets.

1. Locate each half of the outer center collar (30) and place them opposite to each other.
2. Align the holes and secure the ends of the center collar halves using 7/16" x 2" flange bolts (5), 7/16" flat washers (9) and 7/16" flange nuts (13).
3. Tighten all the hardware to the recommended specifications. See *Bolt Torque Specifications, page 26*.

Figure 8-17 *Outer center collar assembly*



5	7/16" x 2" flange bolt (S-10381)	13	7/16" flange nut (S-10251)
9	7/16" flat washer (S-7548)	30	Outer center collar (CTR-1540-BS)

Assembling the Lower Stand-Off Brackets to the Outer Center Collar

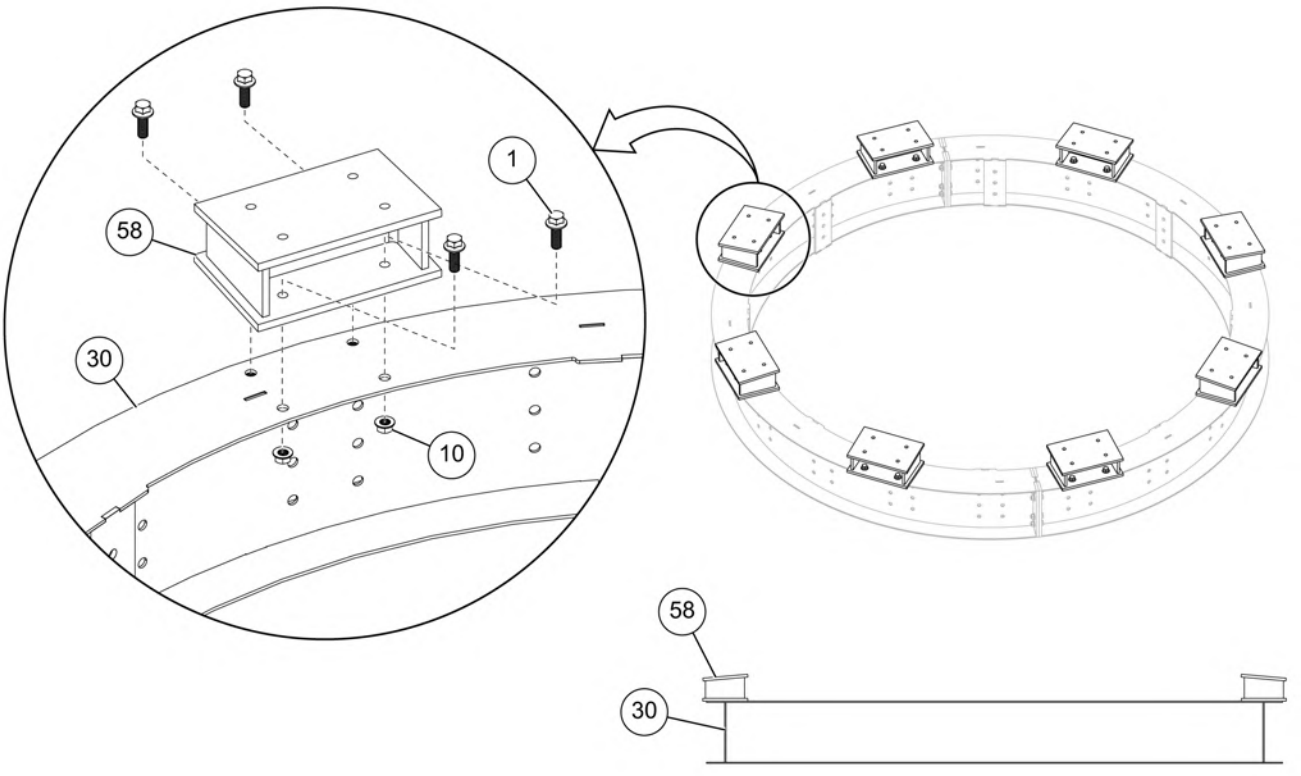
There will be eight lower stand-off support brackets that are needs to be assembled to the outer center collar before it is lifted onto the roof with the center pole.

Before You Begin

Make sure that the outer center collar is secured properly on the stands or suitable blocks.

1. Locate a set of four holes on the top flange of the outer center collar (30) and place the lower stand-off support bracket (58).
2. Install the lower stand-off support bracket (58) to the outer center collar (30) using 3/8" x 1-1/2" flange bolt (1) and 3/8" flange nuts (10).
3. Repeat the procedure to continue installing all the remaining lower stand-off brackets (58) to the outer center collar (30).
4. Tighten all the hardware to the recommended specifications. See *Bolt Torque Specifications, page 26*.

Figure 8-18 *Assembling the lower stand-off brackets to the outer center collar*



1	3/8" x 1-1/2" flange bolt with sealing washer (S-7488)	30	Outer center collar (CTR-1540-BS)
10	3/8" flange nut (S-9426)	58	Lower stand-off support bracket (CTR-1559-BS)

Center Collar Placement

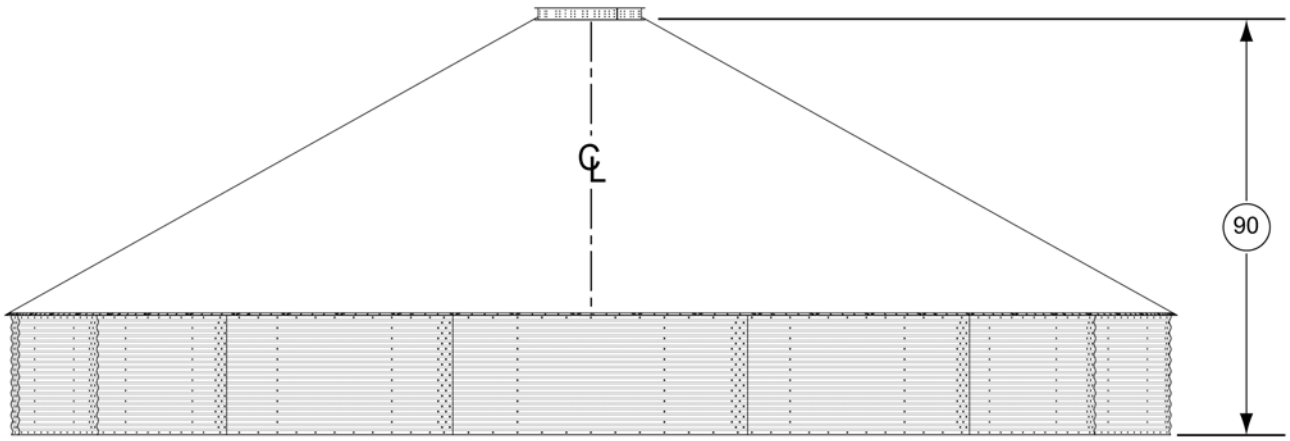
The following figure gives the approximate height needed to install the center collar.

With one sidewall ring in place, use the center support and position the center collar at the height specified, measuring from the bottom of the center collar to the bottom of the sidewall sheet as shown. If additional rings are required for construction purposes, add 44" for each additional ring.

NOTE: *It is better to set the center collar a little too high. Do not set the center collar too low.*

NOTE: *Make sure the center pole is adjustable up and down.*

Figure 8-19 *Center collar placement*



90	225" (18'-9") (571.5 cm) from foundation to the bottom of the center collar on 60' diameter bin

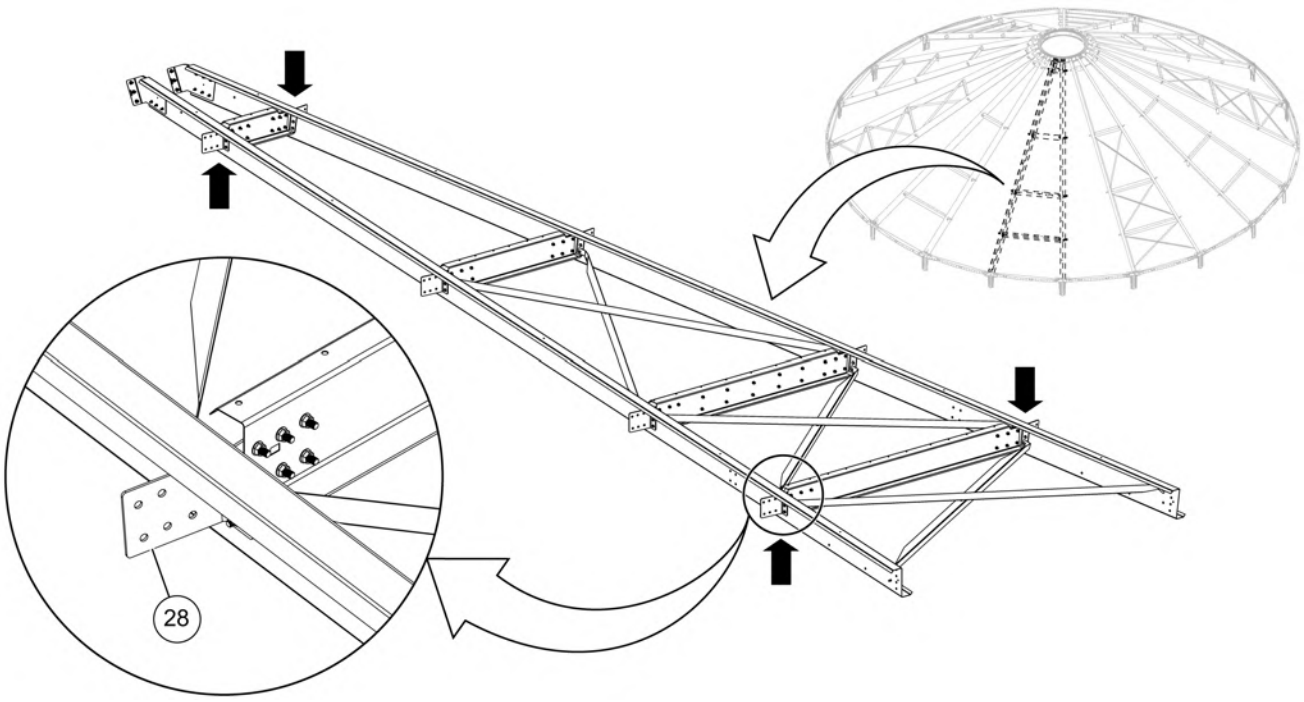
Guidelines for Assembling and Lifting the A-Frame Rafter Sections

The roof is assembled in sections and referred to as A-frame sections. Each A-frame section is assembled on the ground and lifted into place.

IMPORTANT: *Do not drill additional holes in purlins. Install the flange bolts and nuts based on the number of holes in the purlins.*

NOTE: *Use purlin clips as lifting references as shown.*

Figure 8-20 *Recommended lifting references for A-frame sections*



28	Purlin clip (CTR-0490)

The A-frame section has two configurations: with X-bracing and without. The number of A-frame sections with X-bracing depends on which size bin is being constructed.

DANGER

All lifting should be performed by a certified crane operator with prior bin construction experience. Never lift during windy conditions.

General Guidelines:

- Construct the A-frame sections on flat ground or blocking.
- Install the temperature cable brackets at the same time you assemble the A-frame sections.
- Always be aware of the orientation of each part prior to assembling.
- Use the correct hardware for the part being assembled. Never substitute hardware.
- Always ensure the hardware is tightened prior to lifting.

- Always practice safety when assembling the rafter sections. Be aware of others around you when moving long A-frame sections.
- Use evenly distributed connection points of support when lifting.
- Before attempting a lift, adjust each lifting cable to achieve the appropriate angle needed (approximately 30 degrees).
- Assemble the A-frames with X-bracing last, so that they can be easily accessed for lifting into place first.

Table 8-3 *For standard roof*

Bin Diameter	Peak Capacity	Ground Snow Load	Approximate A-Frame Weight
60' (18.29 m)	30K	40 PSF	410 lbs. (186.5 kg)
The part variance multiplier is 4%.			

Attaching the A-Frame to the Center Collar

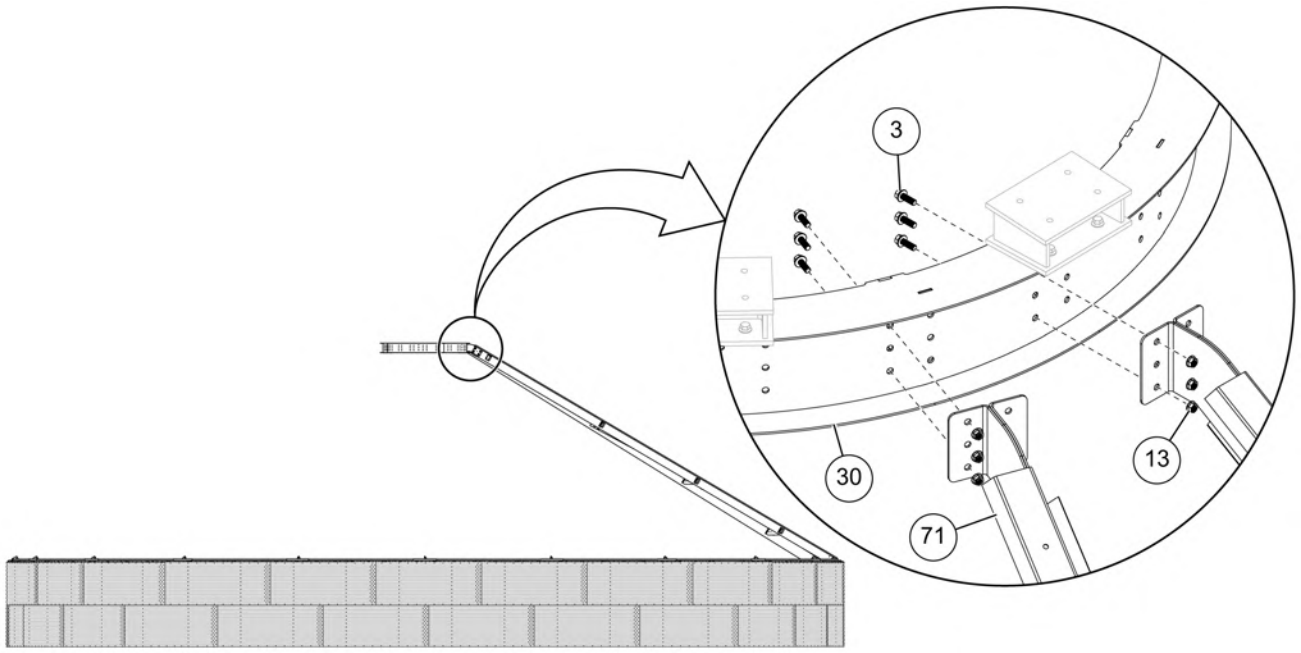
The upper portion of the A-frame assembly must be installed to the center collar, so that it supports the center collar and the main roof structure.

Before You Begin

Make sure the center collar is assembled and secured to the center support pole. See *Center Collar Placement, page 146* for details. Determine the correct location of each A-frame. For more information, see *About Temperature Cable Brackets and A-Frame Assemblies, page 130*. Read and understand the safe and proper lifting procedures needed to install the A-frames. For more information, see *Guidelines for Assembling and Lifting the A-Frame Rafter Sections, page 147*.

1. Carefully lift the A-frame assembly (71) into position and align with the proper holes on the center collar (30).
2. Install 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13) to secure the A-frame assembly (71) to the center collar (30).
3. Before continuing with the remaining A-frame assemblies, secure the A-frame assembly (71) to the eave bracket. See *Attaching the A-Frame to the Eave Bracket, page 150*.
4. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Figure 8-21 *Attaching the A-frame to the center collar*



3	7/16" x 1-1/4" flange bolt (S-10250)	30	Outer center collar (CTR-1540-BS)
13	7/16" flange nut (S-10251)	71	A-frame assembly

Attaching the A-Frame to the Eave Bracket

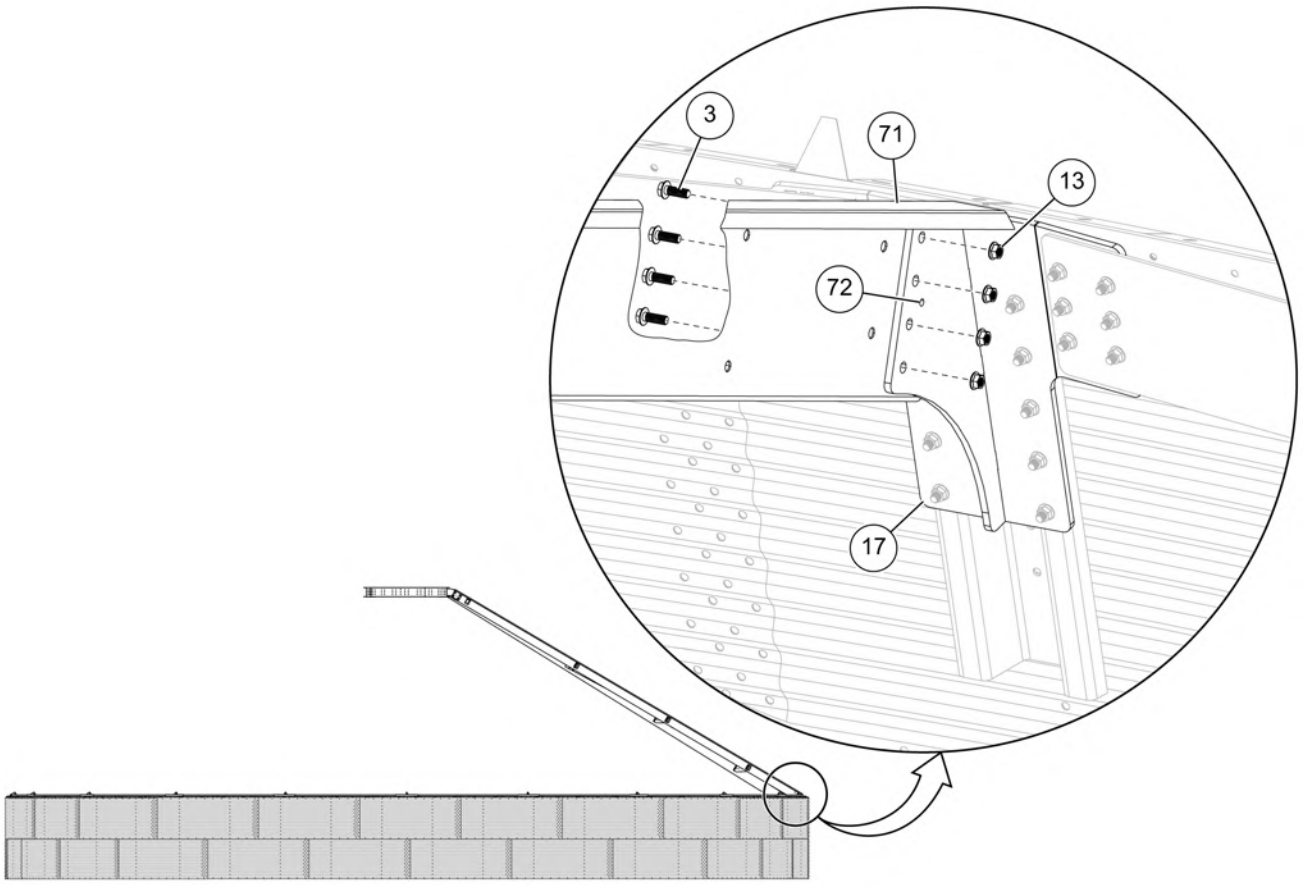
The bottom end of the rafters in the A-frame must be installed to the eave brackets.

1. Lower the A-frame assembly (71) along the side of the eave bracket (17) and align with the proper holes.

   NOTE: *Use the alignment hole (72) in the rafter to help align the holes with a punch tool.*

2. Install 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13) to secure the rafter on one side on the A-frame assembly (71) to the eave bracket (17).
3. Repeat this procedure for the other side of the A-frame assembly (71).
4. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Figure 8-22 *Attaching the A-frame to the eave bracket*



3	7/16" x 1-1/4" flange bolt (S-10250)	71	A-frame assembly
13	7/16" flange nut (S-10251)	72	Hole for alignment tool
17	Eave bracket (CTR-0498-BS)		

After You Finish

Continue to install the next A-frame assembly to the center collar and then to the eave brackets until all the A-frame assemblies are installed.

Installing the Intermediate Purlins

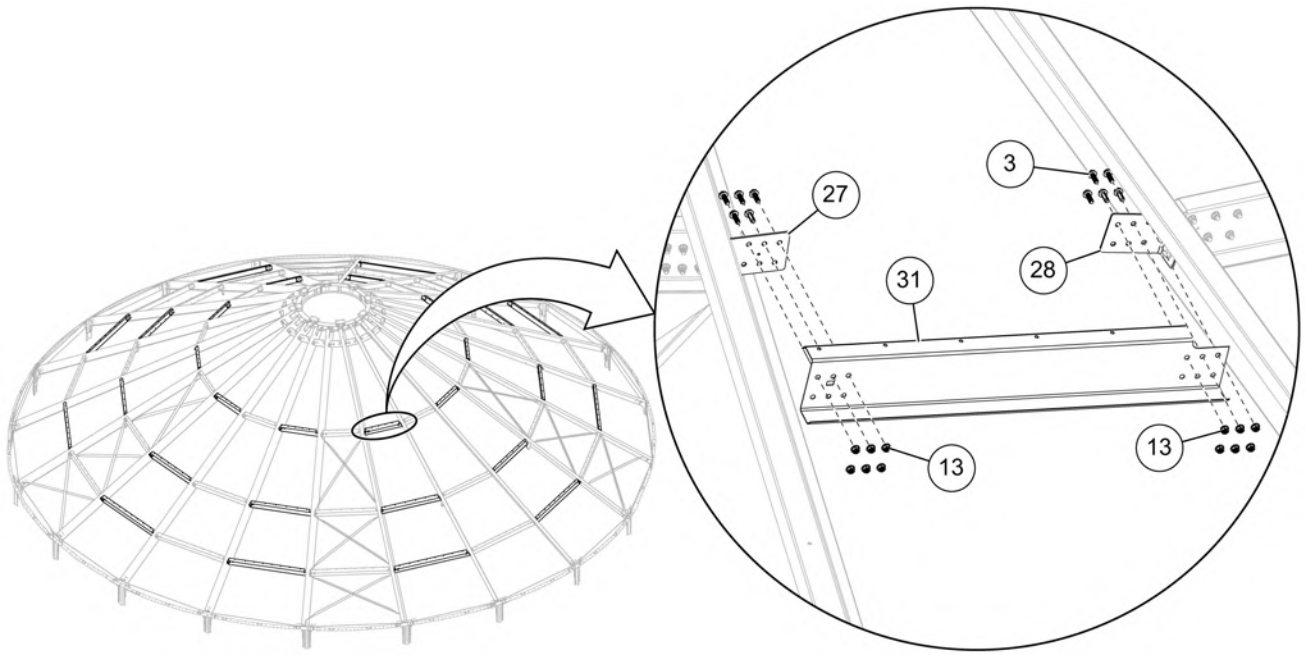
Intermediate purlins must be installed to connect each A-frame assembly together. The intermediate purlins connecting each A-frame assembly have six holes on each side to secure them with the purlin clips.

Before You Begin

All A-frame assemblies must be installed and secured to both the center collar and the eave brackets.

1. Position the intermediate purlin (63) between the purlin clips (27 and 28) located outside of each A-frame assembly (71).
2. Install six 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13) to each end of the purlin (63), securing the intermediate purlin (63) to the purlin clips (27 and 28).
3. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Figure 8-23 *Installing the intermediate purlin between the A-frame assemblies*



3	7/16" x 1-1/4" flange bolt (S-10250)	28	Right purlin clip (CTR-0490)
13	7/16" flange nut (S-10251)	63	Purlin
27	Left purlin clip (CTR-0489)	71	A-frame assembly

NOTE: *Purlin part numbers will vary with location.*

After You Finish

Repeat this process to install the remaining intermediate purlins between the A-frame assemblies.

Attaching the Roof Panels

Roof panels overlap the previous roof panel, giving protection from outside elements. Eave angles, rafters and roof panel clips will support to hold the roof panels.

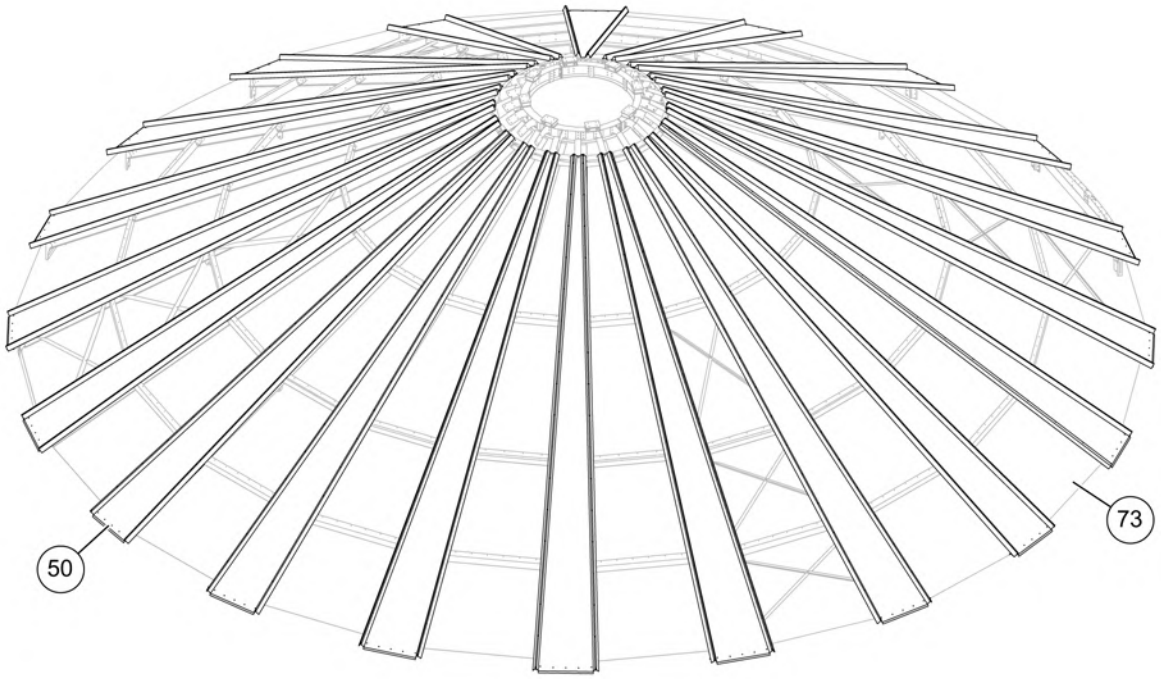
Before You Begin

Make sure all the A-frame assemblies, purlins are installed and properly tightened. Pre-determine the manway access location. Also, make sure that roof panel support clips are installed to the purlins before installing the roof panels.

What You Should Know

For adjustment purposes and better results, roof panels (50) will be installed to each rafter assembly first, causing exposed gaps (73) between each installed roof panel (50) (see figure below).

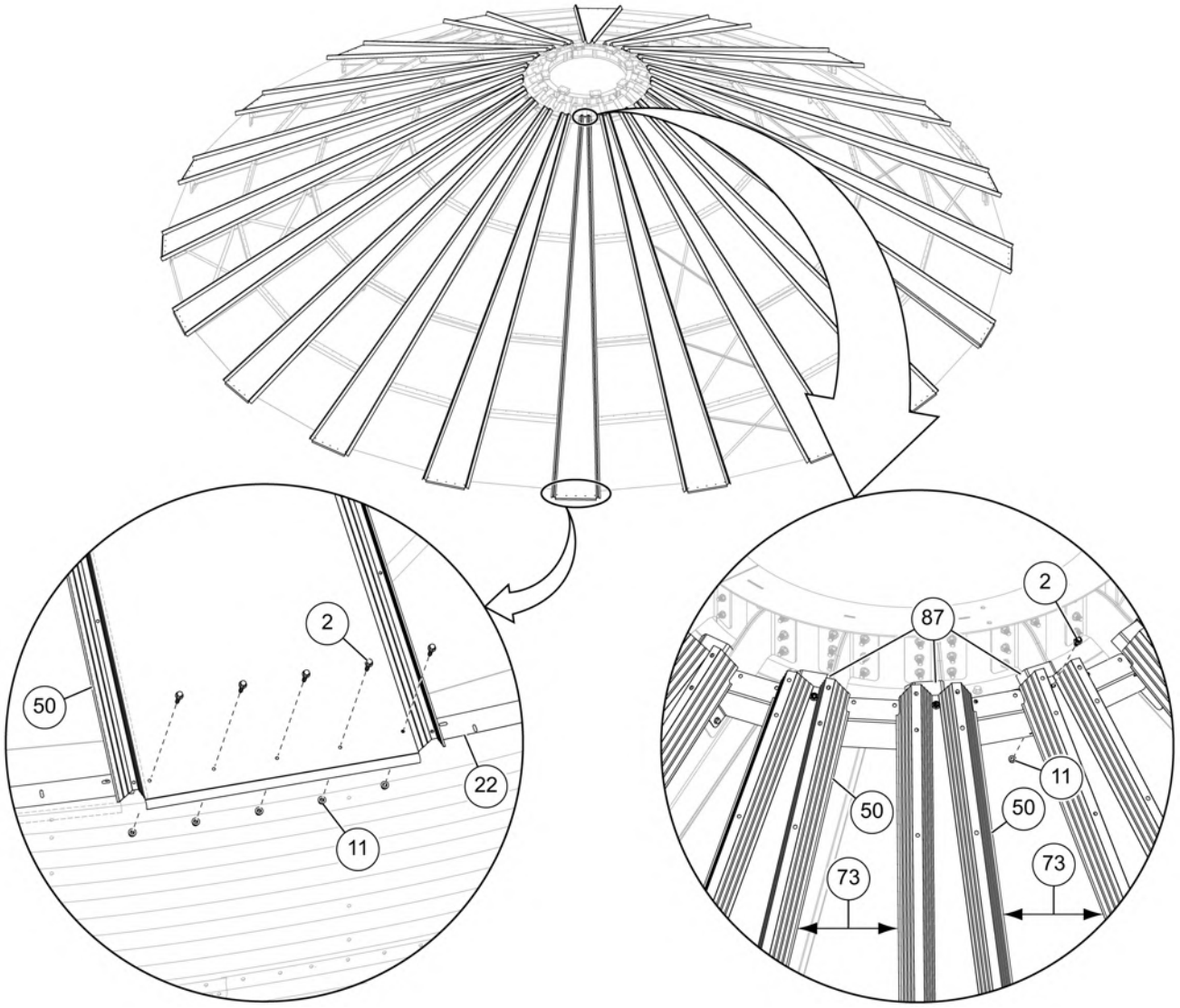
Figure 8-24 *Roof panel overview*



50	Roof panel (CTR-0392)	73	Exposed gap

1. With assistance, position a roof panel (50) onto the roof rafter (87) and install a 5/16" x 1" flange bolt (2) and 5/16" flange nut (11), securing the upper portion of the roof panel (50) to the roof rafter (87).
2. Install five 5/16" x 1" flange bolts (2) and 5/16" flange nuts (11) to the lower portion of the roof panel (50), securing the roof panel (50) to the eave angle (22).
3. Working in a clockwise direction, continue installing the roof panels (50) to each roof rafter (87), leaving an exposed gap (73) between each installed roof panel (50).

Figure 8-25 *Installing the roof panel to the roof rafter and the eave angle*



2	5/16" x 1" flange bolt with sealing washer (S-10260)	50	Roof panel (CTR-0392)
11	5/16" flange nut (S-3611)	73	Exposed gap
22	Eave angle (CTR-0720)	87	Roof rafter assembly

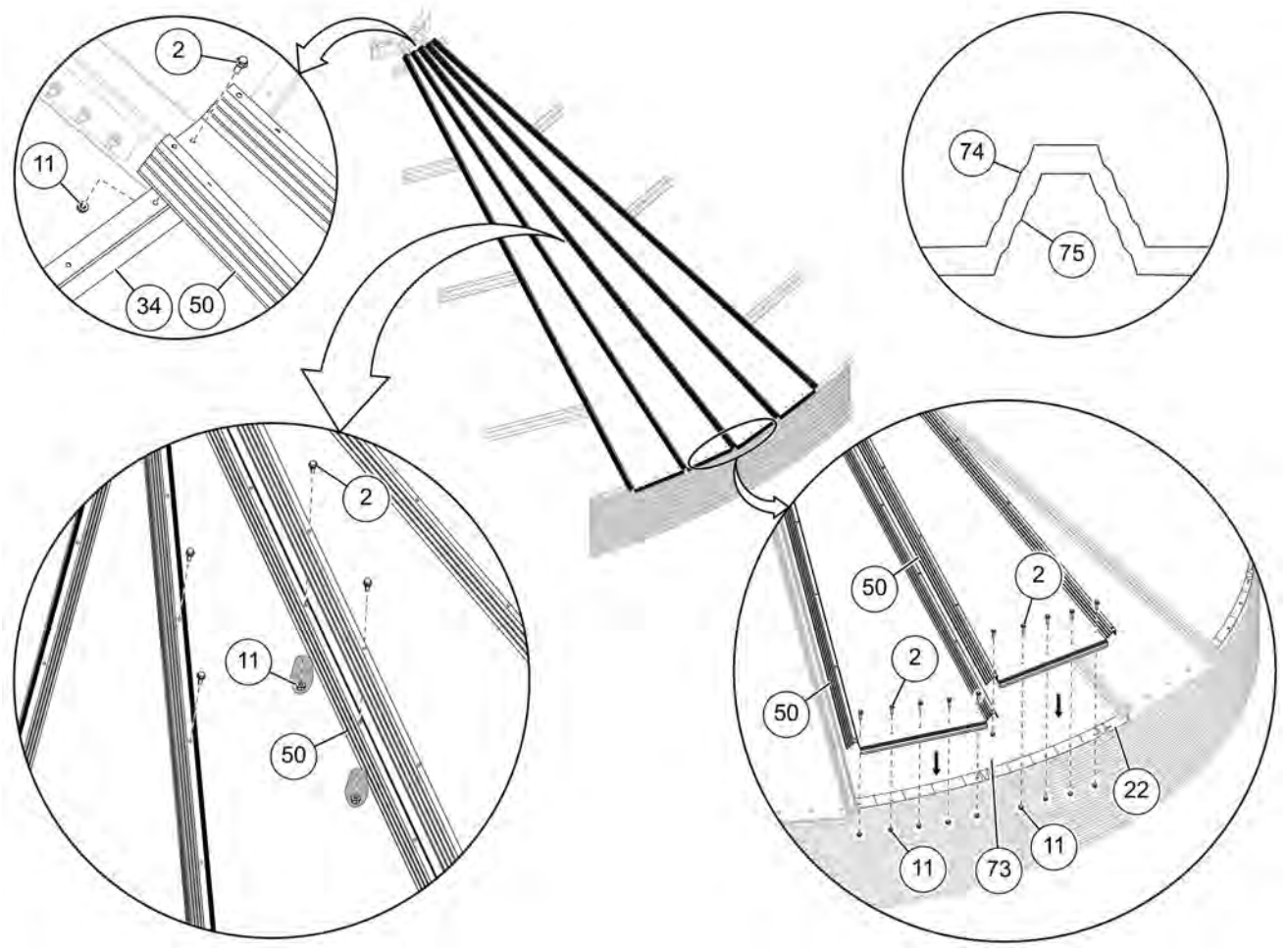
4. When the initial roof panels (50) are installed, fill in the exposed gaps (73). Working in a **counter-clockwise direction**, install two additional roof panels (50) (as shown), overlapping each roof panel (50) on the left. Adjust the roof panels (50) as needed.

   NOTE: *You will need to tuck one roof panel (50) per gap under the previously installed roof panel (50), by slightly lifting the upper rib (74) of the previously installed panel and allowing the lower rib (75) of the new roof panel (50) to be tucked under.*

5. When all the roof panels (50) within a gap are in place, install 5/16" x 1" flange bolts (2) and 5/16" flange nuts (11) to secure the top portion of the roof panels (50) to the purlin (34) and the bottom portion to the eave angles (22).

6. Install 5/16" x 1" flange bolts (2) and 5/16" flange nuts (11) along the ribs of each roof panel (50) and tighten all the hardware to the recommended torque specification. See *Bolt Torque Specifications, page 26*.

Figure 8-26 *Installing the roof panels into the exposed gaps*



2	5/16" x 1" flange bolt with sealing washer (S-10260)	50	Roof panel (CTR-0392)
11	5/16" flange nut (S-3611)	73	Exposed gap
22	Eave angle (CTR-0720)	74	Upper rib
34	Purlin (CTR-1058)	75	Lower rib

7. Field drill holes (76) in the roof panels (50) through the holes in the top flange of the purlins (63). Secure the panels (50) to the purlins (63) using 5/16" x 1" flange bolts (2) and 5/16" flange nuts (11).

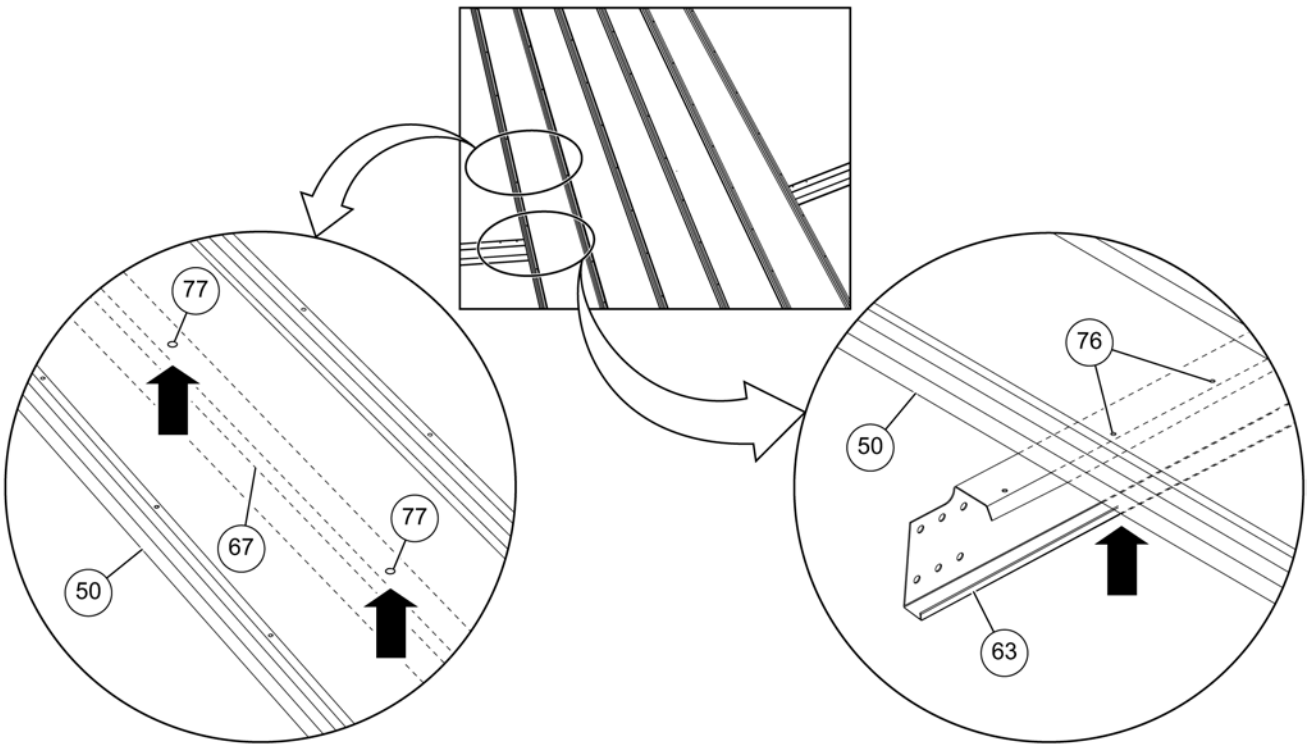
   NOTE: *Make sure that the holes are drilled from the inside of the bin.*

8. Field drill holes (77) in the roof panels (50) through the holes in the top flange of the rafters (67). Secure the roof panels (50) to the rafters (67) using 5/16" x 1" flange bolts (2) and 5/16" flange nuts (11).

   NOTE: *Make sure that the holes are drilled from the inside of the bin.*

   IMPORTANT: *Failure to properly secure the roof panel (50) to the purlins and the rafter (67) will constitute a modification to the product not specifically delineated in this manual and will void the limited warranty.*

Figure 8-27 *Installing the roof panels to the roof panel support clips and roof rafters*



50	Roof panel (CTR-0392)	76	Roof panel holes (drilled through purlin)
63	Purlin	77	Roof panel holes (drilled through rafter)
67	Roof rafter		

Installing the Roof Flashing

The roof flashing will seal the area between the center collar and the roof panels.

What You Should Know
Each roof flashing section overlaps and bolts together with the previously installed roof flashing section.

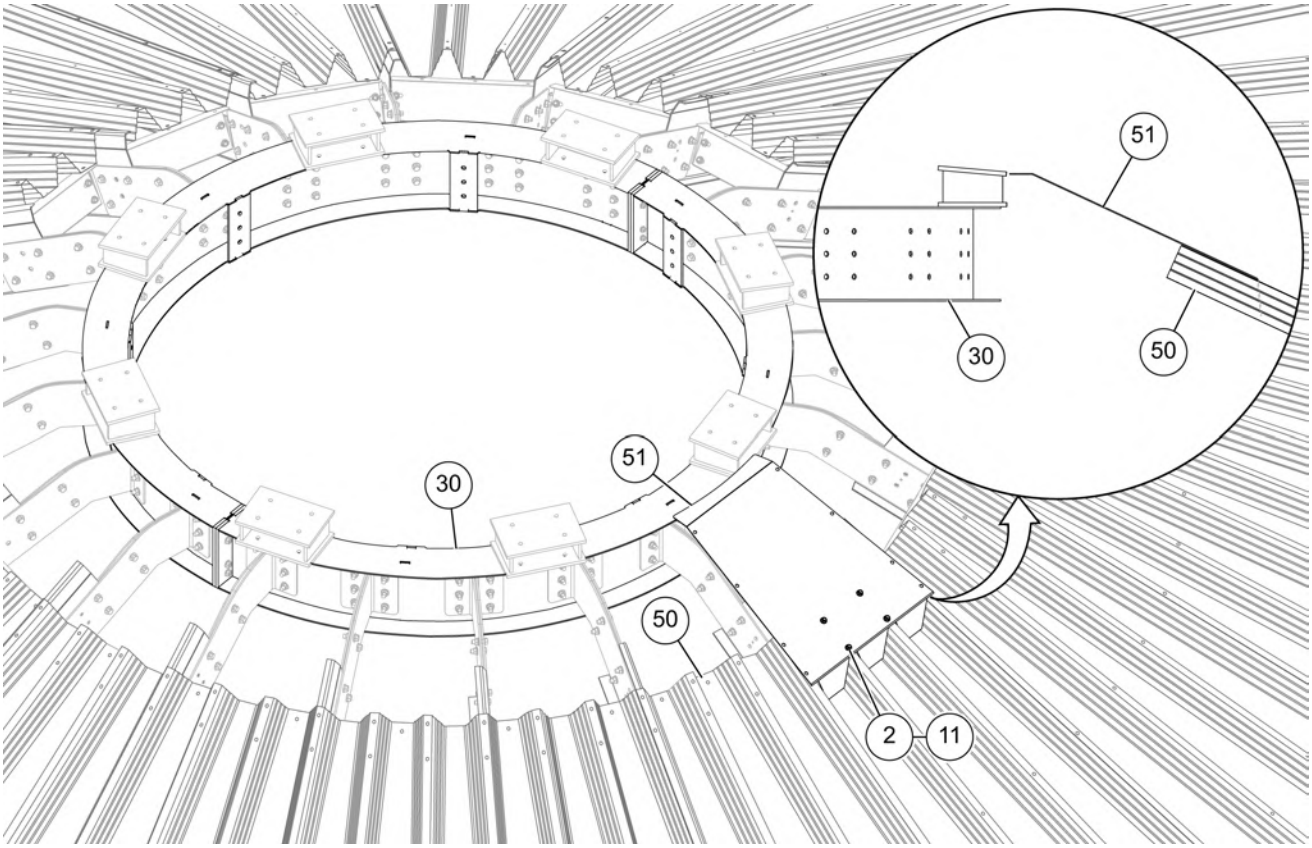
1. Install the first roof flashing section (51) onto the roof panel and align the holes on the roof flashing (51) with the roof panel.

   NOTE: *Flashing (51) is not supposed to be attached to the center collar (30).*

2. Install 5/16" x 1" flange bolts (2) and 5/16" flange nuts (11) to secure the first roof flashing section (51) to the roof panel ribs.

   NOTE: *Only the first roof flashing (51) section is installed using four of the required flange bolts (2) and nuts (11). Any remaining unfilled holes will be filled when the adjacent and last roof flashing (51) section is installed.*

Figure 8-28 *Installation of the first roof flashing section*

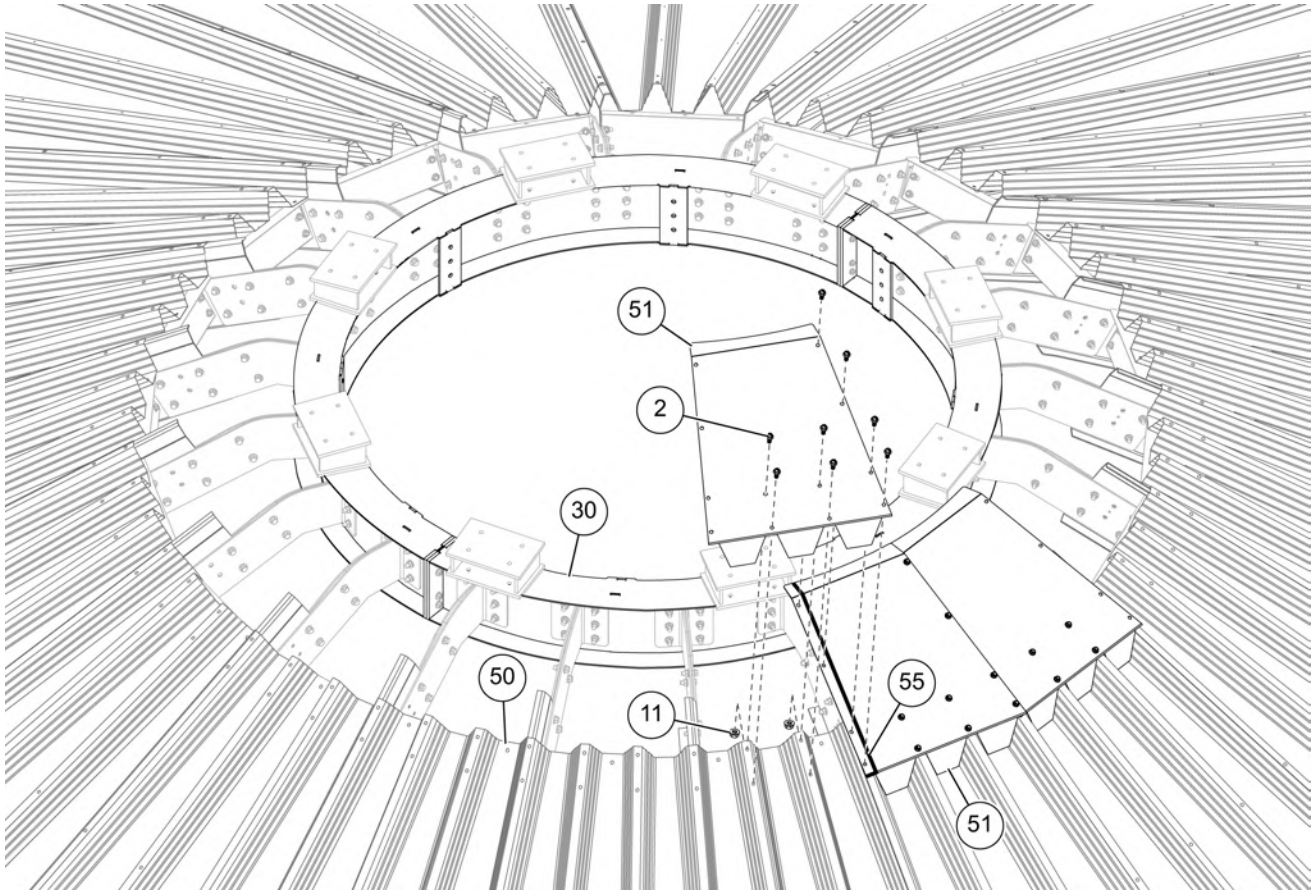


2	5/16" x 1" flange bolt with sealing washer (S-10260)	50	Roof panel (CTR-0391)
11	5/16" flange nut (S-3611)	51	Roof flashing (CTR-1590)
30	Outer center collar (CTR-1540-BS)		

3. Place a strip of rope caulk (55) along the edge of the installed roof flashing (51) where the next roof flashing (51) will overlap.
4. Align the holes along the edge of the next roof flashing (51) with the previously installed roof flashing holes.
5. Install 5/16" x 1" flange bolts (2) and 5/16" flange nuts (11) to secure the two roof flashing sections (51) together.
6. Install six 5/16" x 1" flange bolts (2) and 5/16" flange nuts (11) to secure the roof flashing section (51) to the roof panel ribs.
7. Continue installing the remaining flashing (51) until the gap between the center collar (30) and roof panels is covered.

   NOTE: *Remember to place caulk (55) between the overlap of the last two panels.*

Figure 8-29 *Installation of remaining roof flashing sections*



2	Roof flashing (CTR-1590)	50	Roof panel (CTR-0392)
11	5/16" x 1" flange bolt with sealing washer (S-10260)	51	Roof flashing (CTR-1590)
30	Center collar (CTR-1540-BS)	55	Rope caulk (S-4458)

After You Finish

NOTE: *If roof exhausters will be installed, see roof accessories,* *Preparation for the Roof Exhauster Installation, page 179**.*

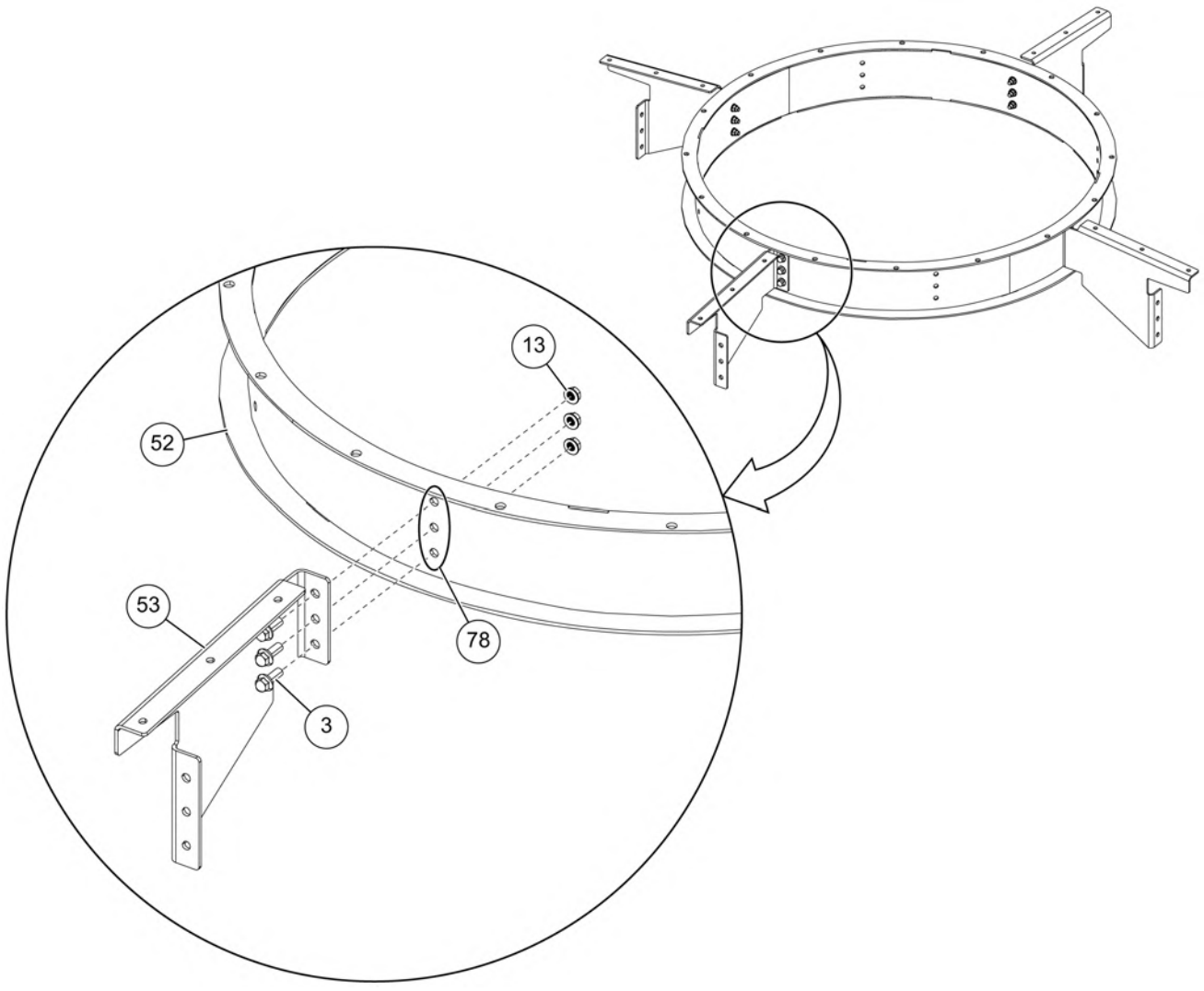
Assembling the Center Collar Brackets to the Inner Center Collar

The inner center collar is a one piece design which connects to the outer center collar with eight center collar channel brackets. Four center collar channel brackets must be assembled to the inner center collar before it is lifted to the roof.

1. Locate the four columns of three holes (78) at equal distances on the outside radius of the inner center collar (52) and align one center collar channel bracket (53) with each column of holes.
2. Install 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13) to secure the center collar channel brackets to the inner center collar (52).

   NOTE: *Tighten the flange bolts (3) and flange nuts (13) loosely to allow the center collar channel brackets (53) to adjust for aligning properly with the outer center collar.*

Figure 8-30 *Assembling the center collar brackets to the inner center collar*



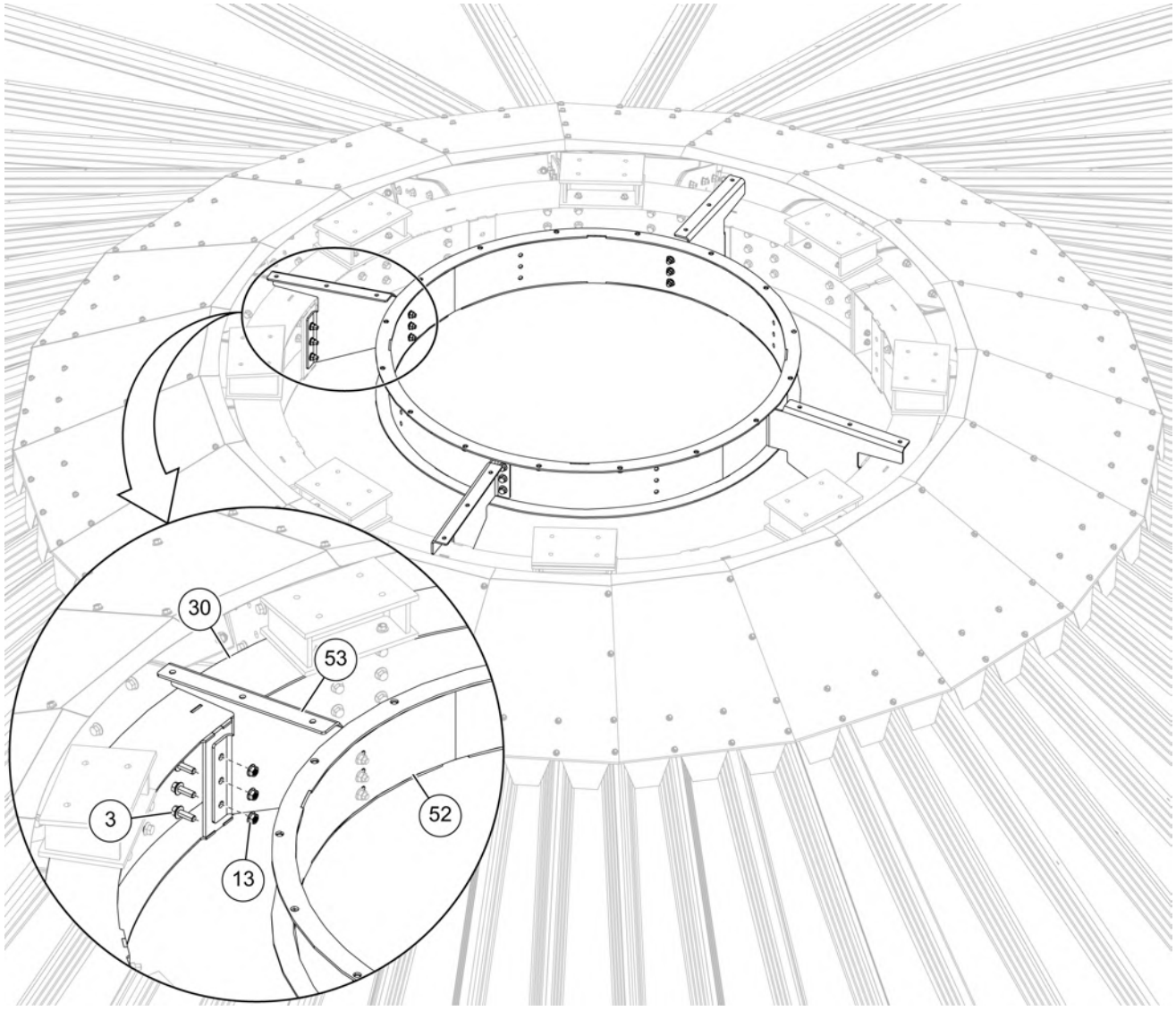
3	7/16" x 1-1/4" flange bolt (S-10250)	53	Center collar channel bracket (CTR-1558)
13	7/16" flange nut (S-10251)	78	Holes for channel bracket
52	Inner center collar (CTR-1562-BS)		

Installing the Inner Center Collar to the Outer Center Collar

1. Make sure all the holes in the center collar channel brackets (53) are aligned with the holes in the weldments of the outer center collar (30) and install the 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13).

   NOTE: *Do not tighten the flange bolts (3) and flange nuts (13) until all the center collar channel brackets (53) are installed.*

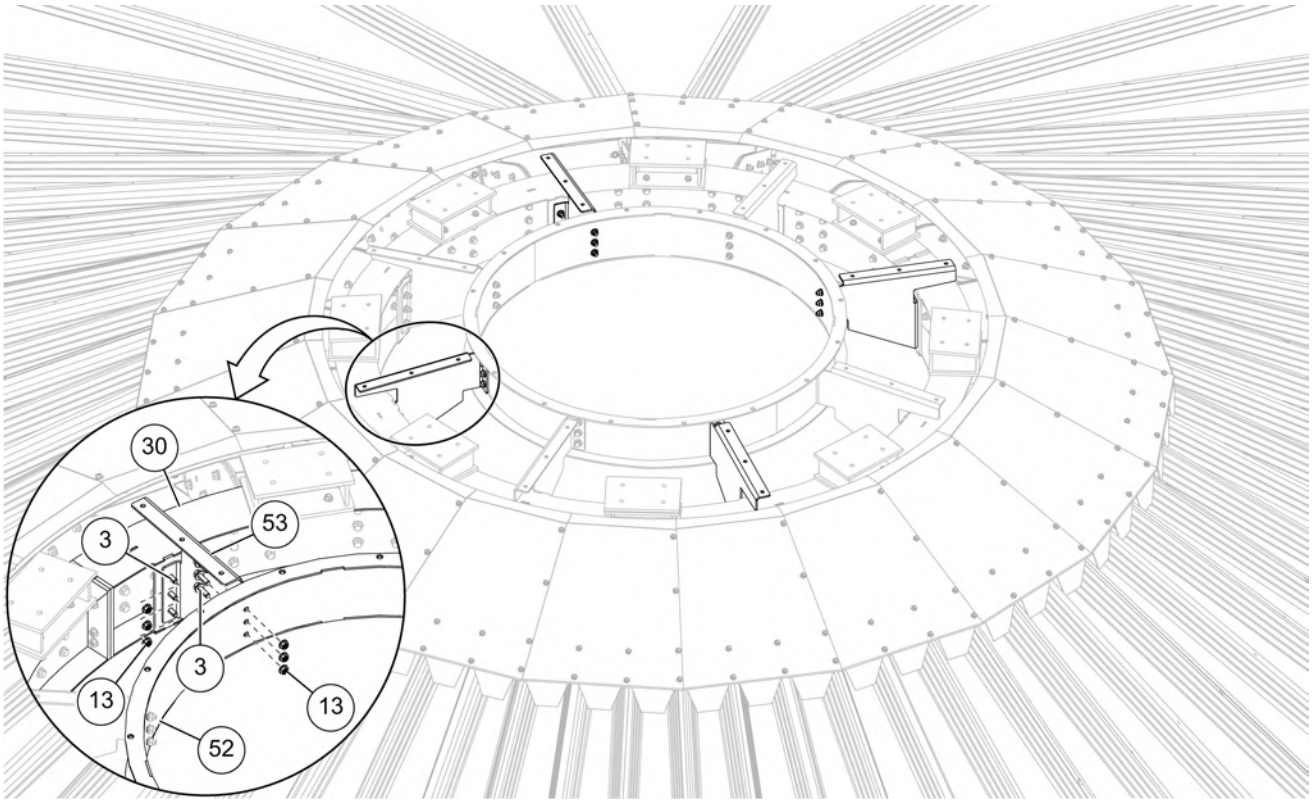
Figure 8-31 *Installing the inner center collar to the outer center collar*



3	7/16" x 1-1/4" flange bolt (S-10250)	52	Inner center collar (CTR-1562-BS)
13	7/16" flange nut (S-10251)	53	Center collar channel bracket (CTR-1558)
30	Outer center collar (CTR-1540-BS)		

2. Install the remaining four center collar channel brackets (53) between the inner center collar (52) and outer center collar (30) using 7/16" x 1-1/4" flange bolts (3) and 7/16" flange nuts (13).

Figure 8-32 *Installing the remaining inner center collar brackets*



3	7/16" x 1-1/4" flange bolt (S-10250)	52	Inner center collar (CTR-1562-BS)
13	7/16" flange nut (S-10251)	53	Center collar channel bracket (CTR-1558)
30	Outer center collar (CTR-1540-BS)		

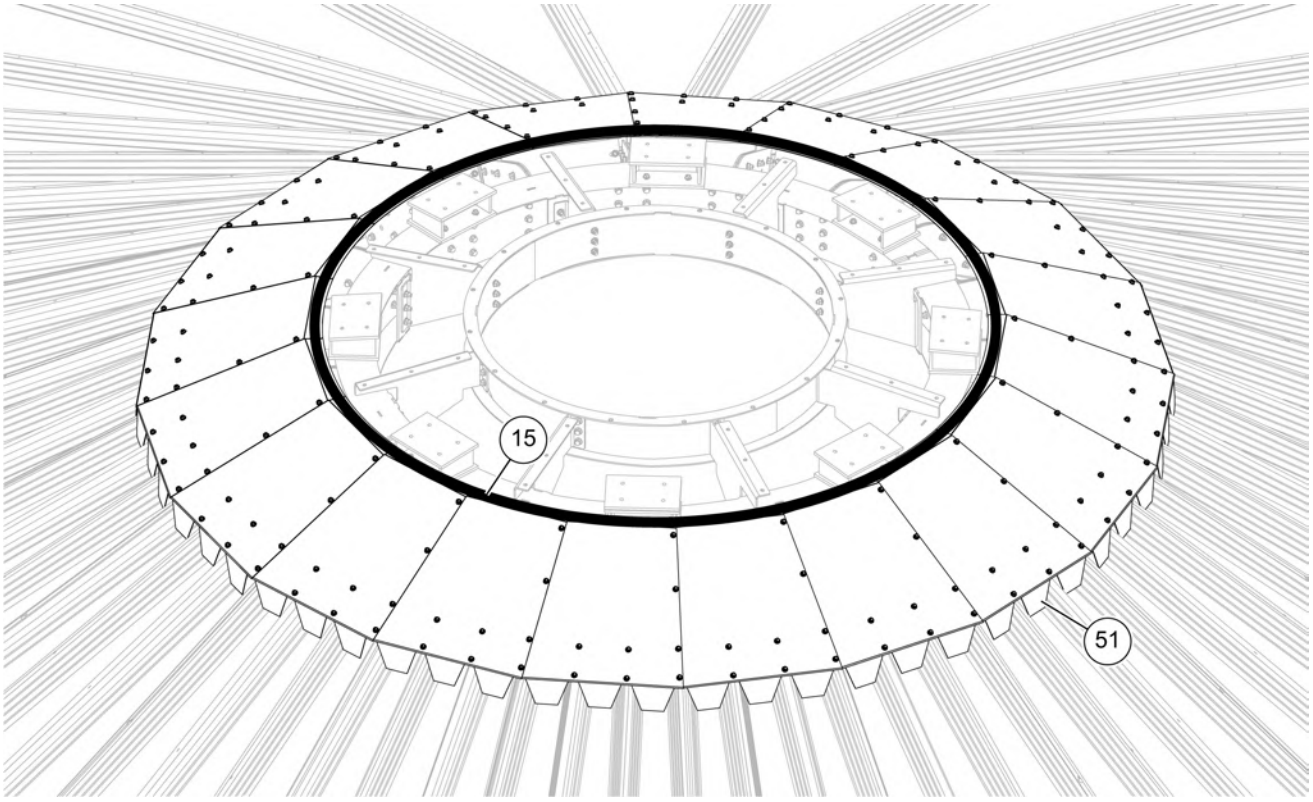
3. Tighten all the hardware to the recommended specifications. See *Bolt Torque Specifications, page 26*.

Installing the Top Panels

The top panels seal the area between the inner center collar and outer center collar.

1. Place a continuous strip of caulk (15) on the mating surfaces of the top panel with the roof flashing (51).

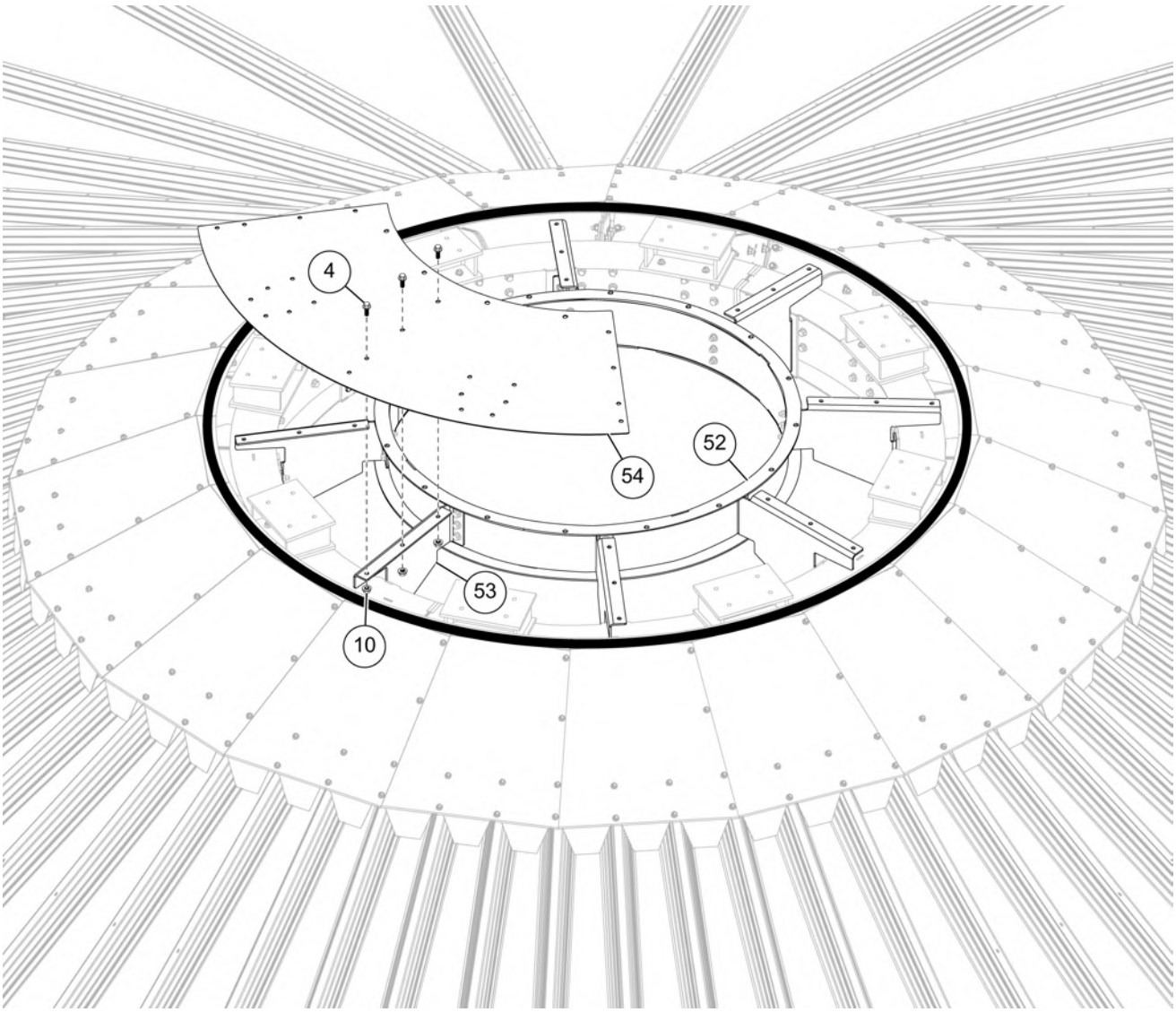
Figure 8-33 *Placing tube of caulk on the roof flashing*



15	3/8" x 1" caulk (S-10319)	51	Roof flashing (CTR-1590)

2. Align the holes on the first top panel (54) with the holes in the center collar channel brackets (53) and the inner center collar flange (52).
3. Install 3/8" x 1" flange bolts (4) and 3/8" flange nuts (10) only to the middle set of holes to secure the first top panel (54) with the center collar channel bracket (53).

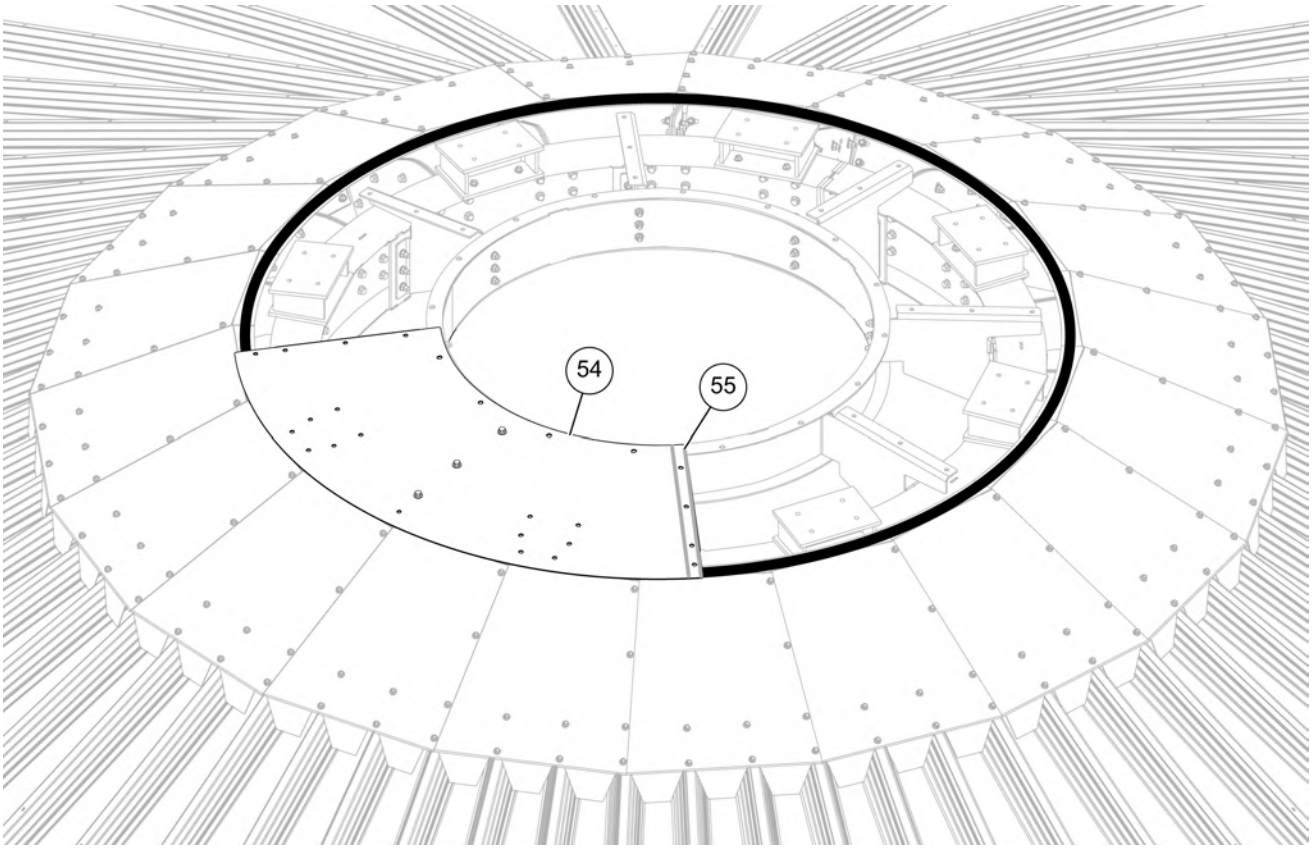
Figure 8-34 *Installing the first top panel*



4	3/8" x 1" flange bolt with sealing washer (S-7487)	53	Center collar channel brackets (CTR-1558)
10	3/8" flange nut (S-9426)	54	Top panel (CTR-1566)
52	Inner center collar (CTR-1562-BS)		

4. Place two strips of rope caulk (55) along the edge of the top panel (54) (adjacent to the holes) where the next top panel (54) will overlap.

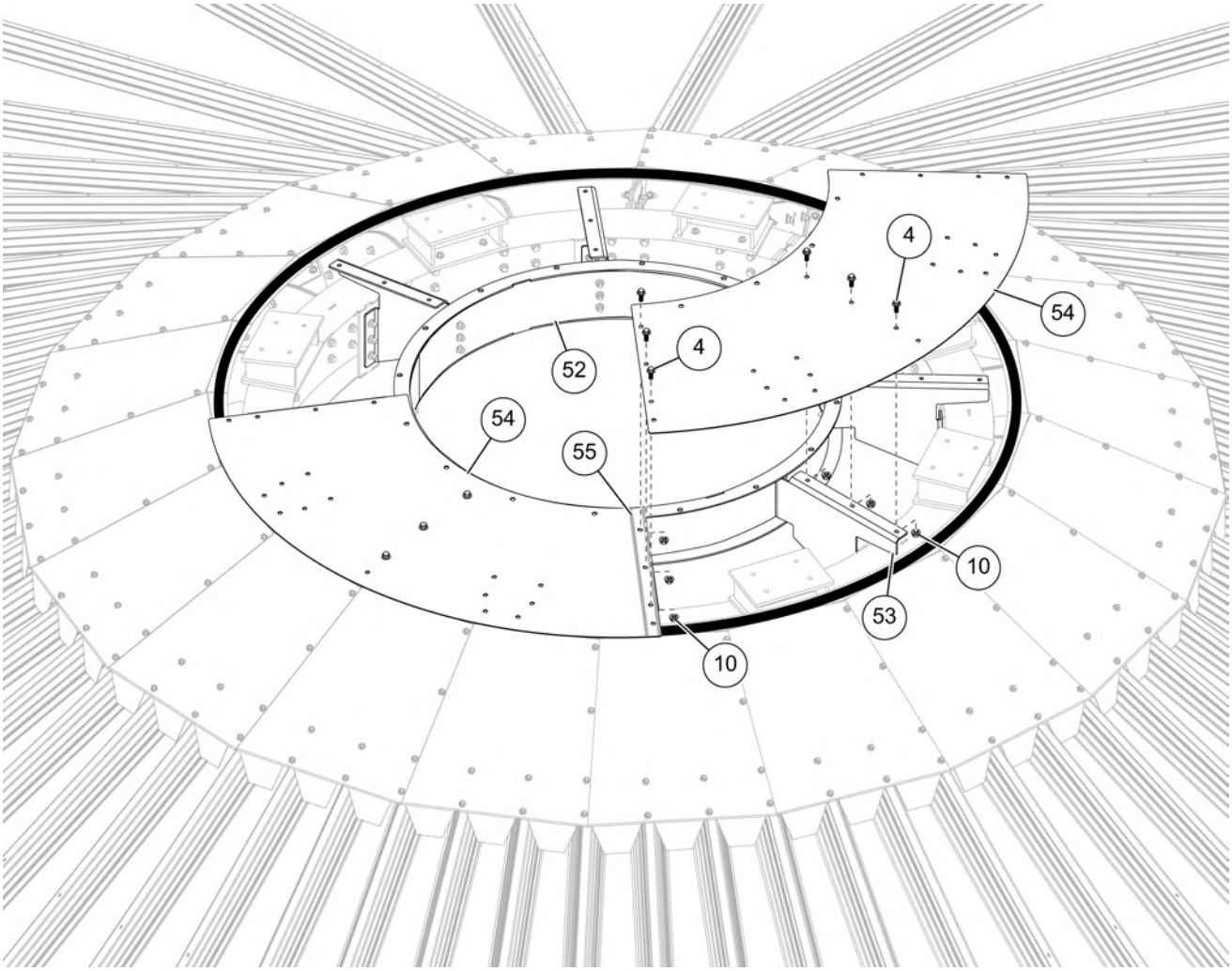
Figure 8-35 *Placing tube of caulk on the first top panel*



54	Top panel (CTR-1566)	55	Rope caulk (S-4458)

5. Align the holes along the edge of the next top panel (54) with the holes of the previously installed top panel (54).
6. Install 3/8" x 1" flange bolts (4) and 3/8" flange nuts (10) to the holes at the overlap and the middle holes, securing the top panels (54) with the center collar channel brackets (53).

Figure 8-36 *Installing the remaining top panels*



4	3/8" x 1" flange bolt with sealing washer (S-7487)	53	Center collar channel brackets (CTR-1558)
10	3/8" flange nut (S-9426)	54	Top panel (CTR-1566)
52	Inner center collar (CTR-1562-BS)	55	Rope caulk (S-4458)

7. Continue installing the remaining top panels (54) until the gap between the outer and inner center collars (52) is covered.

   NOTE: *Remember to place rope caulk (55) between the overlap of the last two panels.*

8. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Installing the Upper Stand-Off Support Brackets and Stand-Off Plates

Four upper stand-off support brackets are attached to the top panels and allow support for a conveyor or catwalk system.

1. Locate the four sets of four holes in the top panels (54), and place a gasket (56) over each set of four holes, where the upper stand-off support brackets (57) will be installed.

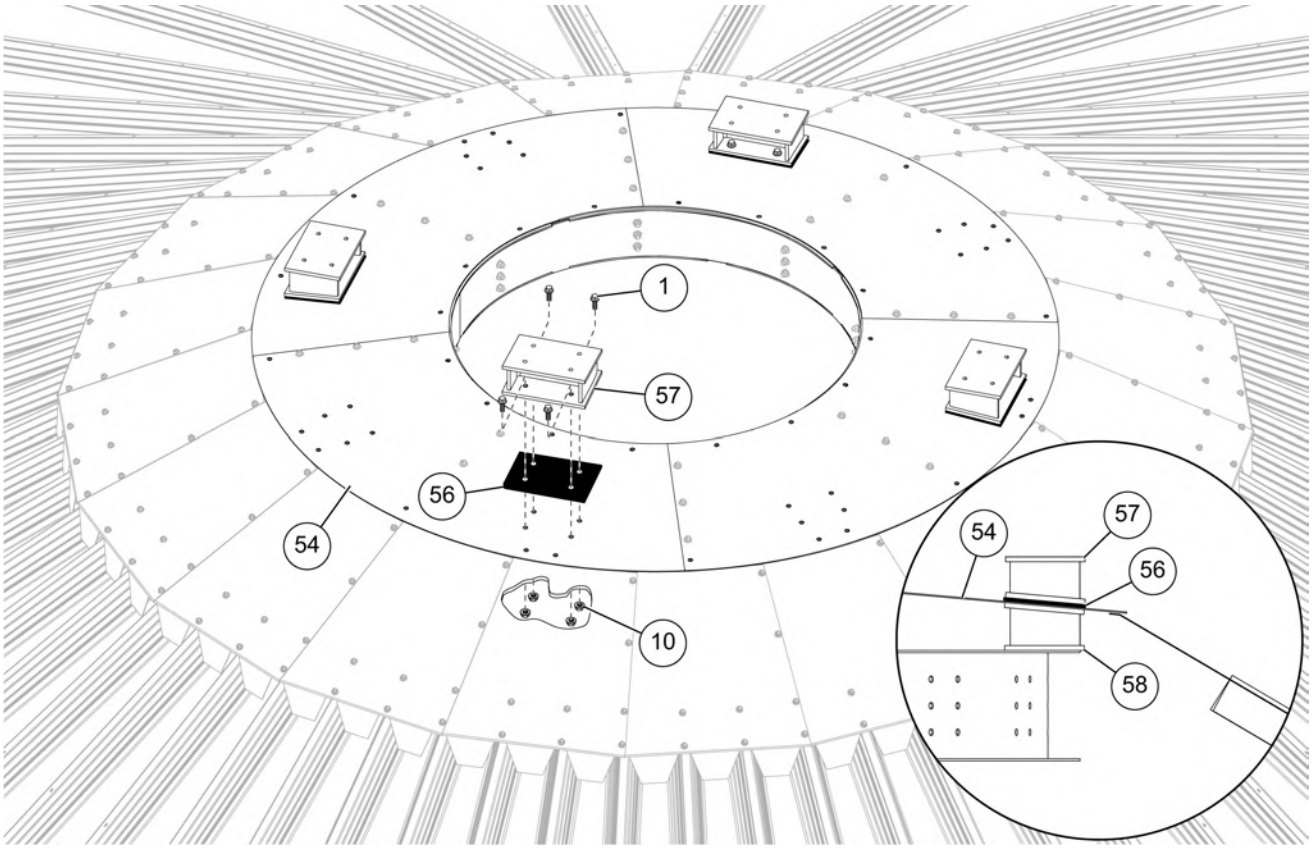
   NOTE: *There will be eight set of four holes on the top panels (54). While placing the gaskets (56), make sure to leave a set of four holes between each placement.*

2. Position one upper stand-off bracket (57) over each gasket (56) and align the holes.

3. Install 3/8" x 1-1/2" flange bolts (1) and 3/8" flange nuts (10) to secure the upper stand-off support brackets (57), gaskets (56) and lower stand-off support brackets (58) together with the top panels (54).

   NOTE: *Make sure the end lines in the stand-off brackets (57 and 58) are vertical.*

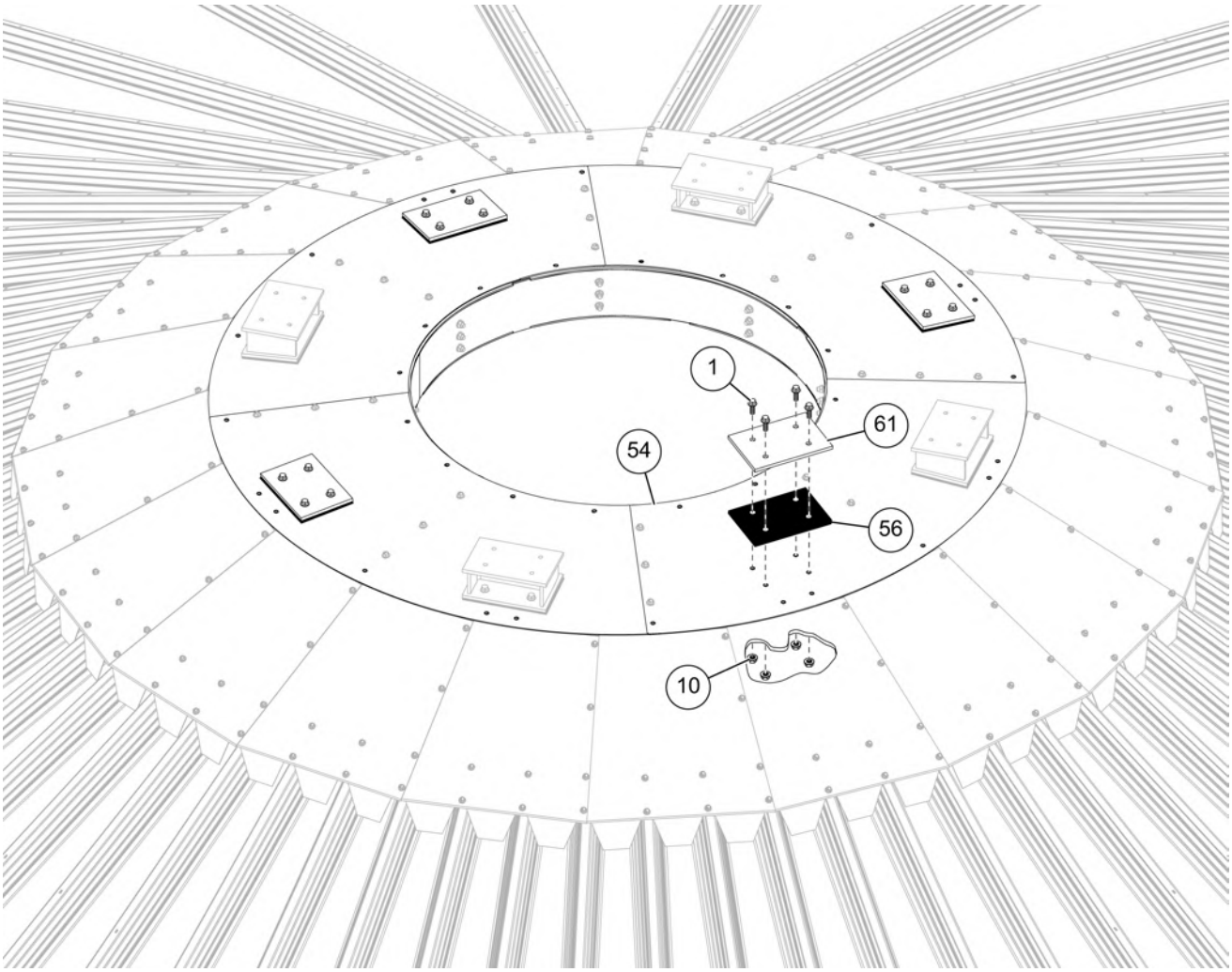
Figure 8-37 *Installing the upper stand-off support brackets*



1	3/8" x 1-1/2" flange bolt with sealing washer (S-7488)	56	Gasket (S-10378)
10	3/8" flange nut (S-9426)	57	Upper stand-off support brackets (CTR-1559-BS)
54	Top panel (CTR-1566)	58	Lower stand-off support bracket (CTR-1559-BS)

4. Locate the remaining four sets of four holes in the top panels (54), and place a gasket (56) over each set of four holes, where the stand-off plates (61) will be installed.
5. Position one stand-off plate (61) over each gasket (56) and align the holes.
6. Install 3/8" x 1-1/2" flange bolts (1) and 3/8" flange nuts (10) to secure the upper stand-off plates (61), gaskets (56) and lower stand-off brackets (58) together with the top panels (54).

Figure 8-38 *Installing the stand-off support plates*



1	3/8" x 1-1/2" flange bolt with sealing washer (S-7488)	56	Gasket (S-10378)
10	3/8" flange nut (S-9426)	61	Stand-off plate (CTR-1561-BS)
54	Top panel (CTR-1566)		

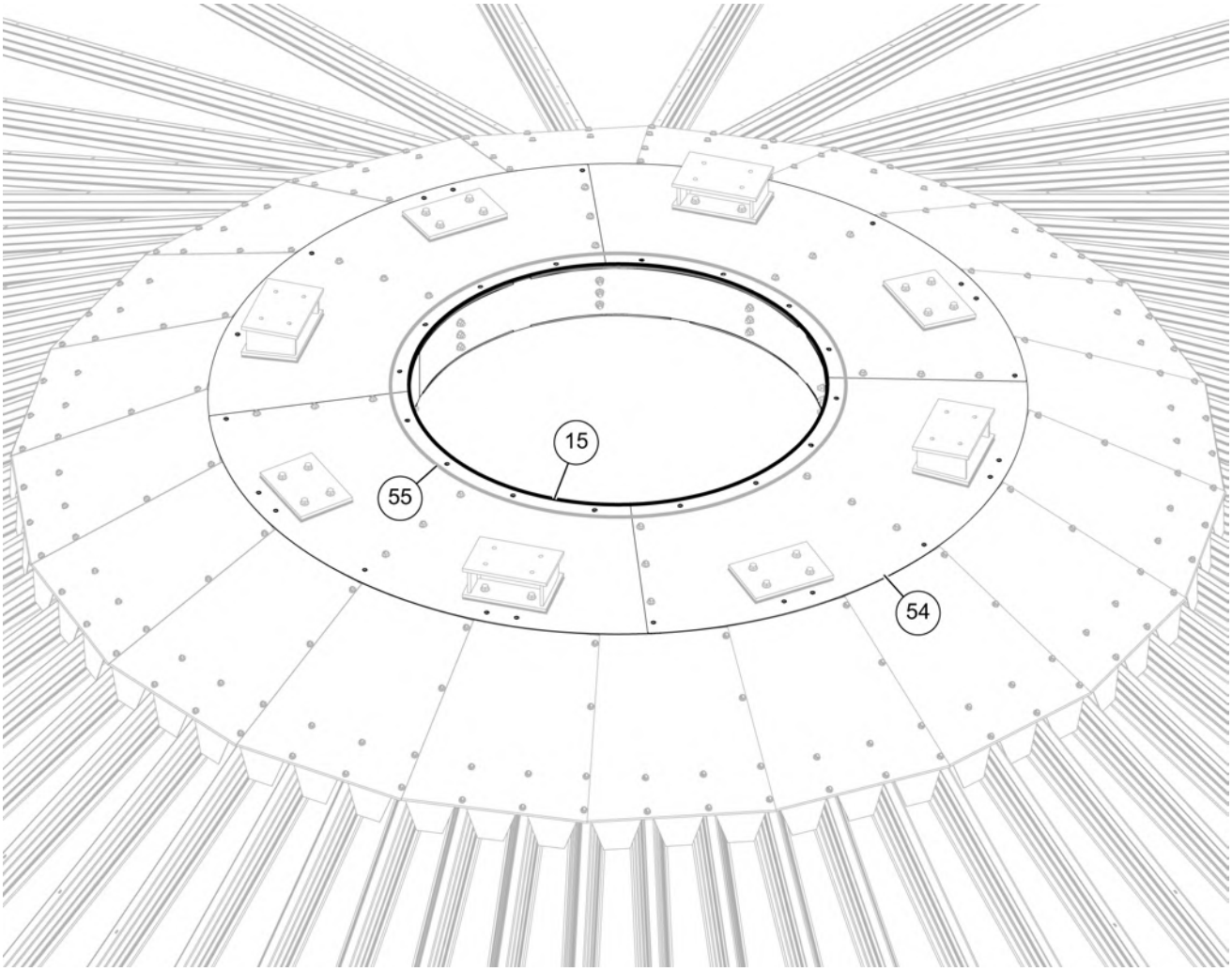
7. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Installing the Center Cap Plate

Center cap plate will need to be installed on top of the inner center collar and the top panels.

1. Place a continuous strip of caulk (15) on the mating surface (inside edge of the holes) of the cap plate with the top panels (54).
2. Place a continuous strip of rope caulk (55) on the mating surface (outside of the holes) of the cap plate with the top panels (54).

Figure 8-39 *Placing the strip of caulks on the top panels*

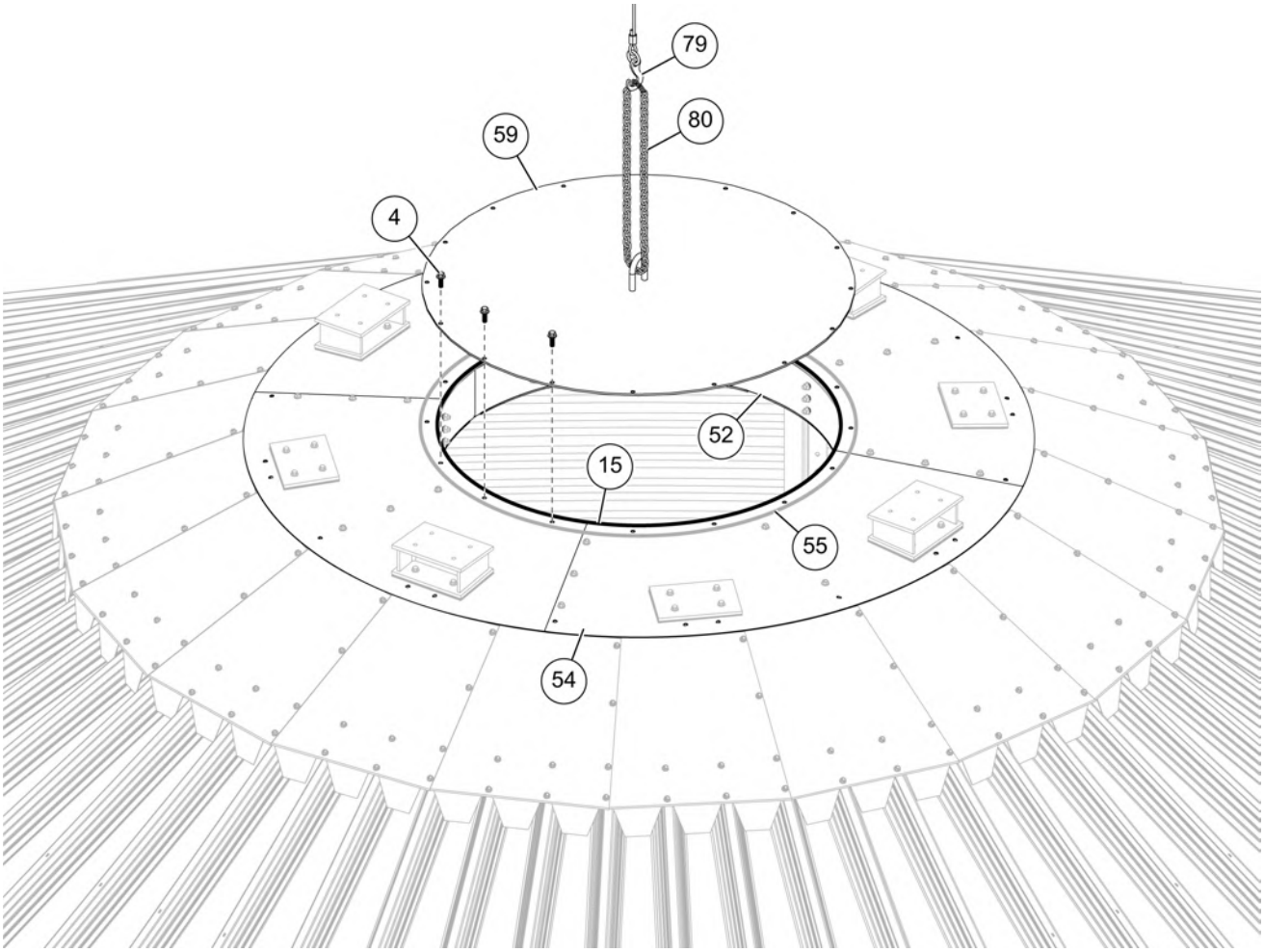


15	3/8" x 1" caulk (S-10319)	55	Rope caulk (S-4458)
54	Top panel (CTR-1566)		

3. Attach the appropriate lifting chain (80) to the hook in the center cap plate (59).
4. Attach the appropriate lifting device (79) to the lifting chain (80).
5. Use the qualified personnel to hoist the center cap plate (59) into place.
6. Align the holes in the center cap plate (59) with the holes in the inner center collar (52) and the top panels (54) and fasten them together using 3/8" x 1" flange bolts (4).

   NOTE: *Make sure the flange nuts are welded to the bottom of the inner center collar (52) top flange.*

Figure 8-40 *Lifting and installing the center cap plate*



4	3/8" x 1" flange bolt with sealing washer (S-7487)	55	Rope caulk (S-4458)
15	3/8" x 1" caulk (S-10319)	59	Center cap plate (CTR-1572-BS)
52	Inner center collar (CTR-1562-BS)	79	Lifting device
54	Top panel (CTR-1566)	80	Lifting chains

7. Tighten all the hardware to the recommended specifications. See *Bolt Torque Specifications, page 26*.

Installing the Flashing Lock

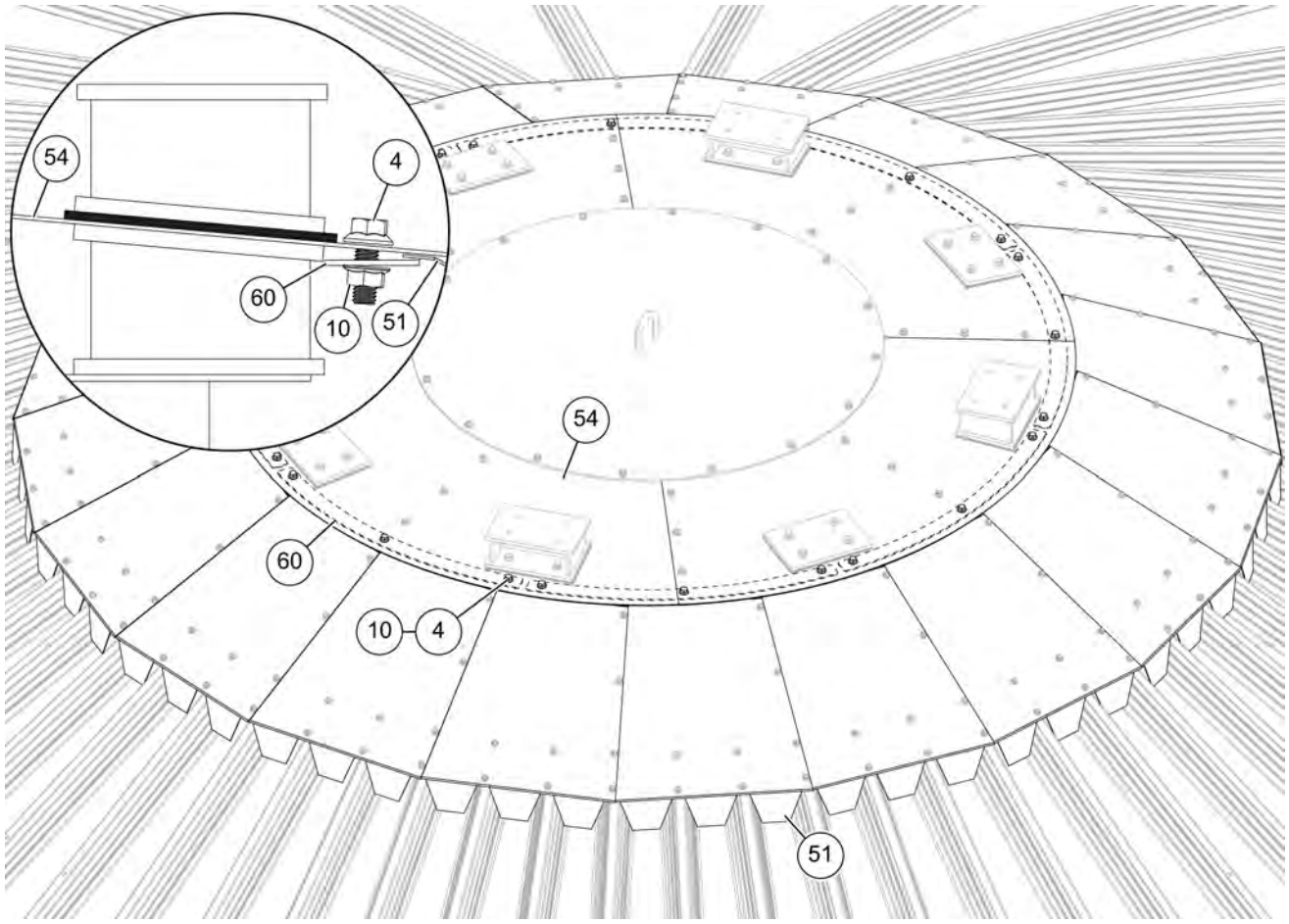
The flashing lock will need to be installed to secure the roof flashing and the top panel.

1. Position the flashing lock (60) under the roof flashing (51), aligning with the holes in the top panel (54) from the underside of the roof.

   NOTE: *Ensure the roof flashing (51) is inserted between the top panel (54) and the flashing lock (60).*

2. Install 3/8" x 1" flange bolts (4) and 3/8" flange nuts (10) to secure the top panel (54) with the flashing lock (60).
3. Repeat the procedure to install the remaining flashing locks (60).
4. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Figure 8-41 *Installing the flashing lock*



4	3/8" x 1" flange bolt with sealing washer (S-7487)	54	Top panel (CTR-1566)
10	3/8" flange nut (S-9426)	60	Flashing lock (CTR-1569)
51	Roof flashing (CTR-1590)		

NOTES

9 Bin Accessories

Topics Covered in this Chapter

- Installing the Roof Ladder Steps
- Roof Ring Placement (Optional)
- Installing the Roof Ring
- Installation of the Peak–To–Exhauster Ladder Kit
- Preparation for the Roof Exhauster Installation
- Assembling the Roof Exhauster
- Installing the Roof Exhauster Assembly
- Installing the Manway Cover
- Assembling the Inside Ladder
- Installing the Inside Ladder
- Installing the Inside Ladder Bottom Bracket
- Guidelines for Installing a Sidedraw System
- Locating the Chutes
- Locating the Discharge Opening
- Sidewall Overlap for Sidedraw Weldment
- Caulking for the Sidedraw Weldment
- Wind Ring Quantities
- Wind Ring Locations
- Installing the Wind Rings
- Assembling the Weather Cover for Roller Valve

Installing the Roof Ladder Steps

Roof ladder steps will allow access to the manway access and peak.

What You Should Know

Each eave-to-peak ladder step differs with the diameter of each bin. When installing the ladder steps, always start from the eave and work up towards the peak, installing the longer steps first at the eave and the shorter steps later at the peak.

NOTE: *Use the table at the end of this procedure for part listings and the correct placement of each ladder step configuration for various bin sizes. See Table 9-1, page 173.*

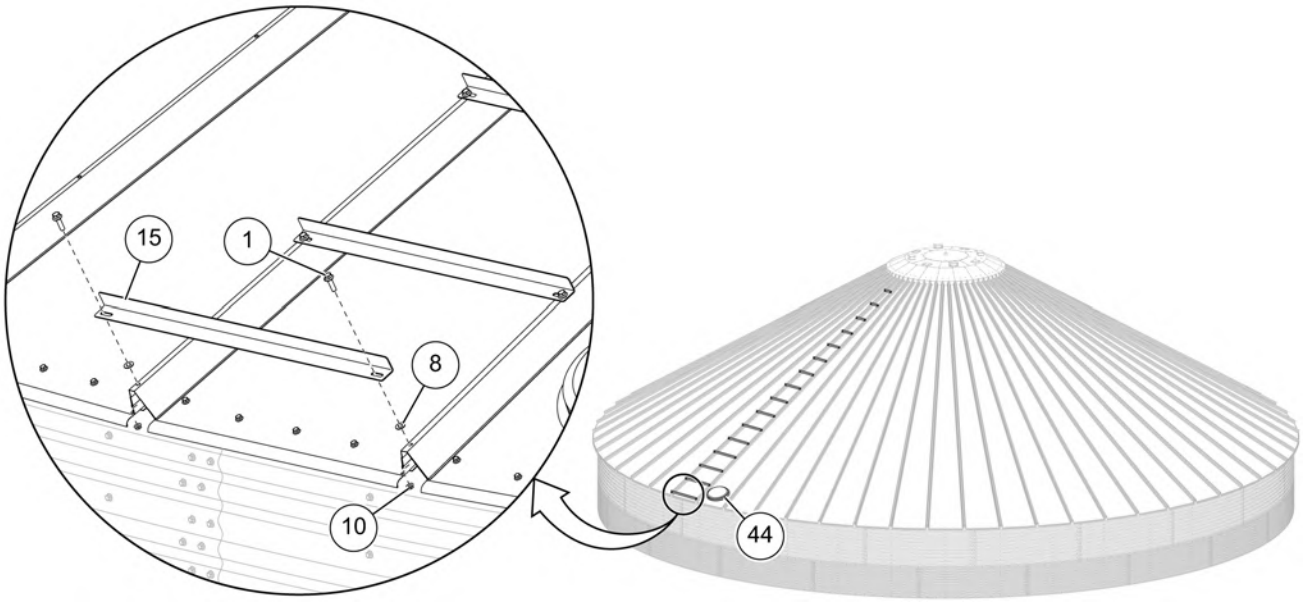
1. Place the first roof ladder step (15) onto the corresponding roof panel (44), next to the manway access.

   NOTE: *Roof ladder steps (15) will not be installed at places where roof rings will be installed. Proceed to next available ladder step.*

2. Place a 5/16" sealing washer (8) between the roof ladder step (15) and the roof panel rib. Secure the roof ladder step (15) to the roof panel rib by installing 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10). Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

3. Repeat this procedure for the remaining ladder steps (15) in the eave-to-peak ladder step.

Figure 9-1 *Installing the roof ladder step*



1	5/16" x 1" flange bolt with sealing washer (S-10260)	15	Roof ladder step (LS-260-X) [1]
8	5/16" Sealing washer (S-1463)	44	Manway roof panel
10	5/16" flange nut (S-3611)		

1. (-X) denotes the ladder step number.

Use the following table as a guide for the location of each ladder step (rung).

Table 9-1 *Ladder Rung Placement Chart*

Location		Bin Diameter							
		33'	36'	42'	48'	54'	60'	66'	72'
↑ Bin Peak	21								
	20								
	19								LS-260-1
	18								LS-260-2
	17								LS-260-3
	16						LS-260-3	LS-260-4	LS-260-3
	15					LS-260-2	LS-260-4	LS-260-5	LS-260-4
Roof Rib Hole Number From Bin Eave	14				LS-260-1	LS-260-3	LS-260-5	LS-260-6	LS-260-5
	13				LS-260-3	LS-260-5	LS-260-6	LS-260-7	LS-260-6
	12			LS-260-2	LS-260-4	LS-260-6	LS-260-7	LS-260-8	LS-260-6
	11			LS-260-3	LS-260-5	LS-260-7	LS-260-8	LS-260-9	LS-260-7
	10		LS-260-3	LS-260-5	LS-260-7	LS-260-8	LS-260-9	LS-260-10	LS-260-8
	9	LS-260-3	LS-260-5	LS-260-7	LS-260-8	LS-260-10	LS-260-10	LS-260-11	LS-260-8
	8	LS-260-5	LS-260-6	LS-260-8	LS-260-10	LS-260-11	LS-260-12	LS-260-12	LS-260-9
	7	LS-260-7	LS-260-8	LS-260-10	LS-260-11	LS-260-12	LS-260-13	LS-260-13	LS-260-10
	6	LS-260-9	LS-260-10	LS-260-12	LS-260-13	LS-260-13	LS-260-14	LS-260-14	LS-260-11
	5	LS-260-11	LS-260-12	LS-260-13	LS-260-14	LS-260-15	LS-260-15	LS-260-15	LS-260-11
	4	LS-260-14	LS-260-14	LS-260-15	LS-260-15	LS-260-16	LS-260-16	LS-260-16	LS-260-12
	3	LS-260-16	LS-260-16	LS-260-16	LS-260-17	LS-260-17	LS-260-17	LS-260-17	LS-260-13
↓ Bin Eave	2	LS-260-18	LS-260-18	LS-260-18	LS-260-18	LS-260-18	LS-260-18	LS-260-18	LS-260-13
	1	LS-260-20	LS-260-20	LS-260-20	LS-260-20	LS-260-20	LS-260-20	LS-260-19	LS-260-14

NOTE: *The table above shows the correct ladder step (15) and part number to be installed in the corresponding hole in the roof rib. Shaded areas also show the correct roof exhauster ladder step (15) and part number with the corresponding hole in the roof rib.*

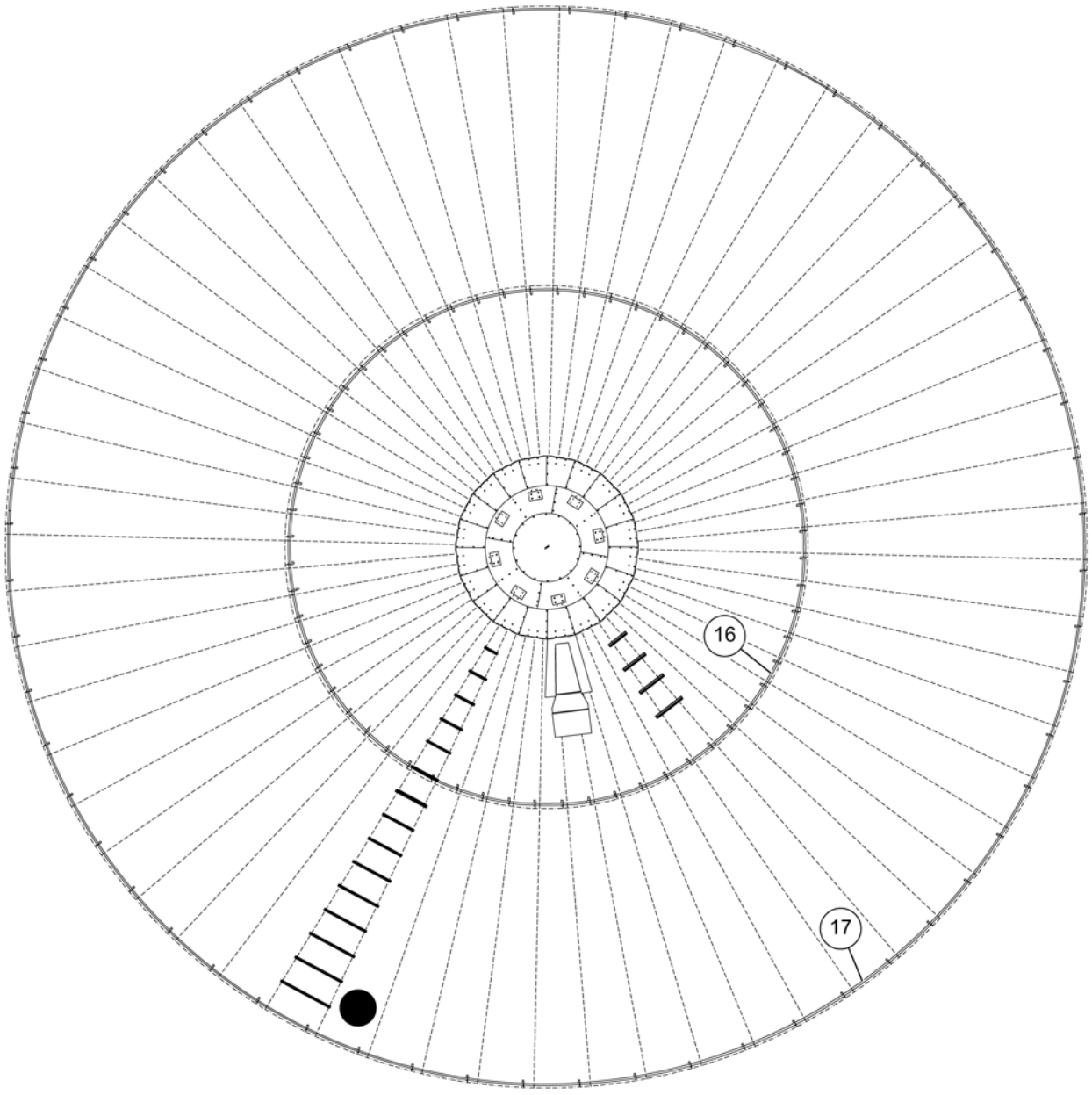
Roof Ring Placement (Optional)

The roof ring is a tubular ring bolted to the exterior of the roof.

The placement location and quantity of roof ring kits vary with the diameter of the each bin. The roof support ring (16) on the 60' bin will be installed in the eleventh (11th) roof panel rib hole from the eave. The eave roof ring (17) will be installed in the last roof panel rib hole located at the eave end of the bin.

NOTE: *If the roof ladder steps have been installed and not already omitted, remove the roof ladder step and install the roof ring to the same roof panel rib hole where the roof ladder step is installed.*

Figure 9-2 *Roof ring location on bin*



16	Roof support ring kit (CRP-4799)	17	Eave roof ring kit (CRP-5496-60)

Installing the Roof Ring

Quantity and part numbers of roof ring kits vary with the placing location and with the size of each bin. The following procedure will be similar for each kit.

What You Should Know

The roof ring and threaded stud may become dislocated from each other during high winds or when the inside pressure of the bin is too high. If a threaded stud is dislocated, the entire roof ring will become disjointed. Prevent this by staking the expansion bolt threads at the jam nut location (after the rings have been installed and expanded to the correct size), use of suitable thread locking compounds or other effective methods. Refer to *Figure 9-4, page 176*.

1. Determine the quantity of roof ring clips (18) required to install a roof ring section (43).

   NOTE: *Each roof panel rib must have a roof ring clip (18) installed.*

2. Install a 5/16" x 1" flange bolt (1) and a sealing washer (9) to each roof ring clip (18).

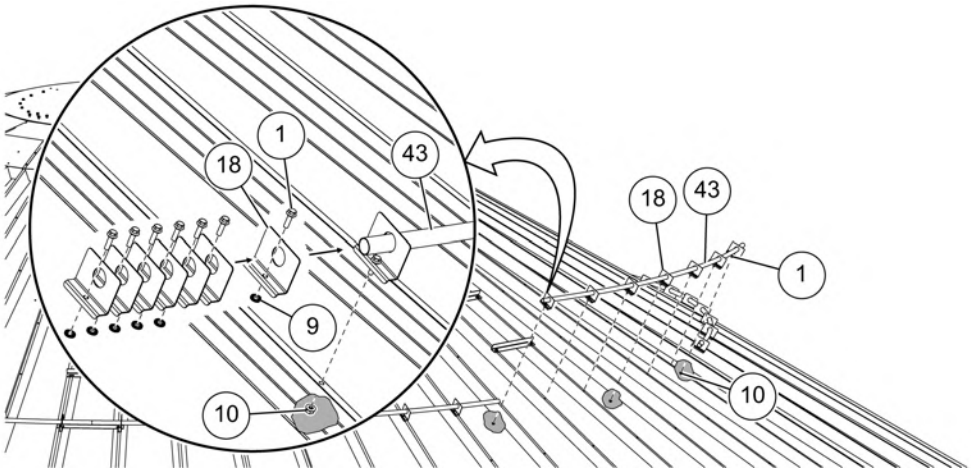
   NOTE: *Make sure to install the sealing washer (9) to the underside of the roof ring clip (18) with 5/16" x 1" flange bolt (1) head on the topside.*

3. Slide the assembled roof ring clips (18) onto a roof ring section (43) and position each roof ring clip (18) over each roof panel rib.

4. Secure the roof ring clips (18) to the roof panel rib by installing a 5/16" flange nut (10) from the inside of the roof.

   NOTE: *Do not tighten the hardware until all the roof ring sections (43) have been installed.*

Figure 9-3 *Installing the roof ring clips*



1	5/16" x 1" flange bolt with sealing washer (S-10260)	18	Roof ring clip (R-997)
9	Sealing washer (S-10303)	43	Roof ring section
10	5/16" flange nut (S-3611)		

Diameter	Roof Ring (43)	
	Exhauster / Support Roof Ring Section	Eave Roof Ring Section
60'	CRP-4753	CRP-5497-60

5. Locate a threaded stud (19) and install two stud nuts (12) evenly and to the center of the threaded stud (19).
6. Install the threaded stud (19) with stud nuts (12) to the end of the installed roof ring section (43).

   NOTE: *Install the threaded stud (19) to the side where the next roof ring section (43) will be installed.*

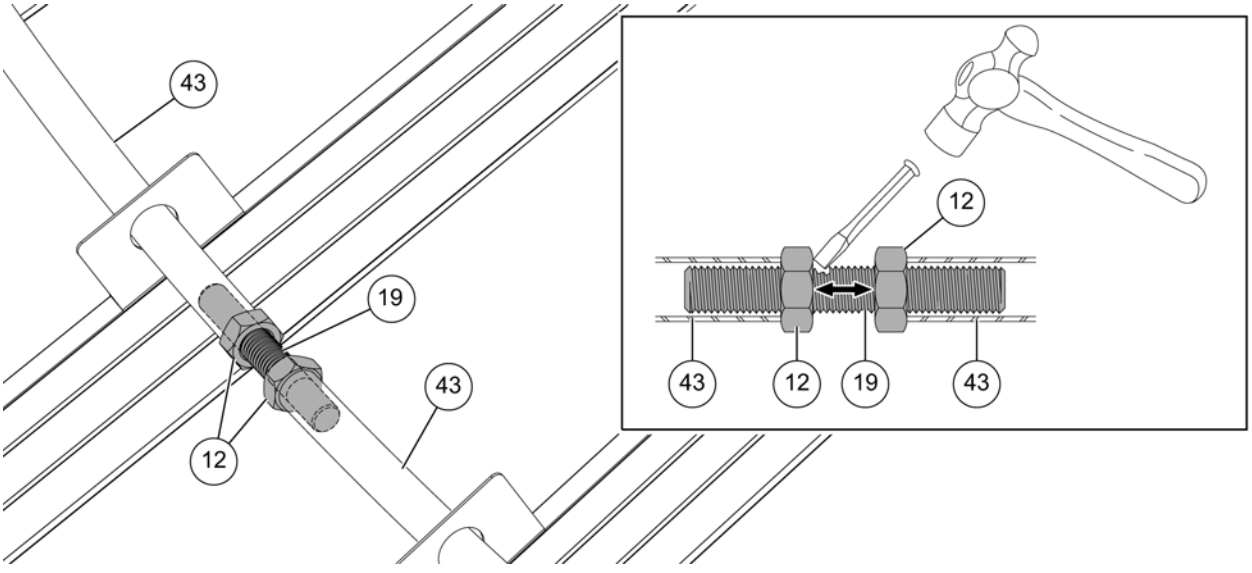
7. Repeat this process, installing each new roof ring section (43) end onto the preceding threaded stud (19) just installed.
8. When all the roof ring sections (43) are installed, tighten each roof ring clip (18) to the recommended torque specifications. Refer to *Bolt Torque Specifications, page 26*.
9. Adjust each stud nut (12) outward, expanding each roof ring section (43). Continue this procedure evenly until the roof ring raises the roof, showing a slight crown.

   NOTE: *Expansion bolts should be fully contracted when assembling the support rings. When you have completely assembled both rings, (but prior to expanding the bolts) tighten all roof bolts including eave clip bolts. Now extend expansion bolts by running the nut out on the threads. This procedure should be continued evenly around the roof until the ring raises the roof to show a slight crown.*

   NOTE: *Roof ring expansion bolts may become dislodged from the roof ring during the life of the bin due to the influence of wind or other factors. If one expansion bolt is dislodged, the entire ring will become ineffective. After expansion to the jam nuts final position, the nuts on the expansion bolt should be secured to prevent this. This may be done by staking the expansion bolt threads at the jam nut location, by using suitable thread locking compounds or other effective methods.*

   In addition, drilling holes through the support pipe and expansion bolt and connecting together with a 1/4" diameter bolt is an effective way to prevent the bolt from dislodging during certain wind and pressure conditions.

Figure 9-4 *Installing the threaded stud and stud nuts*



12	Stud nut (S-8926)	43	Roof ring section
19	Threaded stud (S-8765)		

Installation of the Peak–To–Exhauster Ladder Kit

Before installing the roof exhauster, install the peak-to-exhauster ladder kit onto the roof to have access to the roof exhauster.

Before You Begin

Determine the location of the roof exhauster.

What You Should Know

This procedure is to install the peak-to-exhauster ladder kit onto the roof. When the correct location of the roof exhauster has been determined, the peak-to-exhauster ladder kit will be installed adjacent to the roof exhauster on the next available roof rib.

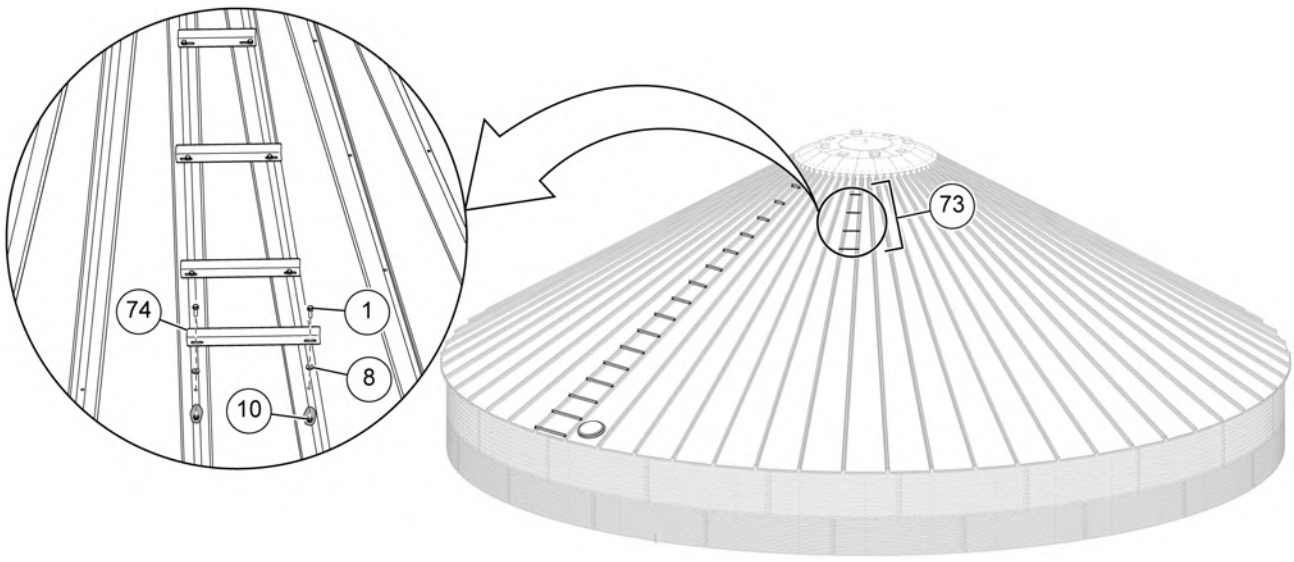
IMPORTANT: *The peak-to-exhauster ladder kit is optional and it does not come with the standard roof exhauster.*

1. Place the appropriate peak-to-exhauster ladder step (74) against the corresponding roof rib hole, using the table listed at the end of this section.

   NOTE: *The contents of each peak-to-exhauster ladder kit (73) differ with bin diameters.*

2. Place a 5/16" sealing washer (8) between the peak-to-exhauster ladder step (74) and the roof panel rib. Secure the peak-to-exhauster ladder step (74) to the roof panel rib by installing 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10).

Figure 9-5 *Installing the peak-to-exhauster ladder kit*



1	5/16" x 1" flange bolt with sealing washer (S-10260)	73	Peak-to-exhauster ladder kit (PLS-42497-XX) [2]
8	5/16" Sealing washer (S-1463)	74	Peak-to-exhauster ladder step (LS-260-X) [3]
10	5/16" flange nut (S-3611)		

2. (-XX) denotes the bin diameter.
3. (-X) denotes the peak-to-exhauster ladder step number.

Table 9-2 *Peak-to-Exhauster Ladder Rung Kit Chart*

Bin Diameter								
Location		**36'**	**42'**	**48'**	**54'**	**60'**	**66'**	**72'**
↑ Bin Peak	19							LS-260-1
	18							LS-260-2
	17							LS-260-3
	16					LS-260-3	LS-260-4	LS-260-3
	15				LS-260-2	LS-260-4	LS-260-5	LS-260-4
Bolt Hole Count Located on the Roof Rib	14			LS-260-1	LS-260-3	LS-260-5	LS-260-6	LS-260-5
	13			LS-260-3	LS-260-5	LS-260-6	LS-260-7	LS-260-6
	12		LS-260-2	LS-260-4	LS-260-6	LS-260-7	LS-260–8	
	11		LS-260-3	LS-260-5	LS-260-7			
	10	LS-260-3	LS-260-5	LS-260-7	LS-260-8			
	9	LS-260-5	LS-260-7	LS-260-8				
	8	LS-260-6	LS-260-8	LS-260-10				
	7	LS-260-8	LS-260-10					
	6	LS-260-10						
	5	LS-260-12						
	4							
	3							
Bin Eave ↓	2							
	1							

NOTE: *The table above shows the correct ladder step and part number to be installed to the corresponding hole in the roof rib. Shaded areas show the correct roof exhauster ladder step and part number with the corresponding hole in the roof rib.*

Preparation for the Roof Exhauster Installation

Using the roof exhauster mounting plate, some preparations are required for the roof panels to which the roof exhauster mounting plate will be installed.

Before You Begin

Determine the location of the roof exhauster and set aside the roof panels that the roof exhauster mounting plate will span.

What You Should Know

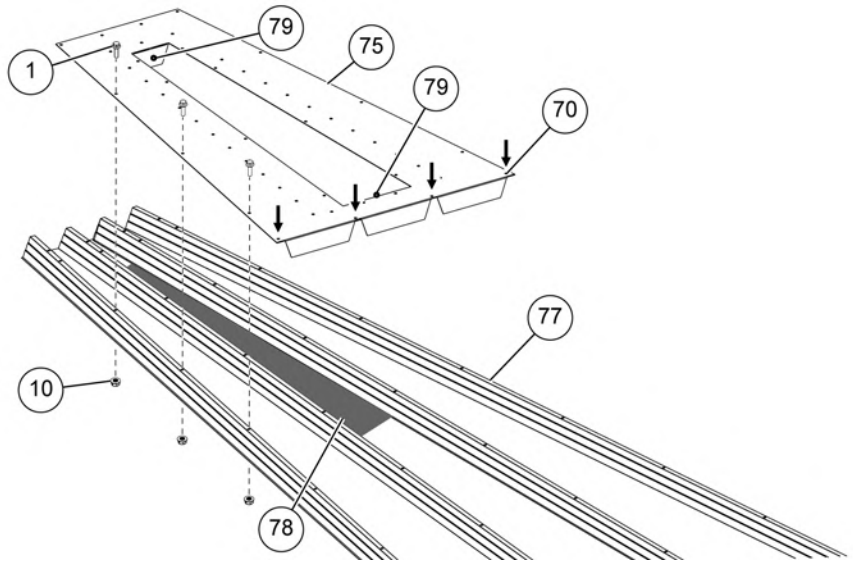
This procedure is to cut the exhauster airflow hole. Use the roof exhauster mounting plate as a template to determine the correct location for field cutting the roof exhauster hole.

1. Position the roof panels (77) spanned by the roof exhauster mounting plate (75) on the ground. Align the roof panel holes as if they are installed on the bin.
2. Temporarily install the roof exhauster mounting plate (75) to the roof panels (77) using 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10). Make sure all the holes are aligned and the teeth of the roof exhauster mounting plate (75) are nestled in between two roof ribs. Also field drill all required holes on the roof panels (77).
3. Using the roof exhauster mounting plate (75), mark or scribe the hole (78) to be cut.

   Tip

   If tabs are already bent, flip the mounting plate (75) upside down to scribe the hole location.

Figure 9-6 *Temporary installation of exhauster mounting plate for marking*



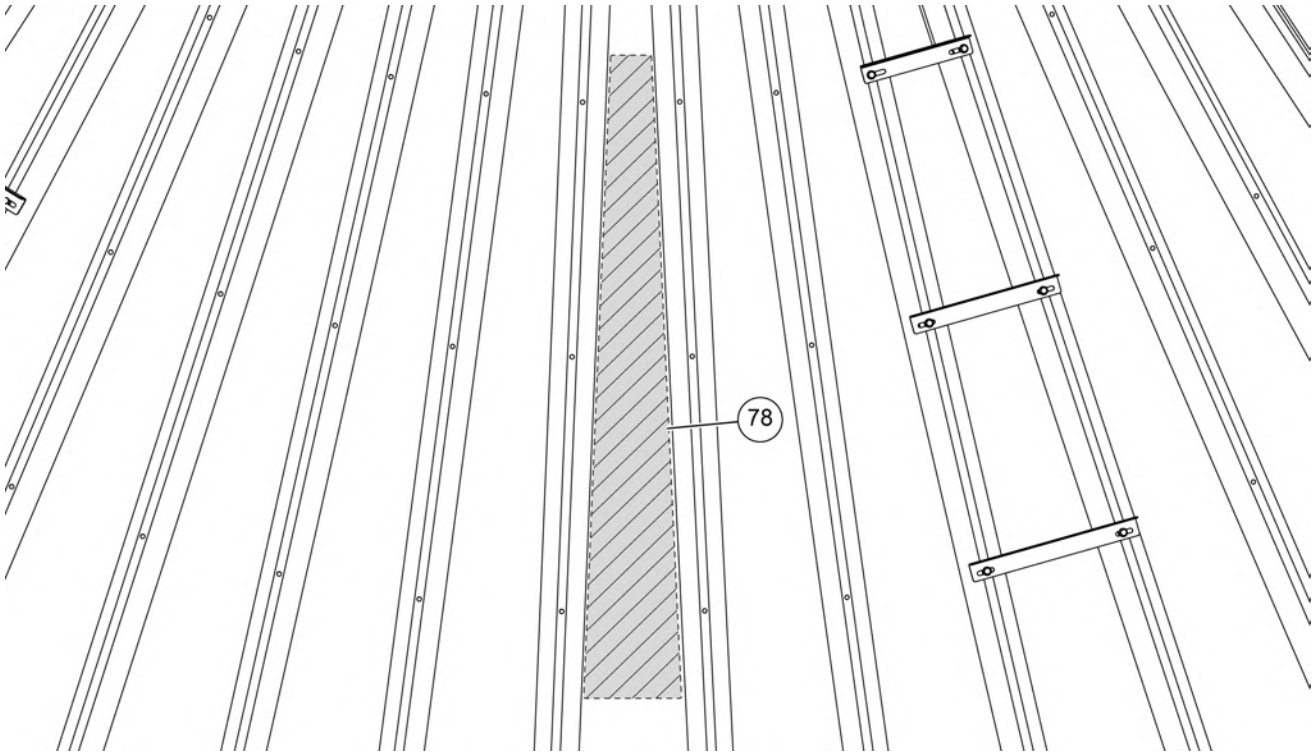
1	5/16" x 1" flange bolt with sealing washer (S-10260)	77	Roof panel
10	5/16" flange nut (S-3611)	78	Marked or scribed hole to be cut
70	Holes to be field drilled	79	Field bent inside tab on roof exhauster mounting plate
75	Exhauster mounting plate (CTR-1299)		

4. Bend the tabs (79) downward approximately 90 degrees on the roof exhauster mounting plate (75) to conform with the roof panel (77).

   NOTE: *Bend the tabs (79) on the ground and adjust as necessary once on the roof.*

5. Remove the roof exhauster mounting plate (75), to make the necessary cut along the mark or scribe (78).

Figure 9-7 *Marking or scribing the hole on the roof panel*



78	Marked or scribed hole to be cut

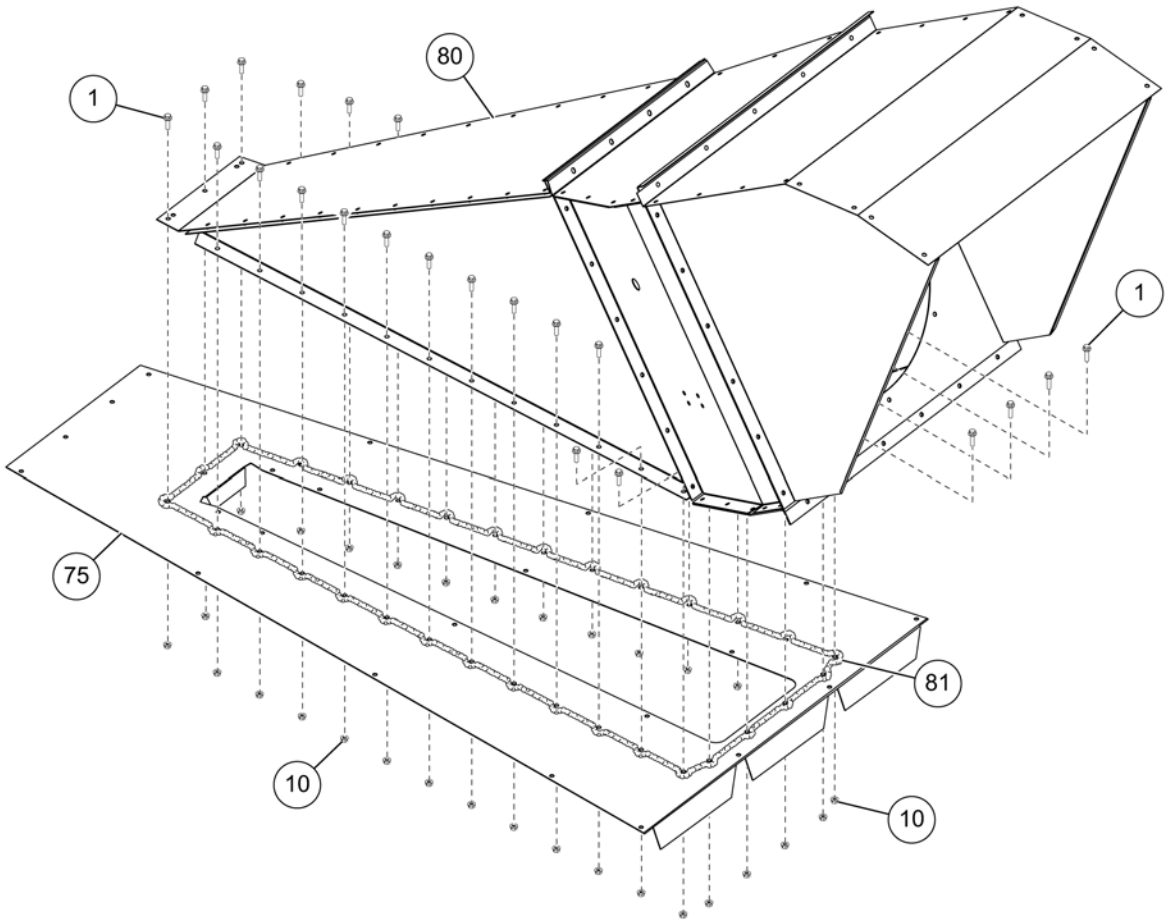
6. After the roof panels (77) are cut appropriately, install the roof panels (77) onto the roof in the desired location.

Assembling the Roof Exhauster

Assembly of the roof exhauster is done prior to installing onto the roof.

1. Apply a strip of tube caulk (81) along the mating surface of the roof exhauster hood (80) and the exhauster mounting plate (75).
2. Position the roof exhauster hood (80) over the exhauster mounting plate (75) and align all the holes.
3. Install 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10) to secure the roof exhauster hood (80) to the exhauster mounting plate (75).

Figure 9-8 *Assembling the roof exhauster hood to the mounting plate*



1	5/16" x 1" flange bolt with sealing washer (S-10260)	80	Roof exhauster hood
10	5/16" flange nut (S-3611)	81	Tube caulk
75	Exhauster mounting plate (CTR-1299)		

Installing the Roof Exhauster Assembly

To install the roof exhauster assembly, it is necessary to replace one of the roof flashing with exhauster flashing.

Before You Begin

IMPORTANT: *Determine the location of the roof exhauster and remove the existing roof flashing panel at this location. Install the peak-to-exhauster ladder kit adjacent to the roof exhauster on the next available rib. The location of the roof exhauster can vary. It should be installed in a location that is free of obstructions, where it does not interfere with any other accessories on the roof.*

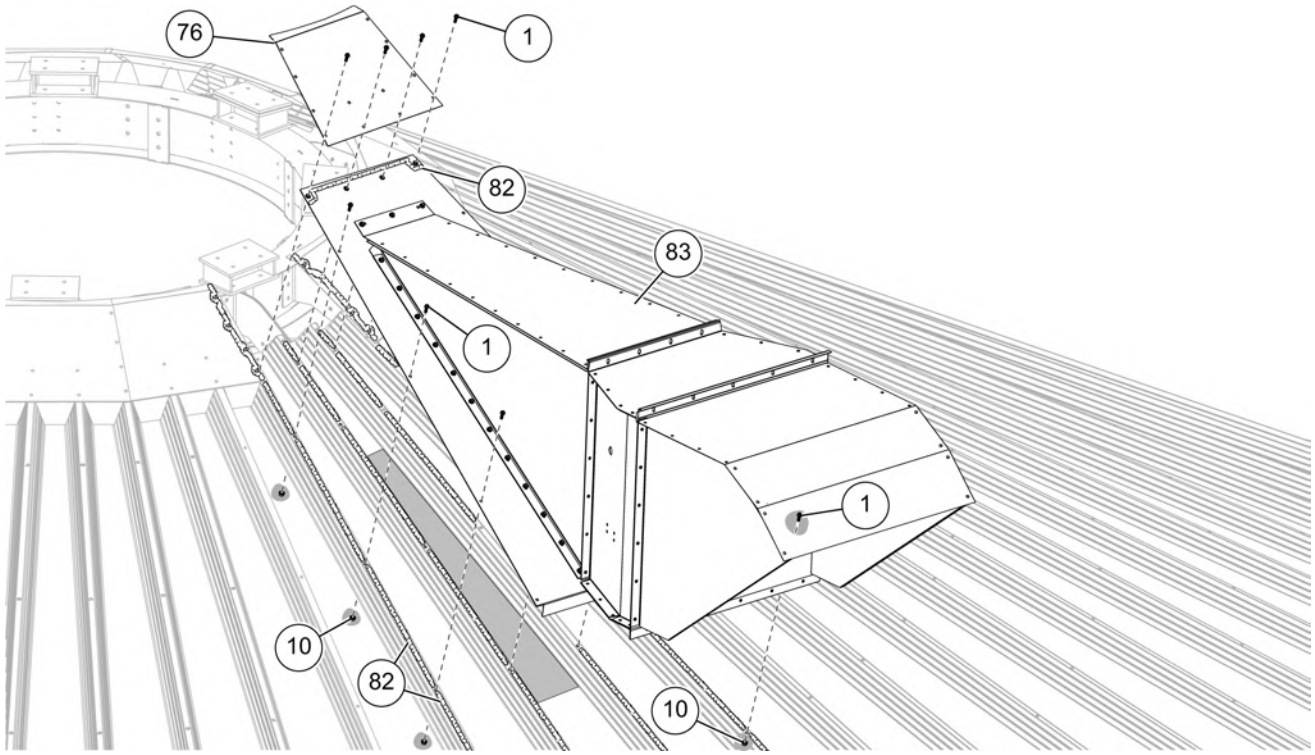
NOTE: *The roof exhauster kit is shipped with additional parts.*

1. Before lifting the roof exhauster into place, apply strips of sealing caulk (82) along the ribs of each roof panel and on each roof flashing (76) as shown.
2. Use an appropriate lifting device and qualified personnel to hoist the roof exhauster assembly (83) into place.
3. Install 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10), securing the roof exhauster assembly (83) to the roof panel.

   NOTE: *Do not tighten flange bolts (1) until all components have been installed.*
4. Apply a strip of sealing caulk (82) along the mating surface of the roof exhauster assembly (83) and roof exhauster flashing (76).

   NOTE: *Roof exhauster flashing (76) must be bolted onto the top surface of the exhauster mounting plate.*
5. Install 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10), securing the roof exhauster flashing (76) to the roof exhauster assembly (83) and adjacent flashing (76).
6. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

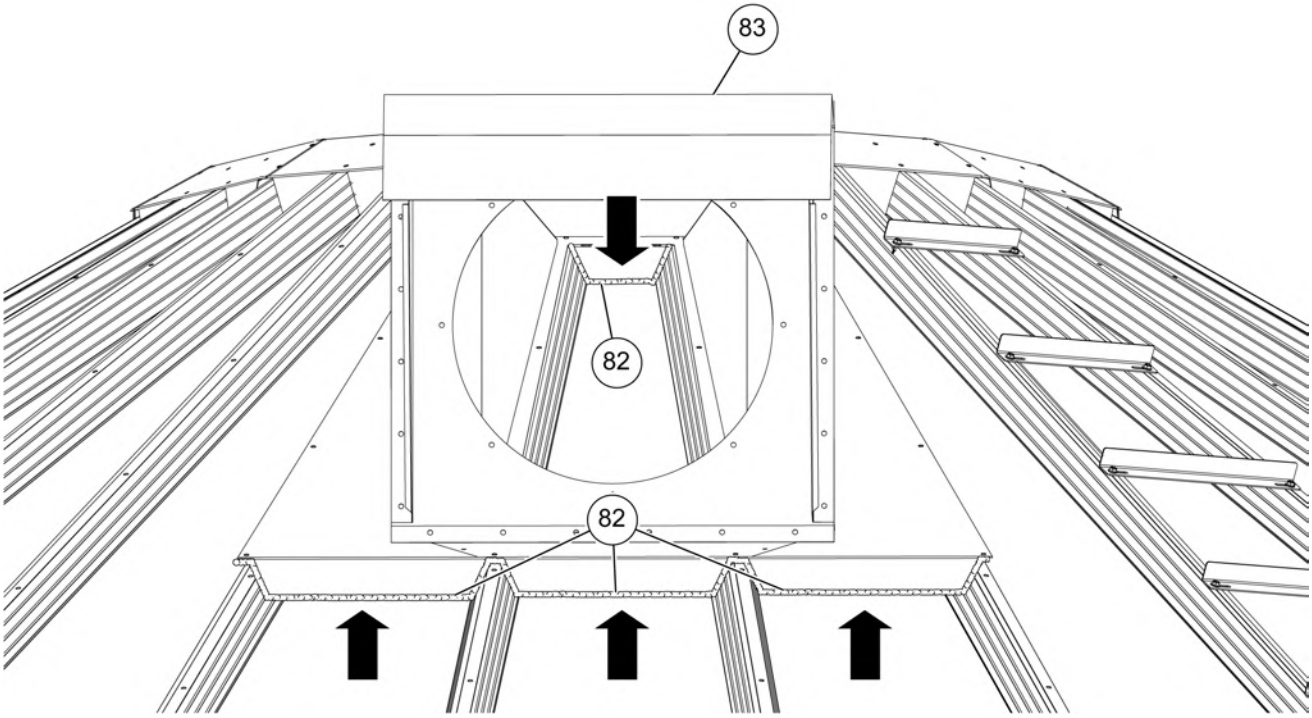
Figure 9-9 *Installing the roof exhauster assembly*



1	5/16" x 1" flange bolt with sealing washer (S-10260)	82	Sealing caulk
10	5/16" flange nut (S-3611)	83	Roof exhauster assembly
76	Roof exhauster flashing (CTR-1735)		

7. When the roof exhauster assembly (83) is installed, apply sealing caulk (82) as shown by arrows, sealing the roof exhauster assembly (83) to the roof.

Figure 9-10 *Sealing caulk location*



82	Sealing caulk	83	Roof exhauster assembly

Installing the Manway Cover

Installation of a manway cover is necessary if a manway hole is present.

Round manway cover details for bins

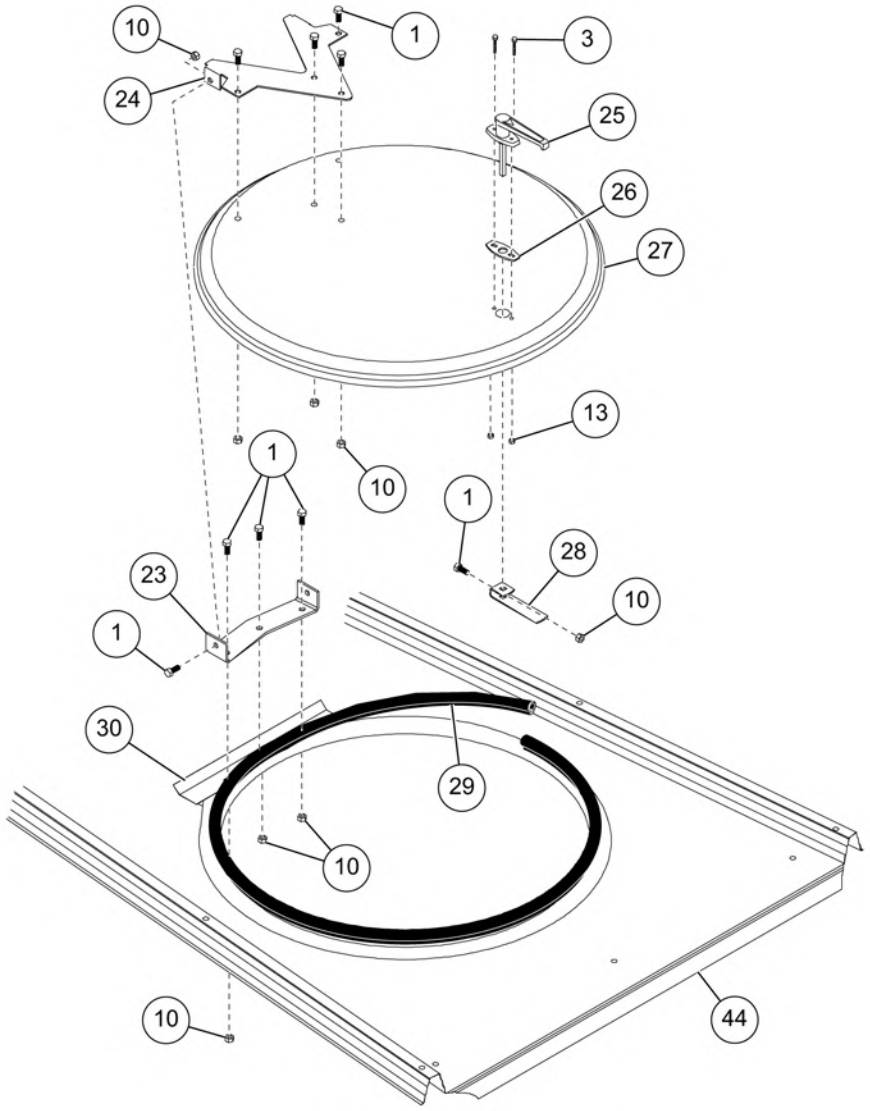
1. Apply caulking to the underside of the moisture diverter (30). Install the moisture diverter (30) along with the hinge base (23) to the manway roof panel (44) using three 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10).
2. Install the handle (25) along with the gasket (26) to the manway cover (27) using two #10-24 x 5/8" long bolts (3) and #10-24 lock nuts (13).
3. Attach the latch (28) to the handle (25) using a 5/16" x 1" flange bolt (1) and 5/16" flange nut (10).
4. Attach the hinge leaf (24) to the manway cover (27) using four 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10).
5. Align the hinge leaf (24) in the manway cover assembly with the hinge base (23) and install using two 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10).

   NOTE: *When installing the hinge leaf (24) to the hinge base (23), double nut each 5/16" x 1" flange bolt (1).*
6. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.
7. After installing the manway cover assembly, check that the suffocation/flighting and entrapment hazard decals (not shown) are present on the underside of the manway cover (27). If not, contact GSI for the decals and install to the underside of the manway cover (27).

   NOTE: *Suffocation/flighting and entrapment hazard decals replacement part numbers:*

   - *DC-GBC-1A (English)*
   - *DC-GBC-1S (Spanish)*
   - *DC-2483 (English)*
   - *DC-2483-ES (Spanish)*
8. Snap the manway seal strip (29) onto the lip of the manway hole.
9. Make the necessary adjustments to the handle (25) and latch (28), creating a tight seal.

Figure 9-11 *Installing the manway cover*



1	5/16" x 1" flange bolt with sealing washer (S-10260)	26	Handle gasket (CRP-5003)
3	#10-24 x 5/8" long bolt (S-2009)	27	Manway cover (ACD-4504)
10	5/16" flange nut (S-3611)	28	Latch (ACD-4514)
13	#10-24 lock nut (S-2010)	29	Manway seal strip (CRP-4998)
23	Hinge base (ACD-4506)	30	Moisture diverter (CRP-4999)
24	Hinge leaf (ACD-4505)	44	Manway roof panel (CTR-0760)
25	Handle (ACD-4513)		

Assembling the Inside Ladder

The inside ladder package consists of the ladder, starter brackets, standoff brackets, reinforcement straps and bottom bracket. The ladder should be assembled before installing it to the bin structure.

What You Should Know

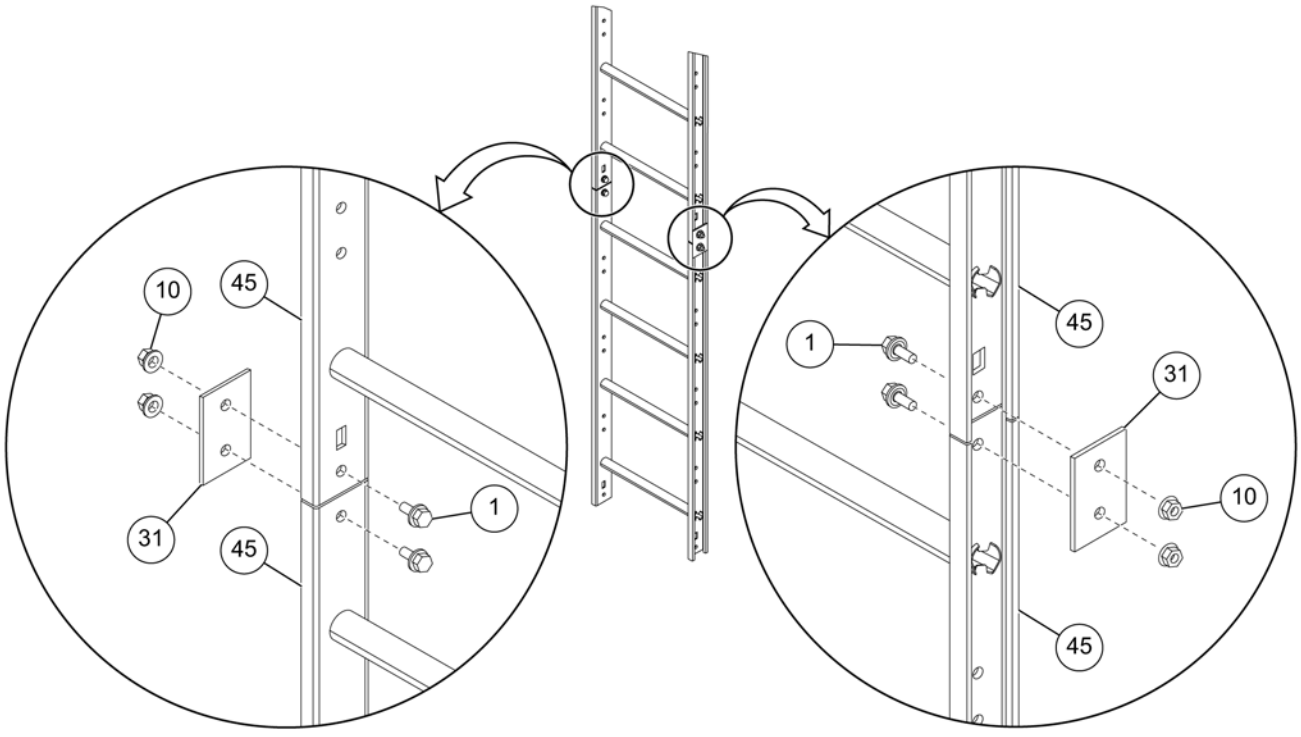
When assembling the ladder sections, ensure all the slip resistant ladder rungs are oriented in the same direction.

NOTE: *A portion of the last ladder section may need to be cut to fit the proper length to the ground or to the intermediate platform.*

1. Place two ladder sections (45) together as shown.
2. Install a splice plate (31) to the outside of each ladder channel using two 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10) per splice (31).

   NOTE: *Install the flange bolts (1) with bolt head on the inside of the ladder channels.*
3. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Figure 9-12 *Assembling the inside ladder sections*



1	5/16" x 1" flange bolt with sealing washer (S-10260)	31	Splice plate (LDR-4317)
10	5/16" flange nut (S-3611)	45	Ladder section

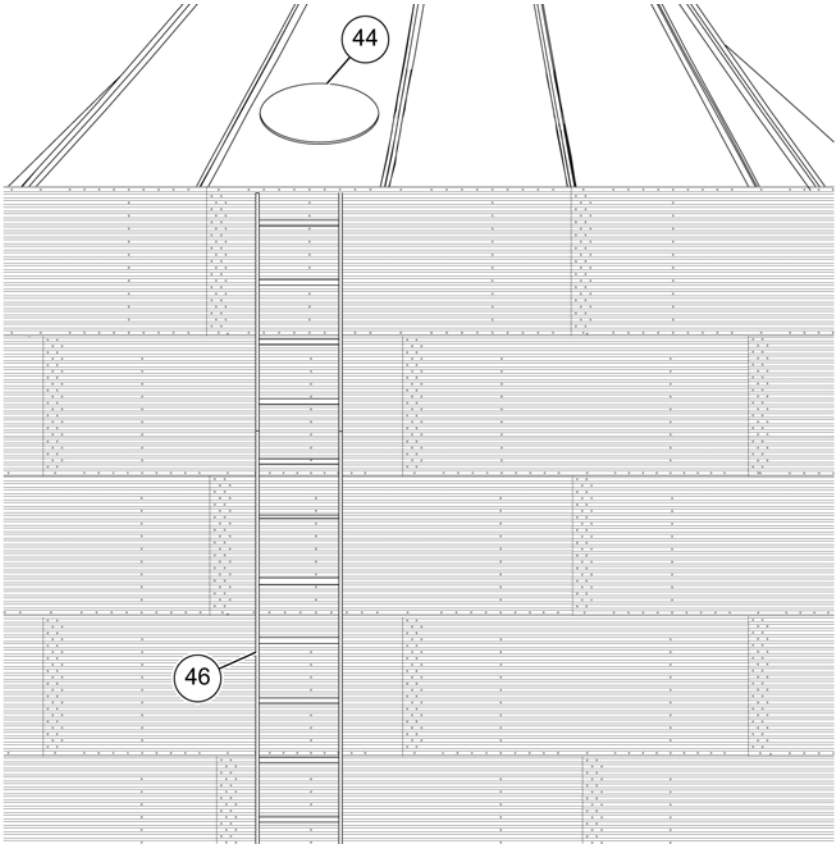
Installing the Inside Ladder

The inside ladder provides manway access from the inside of the bin.

What You Should Know

Begin by temporarily positioning the ladder assembly (46) directly under the manway roof panel for the correct placement location. Mark or scribe the location where each side of the ladder's vertical channels meet the sidewall.

Figure 9-13 *Positioning the inside ladder*



44	Manway roof panel	46	Ladder assembly

1. Install the R.H. starter bracket (32) to the top hole in the first sidewall ring using 5/16" x 1" flange bolt (1) and 5/16" flange nut (10).
2. Measure approximately 18-3/4" to the left of the R.H. starter bracket (32) and install the L.H. starter bracket (35) to the top hole in the first sidewall ring using 5/16" x 1" flange bolt (1) and 5/16" flange nut (10).
3. Temporarily position the ladder (46) back into place, making sure that the mating surface of each starter brackets (32 and 35) are aligned with the inside mating surface of each ladder (46) channels.

4. Field drill 3/8" holes (47) in the sidewall using the bottom hole in each starter brackets (32 and 35) as guides. Install 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10) to the bottom holes. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

5. Working down from the starter brackets (32 and 35) and in vertical alignment, install a ladder standoff bracket (33) at every horizontal seam or 32" from the previously installed bracket. Install a 5/16" x 1" flange bolt (1) and 5/16" flange nut (10), securing each ladder standoff bracket (33) to the sidewall.

   NOTE: *Installing a plumb line to the starter brackets (32 and 35) will help keep each bracket aligned vertically.*

6. Install a ladder reinforcing strap (34) to the ladder standoff brackets (33) using 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10).

   NOTE: *For optimal reinforcement, install the ladder reinforcing straps (34) in a diagonal fashion as shown.*

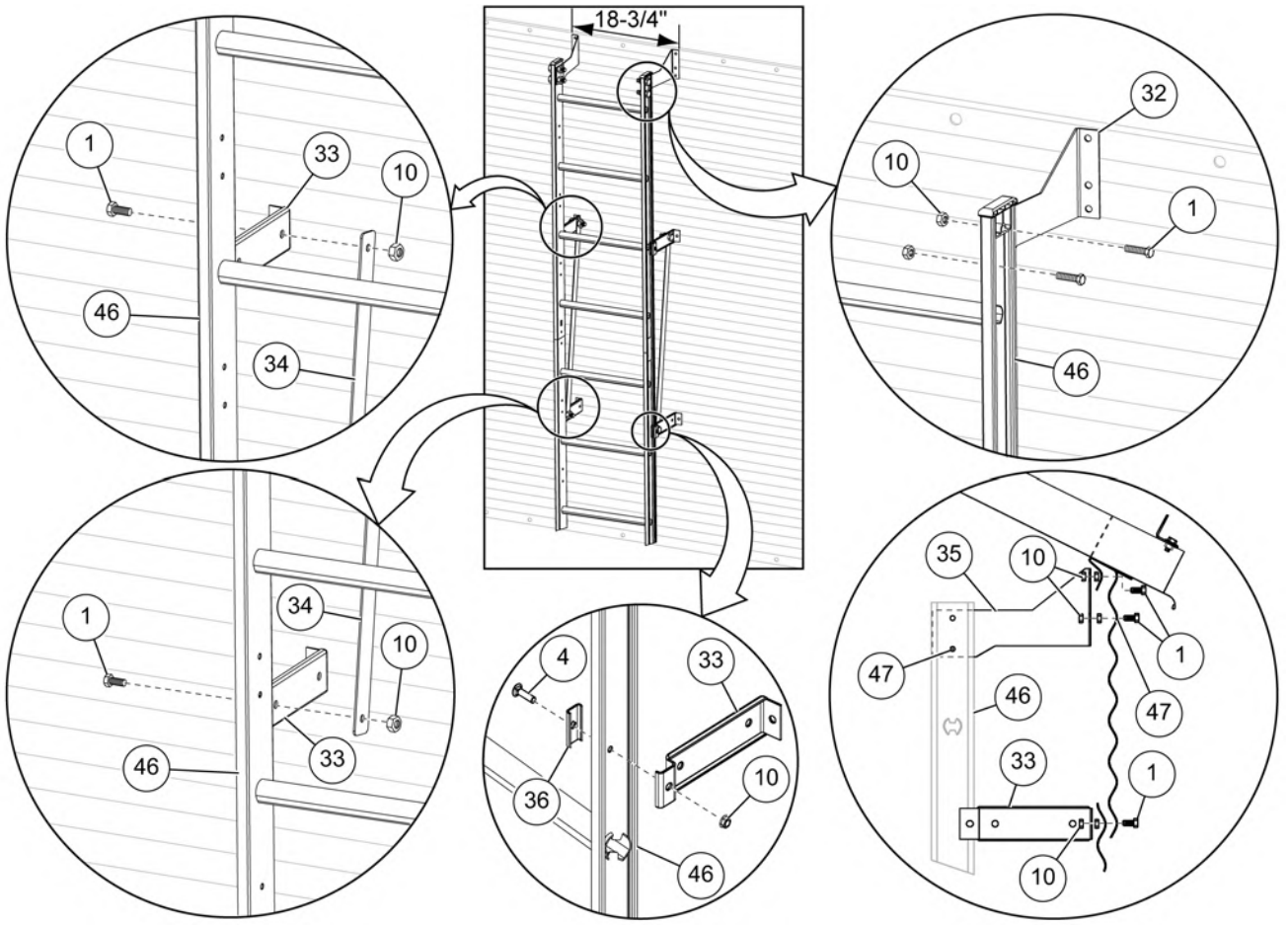
7. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

8. Install the ladder (46) to the starter brackets (32 and 35) using 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10), but do not tighten at this time.

9. Install a 5/16" x 1" carriage bolt (4) to a standoff wedge (36) and insert the standoff wedge (36) into the outside of the ladder (46) channel.

10. Connect the standoff wedge (36) to the standoff bracket (33) by installing a 5/16" flange nut (10), but do not tighten, allowing for adjustment.

Figure 9-14 *Installing the ladder brackets and the inside ladder*



1	5/16" x 1" flange bolt with sealing washer (S-10260)	34	Ladder reinforcing strap (LDR-5143)
4	5/16" x 1" carriage bolt (S-3550)	35	L.H. starter bracket (LDR-4346)
10	5/16" flange nut (S-3611)	36	Standoff wedge (LDR-4198)
32	R.H. starter bracket (LDR-4347)	46	Ladder assembly
33	Standoff bracket (LDR-4314)	47	3/8" field drilled hole location

Repeat this process for the remaining standoff brackets.

11. Field drill 3/8" holes (47) in the ladder (46) channels using the hole in the starter brackets (32 and 35) as guides. Install 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10) to securing the ladder (46) to the starter brackets (32 and 35).

12. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Installing the Inside Ladder Bottom Bracket

The ladder bottom bracket keeps the lower portion of the ladder secure.

What You Should Know

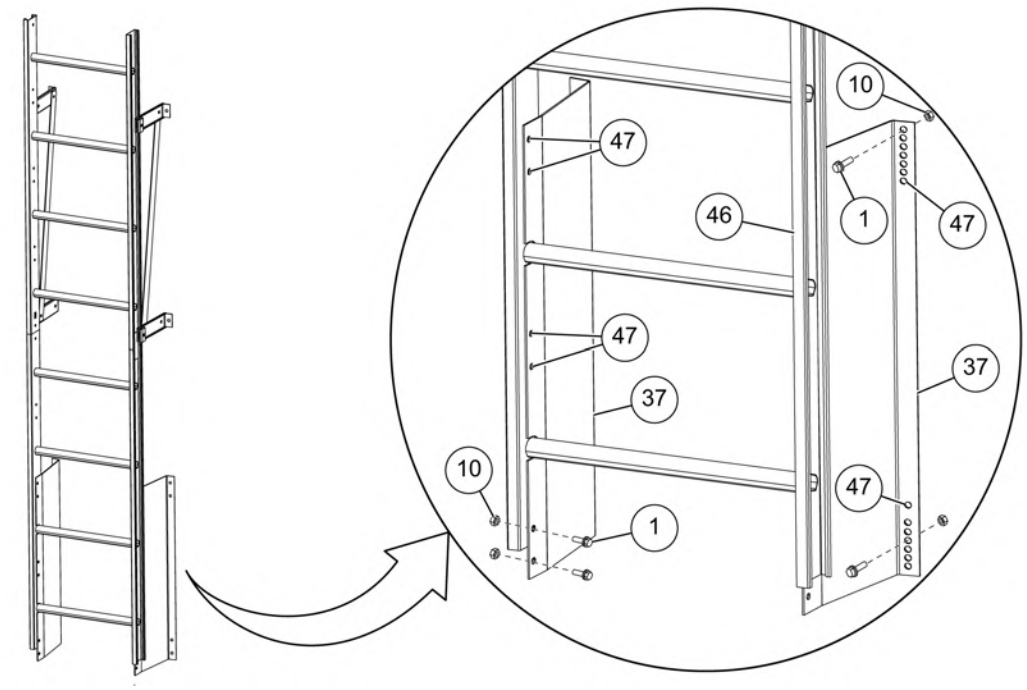
The lower portion of the ladder may need to be cut to fit properly. Field drilling will be required to complete installation.

1. After the ladder is installed, make sure the bottom of the ladder (46) is raised 12" (38.5 cm) from the floor.

   NOTE: *If it is less than 12" (38.5 cm) from the floor, cut the ladder to achieve the distance.*

2. Slide the two notches in the bottom bracket (37) into the last two rungs of the ladder (46).
3. Align the hole in the sidewall with the hole in the bottom bracket (37) and install 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10).
4. Field drill two 3/8" holes (47) as shown and install 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10), securing the bottom bracket (37) to the sidewall.
5. Field drill six 3/8" holes (47) in the ladder (46) channel using the holes in bottom bracket (37) as guides and install 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10), securing the bottom bracket (37) to the ladder (49).
6. Repeat this procedure for the second bottom bracket (37).
7. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Figure 9-15 *Installing the ladder bottom brackets*



1	5/16" x 1" flange bolt with sealing washer (S-10260)	46	Ladder assembly
10	5/16" flange nut (S-3611)	47	3/8" field drilled hole location
37	Ladder bottom bracket (LDR-5133)		

Guidelines for Installing a Sidedraw System

A sidedraw system will allow content unloading using gravity and is done from the inside of the bin.

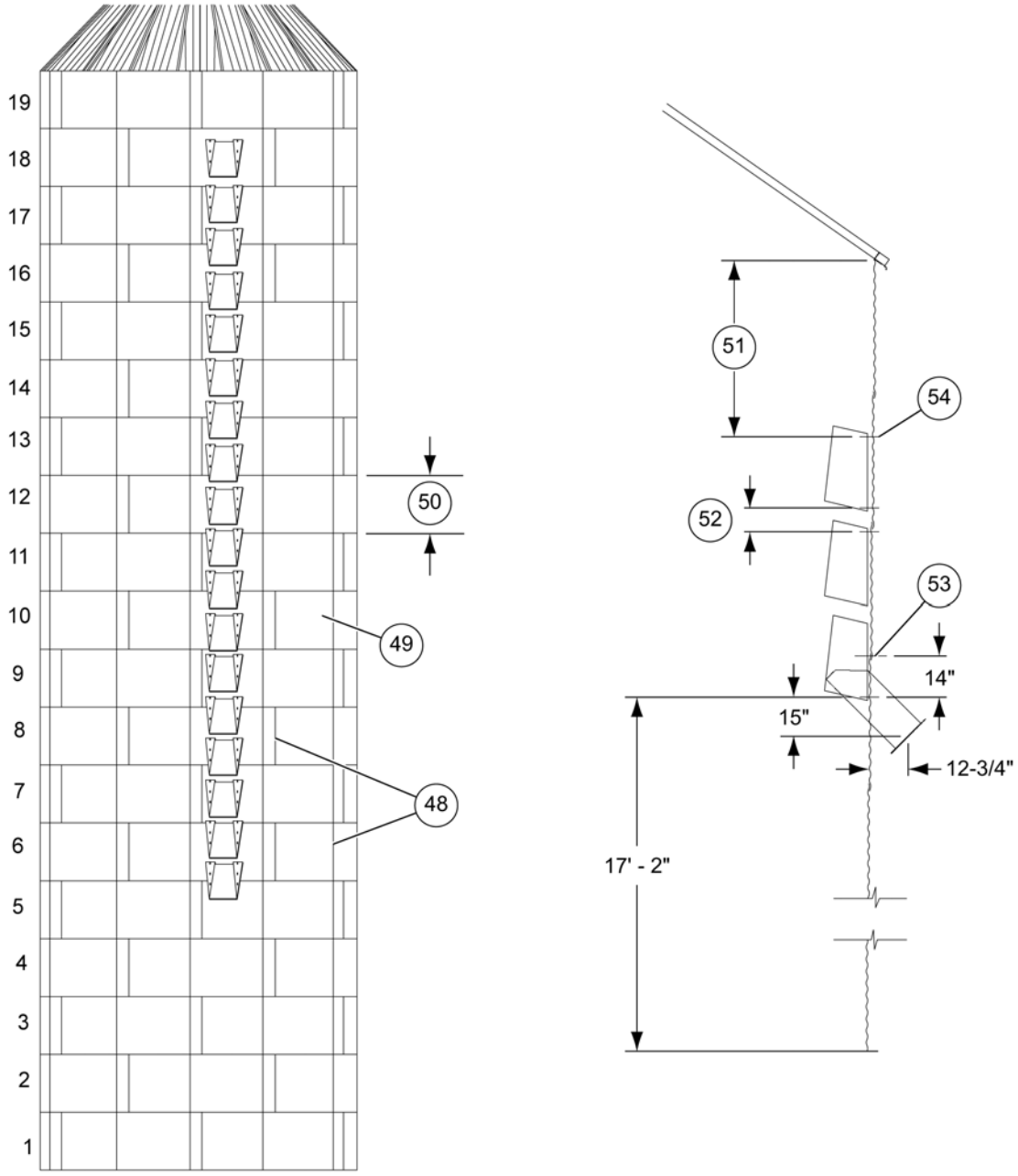
Before You Begin

NOTE: *If a sidedraw system is to be installed, the standard 3/4" anchor bolts must be replaced with 1" anchor bolts.*

General Guidelines to Follow Before Installing a Sidedraw System:

- Side discharge is only permitted in stiffened bins when a GSI manufactured sidedraw flume system has been installed. No corrugated steel bin must be unloaded through the sidewall without installation of such a system and permission of the manufacturer.
- A sidedraw should not be the only discharge system available. A standard center discharge and conveyor must be installed.
- Installation of multiple systems may require additional wind rings and must be placed a minimum of 90° apart. Installation of multiple systems requires approval of GSI.
- Sidedraw systems are intended for use with dry, flowable grain. Sidedraws are not to be used for poorly flowing products. This is not unique to GSI bins and flume systems, but is a general rule for such systems.
- In multiple system installations, only one sidedraw may be used at any one time.
- Filling must not be occurring at the same time as the grain is being discharged through the sidedraw flume system.
- Prolonged storage of grain in the sloped condition produced by sidedraw discharge may accelerate differential settlement and result in deformations of the bin. After using the sidedraw system, the sloped grain must be returned to a near level condition by use of the center discharge. Leveling of the grain should also allow more even consolidation of foundation and fill soils and produce more even settlement of the bin.
- If past experience or geotechnical investigations indicate significant foundation level soil variations or a site propensity toward differential settlement, sidedraw usage may be prohibited or severely restricted. In this situation the use of a flume system should be reviewed with geotechnical consultants or the foundation engineer.
- Before installing, determine if the bin design is a two post stiffener (48).
- Do not install a discharge chute on a vertical seam.
- A discharge chute should be installed at the standard height.

Figure 9-16 *Installing the sidedraw*



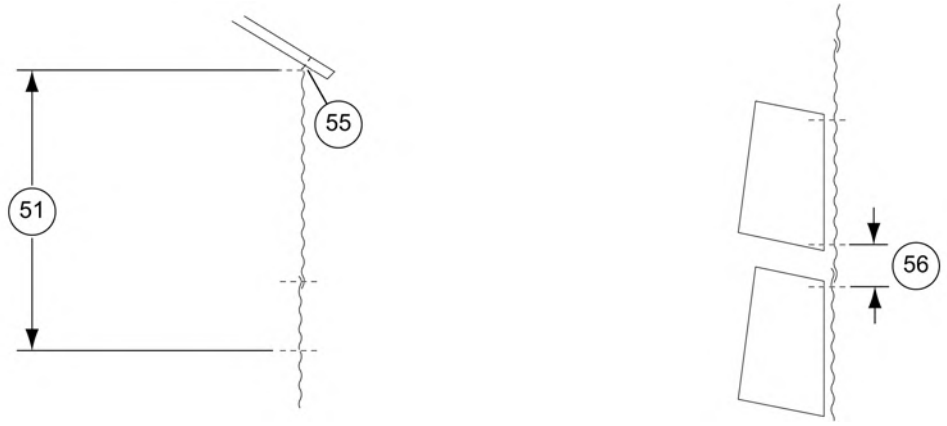
48	Stiffeners	52	Required spacing between chute bolt holes (8")
49	Sidewall sheet	53	5th horizontal seam from base
50	44" typical	54	1st bolt hole in the top chute
51	Starting dimension for first chute		

Locating the Chutes

Use the following procedures to locate the starting position of the first chute.

1. Starting from the top hole in the first sidewall sheet (55), measure down the “starting distance” (51) for the location of the first chute.
2. Keep adding the required number of chutes, making sure to leave 8" between the chute bolt holes (56).

Figure 9-17 *Locating the chutes*



51	Starting dimension for first chute	56	Distance between chute bolt holes
55	First hole on the top sheet		

Table 9-3 *Sidedraw chute installation*

Number of rings	Starting dimension	Number of chutes	Horizontal location for first chute
11	62"	7	Middle of Sheet
12	42"	9	Middle of Sheet
13	54"	10	Middle of Sheet
14	34"	12	Center between Stiffeners
15	46"	13	Center between Stiffeners
16	58"	14	Center between Stiffeners
17	38"	16	Center between Stiffeners
18	50"	17	Center between Stiffeners
19	62"	18	Center between Stiffeners
20	42"	20	Center between Stiffeners
21	54"	21	Center between Stiffeners
22	34"	23	Center between Stiffeners
23	46"	24	Center between Stiffeners
24	59"	25	Center between Stiffeners
25	40"	27	Center between Stiffeners
26	52"	28	Center between Stiffeners
27	32"	30	Center between Stiffeners
28	44"	31	Center between Stiffeners
29	56"	32	Center between Stiffeners
30	36"	34	Center between Stiffeners

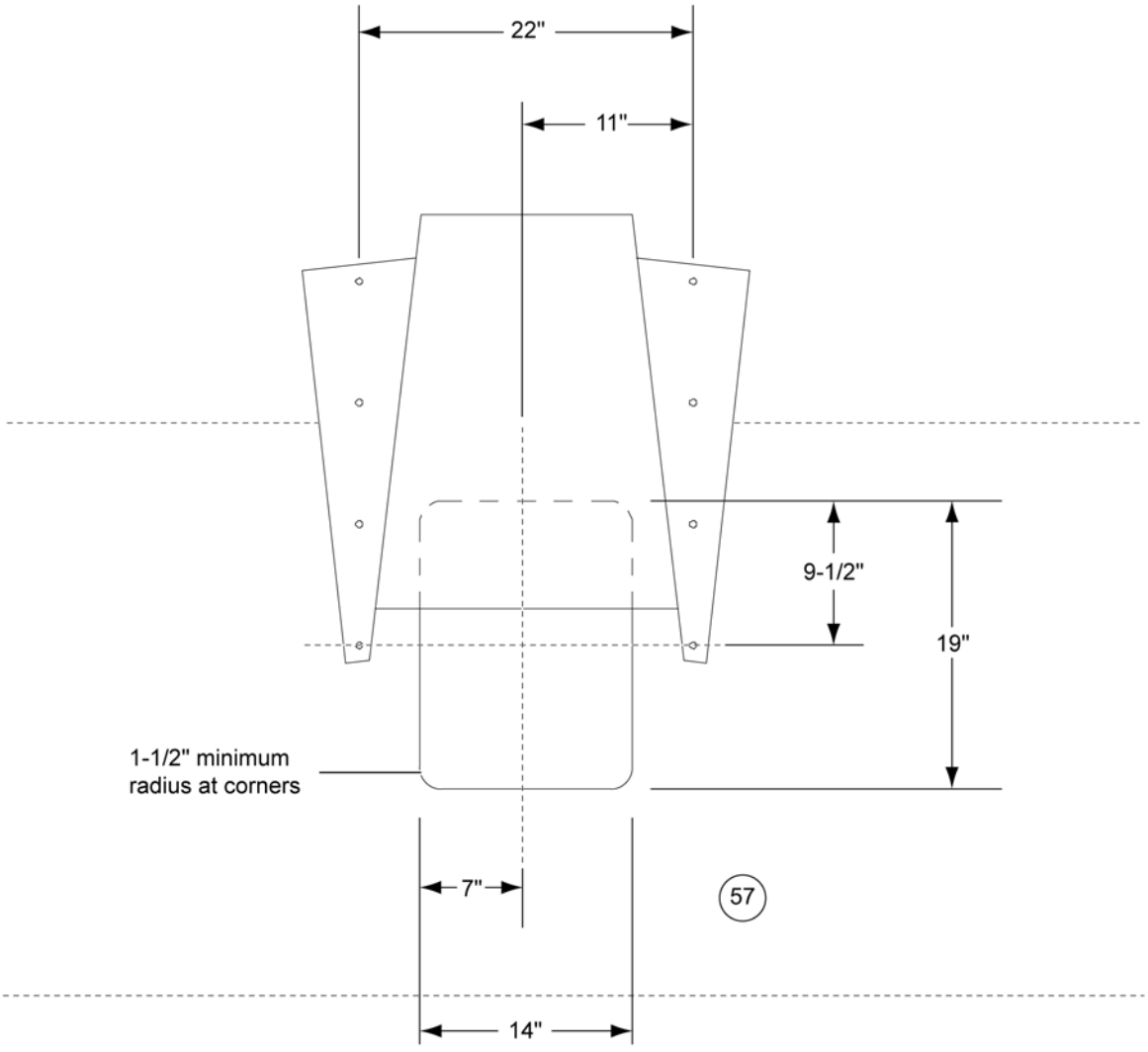
Locating the Discharge Opening

What You Should Know

The last bolt hole in the chute should line up with the center of the discharge opening, that is to be cut. With this last bolt hole as reference, it is possible to approximate an opening.

1. Use the chute bolt hole and mark the horizontal center. Measure approximately 9-1/2" above and below the horizontal center and mark the horizontal cut lines.
2. Mark the vertical center by measuring over 11" from the right or left chute bolt holes. Then from the vertical center, measure approximately 7" on both sides and mark the vertical cut lines.
3. Cut an opening where marked, making sure that corners have a minimum of 1-1/2" radius.

Figure 9-18 *Locating the discharge opening*

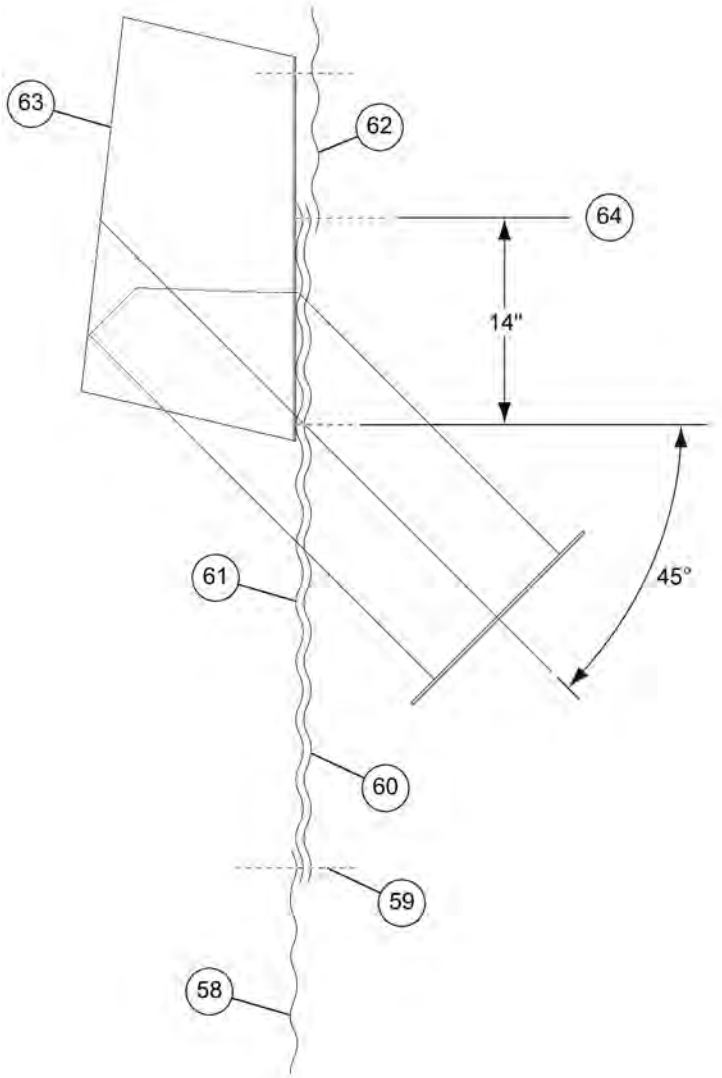


57	5th ring sidewall sheet from the base

Sidewall Overlap for Sidedraw Weldment

For proper watershed, make sure that the upper side sheet (62) overlaps on top of the sidedraw weldment plate (60).

Figure 9-19 *Sidewall overlap*

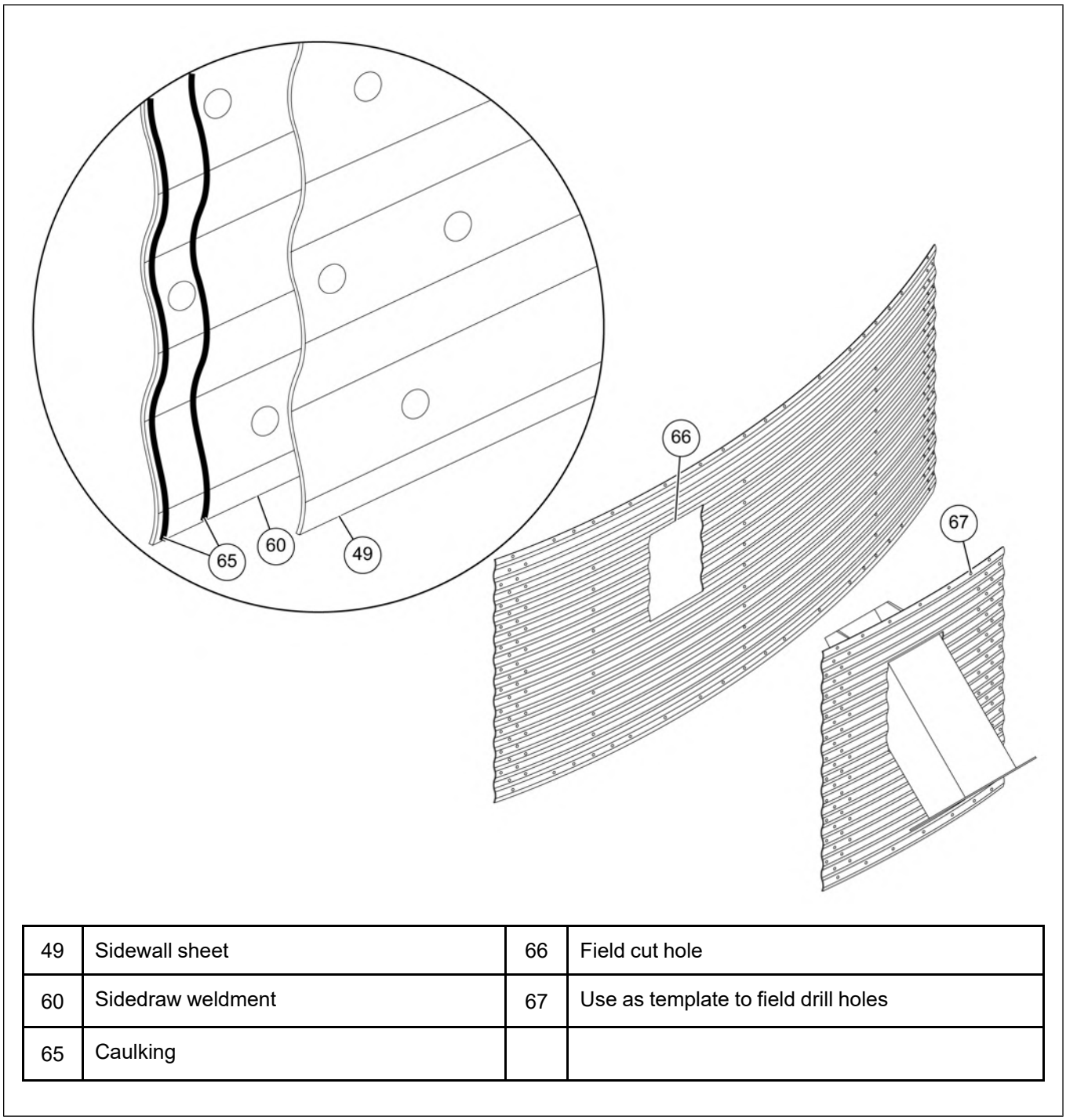


58	4th ring from the base	62	6th ring from the base
59	4th horizontal seam from the base	63	Chute
60	Sidedraw weldment plate	64	Top of 5th sidewall sheet
61	5th ring sidewall sheet (must be field cut)		

Caulking for the Sidedraw Weldment

1. To seal the sidedraw weldment (60) to the sidewall sheets (49), use one strip of caulking (65) on each side of the outer row of bolts.
2. Use the discharge tube weldment as a template to field drill the bolt holes (67) in the sidewall sheet (49).
3. Use 3/8" bolts and nuts provided to assemble the sidedraw weldment (60) with the sidewall sheet (49).

Figure 9-20 *Caulking for the sidedraw weldment*



49	Sidewall sheet	66	Field cut hole
60	Sidedraw weldment	67	Use as template to field drill holes
65	Caulking		

Wind Ring Quantities

Refer to the table below for the standard and sidedraw wind ring quantities based on ring height.

Table 9-4 *Standard and sidedraw wind ring quantities*

Rings/Diameter	2-Post		3-Post	
	Standard wind ring quantities	Sidedraw wind ring quantities	Standard wind ring quantities	Sidedraw wind ring quantities
	60'	60'	60'	60'
11	0	3	0	3
12	1	3	1	3
13	1	3	1	3
14	2	3	1	3
15	3	3	1	3
16	3	3	1	3
17	3	3	1	3
18	3	3	1	3
19	3	3	2	3
20	4	3	2	3
21	4	3	3	3
22	5	2	4	2
23	5	2	4	2
24	5	3	4	3
25	7	2	6	2
26	7	2	6	2
27	8	2	7	2
28	-	-	7	2
29	-	-	7	2
30	-	-	7	2

Wind Ring Locations

Refer to the chart for to identify the bin ring location where the wind rings must be installed.

Table 9-5 *Standard and sidedraw wind ring locations*

Rings/Diameter	2-Post		3-Post	
	Standard wind ring locations	Additional wind ring locations for sidedraw	Standard wind ring locations	Additional wind ring locations for sidedraw
	60'	60'	60'	60'
11	0	2,4,6	0	2,3,5
12	2	3,5,6	2	3,4,6
13	2	3,5,6	2	3,4,6
14	2,4	3,6,8	2	3,4,6
15	2,4,6	3,5,7	2	3,4,6
16	2,4,6	3,5,7	2	3,4,6
17	2,4,6	3,5,7	2	3,4,6
18	2,4,6	3,5,7	2	3,4,6
19	2,4,6	3,5,7	2,4	3,5,7
20	2,4,6,8	3,5,7	2,4	3,5,7
21	2,4,6,8	3,5,7	2,4,6	3,5,7
22	2,4,6,8,10	3,5	2,4,6,8	3,5
23	2,4,6,8,10	3,5	2,4,6,8	3,5
24	2,4,6,8,10	3,5,7	2,4,6,8	3,5,7
25	2,4,6,8,10,12,14	3,5	2,4,6,8,10,12	3,5
26	2,4,6,8,10,12,14	3,5	2,4,6,8,10,12	3,5
27	2,4,6,8,10,12,14,16	3,5	2,4,6,8,10,12,14	3,5
28	-	-	2,4,6,8,10,12,14	3,5
29	-	-	2,4,6,8,10,12,14	3,5
30	-	-	2,4,6,8,10,12,14	3,5

Installing the Wind Rings

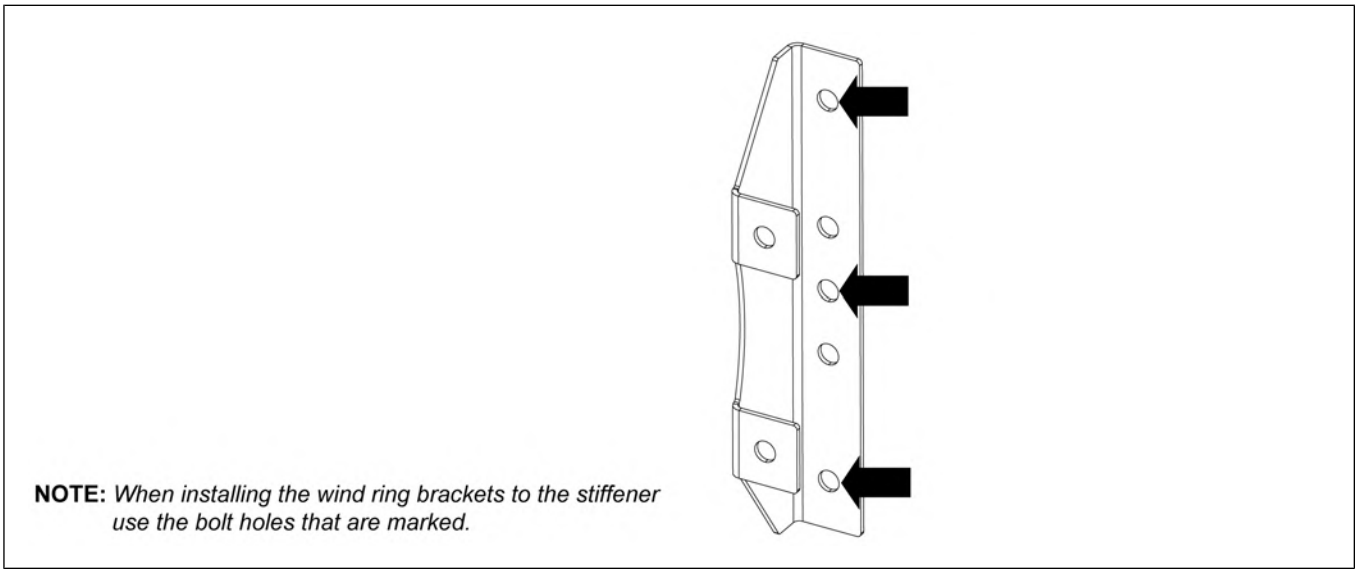
What You Should Know

Before installing, determine the bin size, sidewall gauge thickness and height. Use the hardware chart to match the correct bolt length with the correct sidewall gauge thickness when installing the wind ring brackets to the stiffeners. Refer to the gauge sheet to determine the location of the wind rings or if additional wind rings will be needed for the sidedraw systems.

1. Determine the location of wind ring and install a wind ring bracket (38) to each stiffener (48) using flange bolts (68) and flange nuts (69).

   NOTE: *The flange bolt (68) length may vary with sidewall gauge thickness.*

Figure 9-21 *Wind ring bracket information*

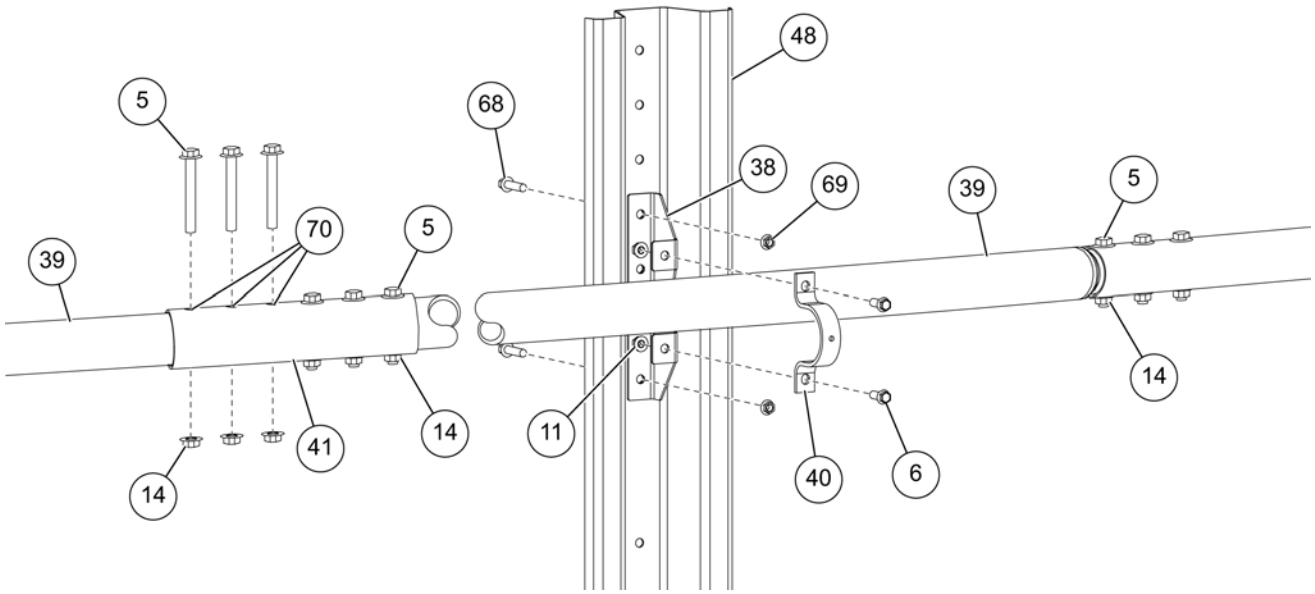


2. Tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.
3. Place a wind ring section (39) onto the wind ring bracket (38) and install using a C-clamp (40), 3/8" x 1" flange bolts (6) and 3/8" flange nuts (11). Do not tighten until all wind ring sections are installed.
4. Repeat this procedure, inserting each wind ring section (39) into the previously installed wind ring section (39). Secure the wind ring sections together using 7/16" x 3-1/4" flange bolts (5) and 7/16" hex nuts (14).
5. Before installing the last wind ring section (39), slide a wind ring coupling collar (41) onto the previously installed wind ring section (39).
6. Install the last wind ring section (39) and cut the wind ring section to the proper length.

   NOTE: *The cut needs to be made in a location that allows minimal space between the pipes.*

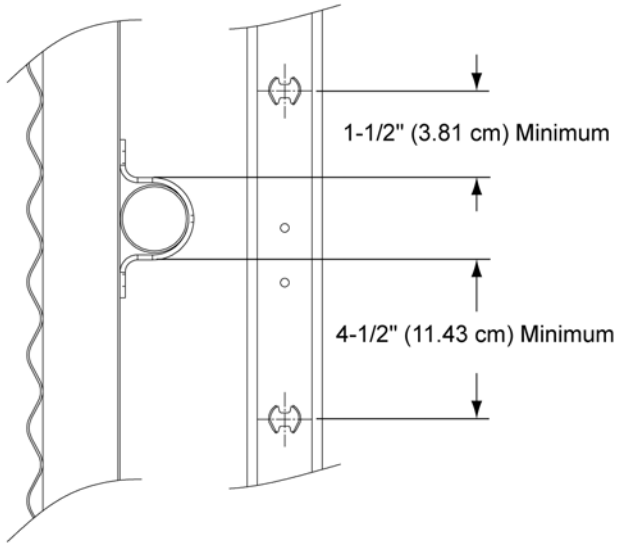
7. Align the three pre-drilled holes in the wind ring coupling collar (41) with the previously installed wind ring section (39) and install 7/16" x 3-1/4" flange bolts (5) and 7/16" hex nuts (14). Field drill the remaining three holes in the last wind ring section (39) using the wind ring coupling collar (41) as a guide.
8. Install the remaining 7/16" x 3-1/4" flange bolts (5) and 7/16" hex nuts (14) and tighten all the hardware to the recommended torque specifications. See *Bolt Torque Specifications, page 26*.

Figure 9-22 *Installing the wind rings to the upper portion of the stiffener*



5	7/16" x 3-1/4" flange bolt with sealing washer (S-10261)	40	C-clamp (SS-7248)
6	3/8" x 1" flange bolt (S-7485)	41	Wind ring coupling collar (CTS-1006)
11	3/8" flange nut (S-9426)	48	Stiffener (part number will vary)
14	7/16" hex nut (S-9281)	68	Flange bolt with sealing washer (part number will vary)
38	Wind ring bracket (CTS-1005)	69	Flange nut (part number will vary)
39	Wind ring section (CTS-1004-XX or CTS-1002–XX)[4]	70	Field drilled hole locations

Figure 9-23 *Dimensions for ladder rung placement*



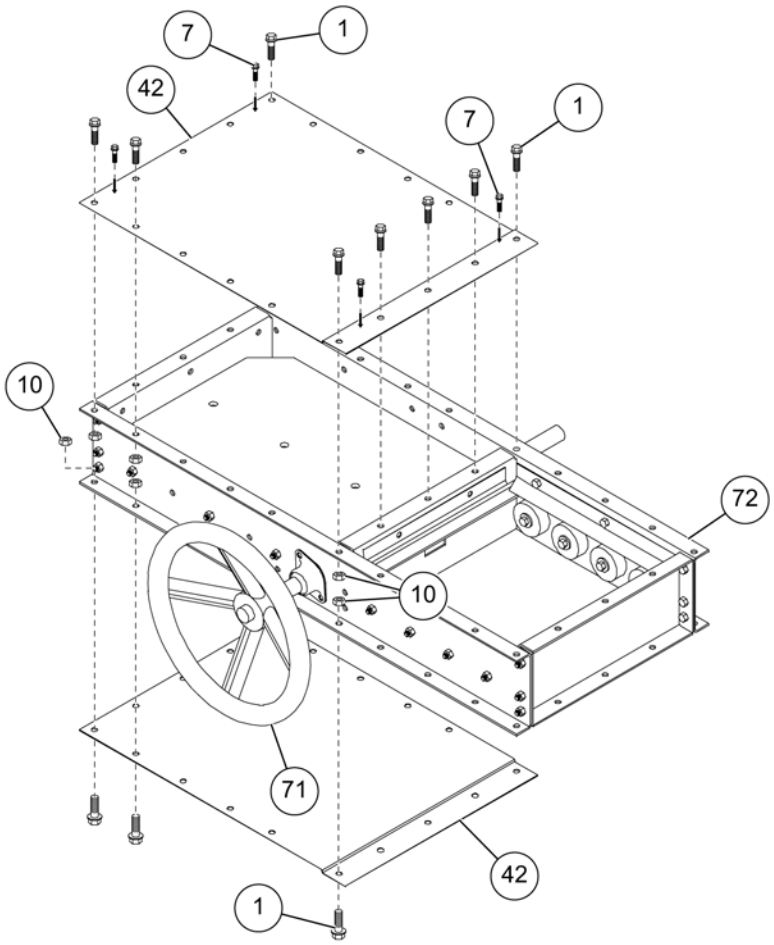
4. (-XX) denotes the bin diameter.

Assembling the Weather Cover for Roller Valve

The following instructions are for assembling the weather cover for the roller valve.

1. Install the weather cover kit after the gate has been installed.
2. Apply strip caulking at all the seams where the weather cover plate (42) attaches to the gate (72).
3. Use 5/16" x 1" flange bolts (1) and 5/16" flange nuts (10) to plug all the unused holes.
4. Use 1/4" self-drilling screws (7) to install the weather cover plate (42) to the gate (72).

Figure 9-24 *Installing the weather cover*



1	5/16" x 1" flange bolt with sealing washer (S-10260)	42	Universal weather cover plate (CHT-1351)
7	1/4" self-drilling screw (S-6497)	71	Chain wheel (typical)
10	5/16" flange nut (S-3611)	72	Gate

Limited Warranty — N.A. Grain Products

The GSI Group, LLC. (“GSI”) warrants products which it manufactures, to be free of defects in materials and workmanship under normal usage and conditions for a period of 12 months from the date of shipment (or, if shipped by vessel, 14 months from the date of arrival at the port of discharge). If, in GSI’s sole judgment, a product is found to have a defect in materials and/or workmanship, GSI will, at its own option and expense, repair or replace the product or refund the purchase price. This Limited Warranty is subject to extension and other terms as set forth below.

Warranty Enhancements: The warranty period for the following products is enhanced as shown below and is in lieu of (and not in addition to) the above stated warranty period. (Warranty Period is from date of shipment.)

	Product	Warranty Period
Storage	Grain Bin Structural Design ▪ Sidewall, roof, doors, platforms and walkarounds ▪ Flooring (when installed using GSI specified floor support system for that floor) ▪ Hopper tanks (BFT, GHT, NCHT, and FCHT)	5 Years
Conditioning	Dryer Structural Design – (Tower, Portable and TopDry) ▪ Includes (frame, portable dryer screens, ladders, access doors and platforms)	5 Years
	All other Dryer parts including: ▪ Electrical (controls, sensors, switches and internal wiring)	2 Years
	All Non-PTO Driven Centrifugal and Axial Fans	3 Years
	Bullseye Controllers	2 Years
Material Handling	Bucket Elevators Structural Design	5 Years
	Towers Structural Design	5 Years
	Catwalks Structural Design	5 Years
	Accessories (stairs, ladders and platforms) Structural Design	5 Years

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This Limited Warranty extends solely to products sold by GSI and does not cover any parts, components or materials used in conjunction with the product, that are not sold by GSI. GSI assumes no responsibility for claims resulting from construction defects, unauthorized modifications, corrosion or other cosmetic issues caused by storage, application or environmental conditions. Modifications to products not specifically delineated in the manual accompanying the product at initial sale will void all warranties. This Limited Warranty shall not extend to products or parts which have been damaged by negligent use, misuse, alteration, accident or which have been improperly/inadequately maintained.

Notice Procedure:
In order to make a valid warranty claim a written notice of the claim must be submitted, using the RMA form, within 60 days of discovery of a warrantable nonconformance. The RMA form is found on the OneGSI portal.

Service Parts:
GSI warrants, subject to all other conditions described in this Warranty, Service Parts which it manufactures for a period of 12 months from the date of purchase unless specified in Enhancements above.

(Limited Warranty - N.A. Grain Products_ revised 01 October 2020)

This equipment shall be installed in accordance with the current installation codes and applicable regulations which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

1004 E. Illinois St.
Assumption, IL 62510-0020
Phone: 1-217-226-4421
Fax: 1-217-226-4420
www.grainsystems.com

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Your Agriculture Company

CN #408156