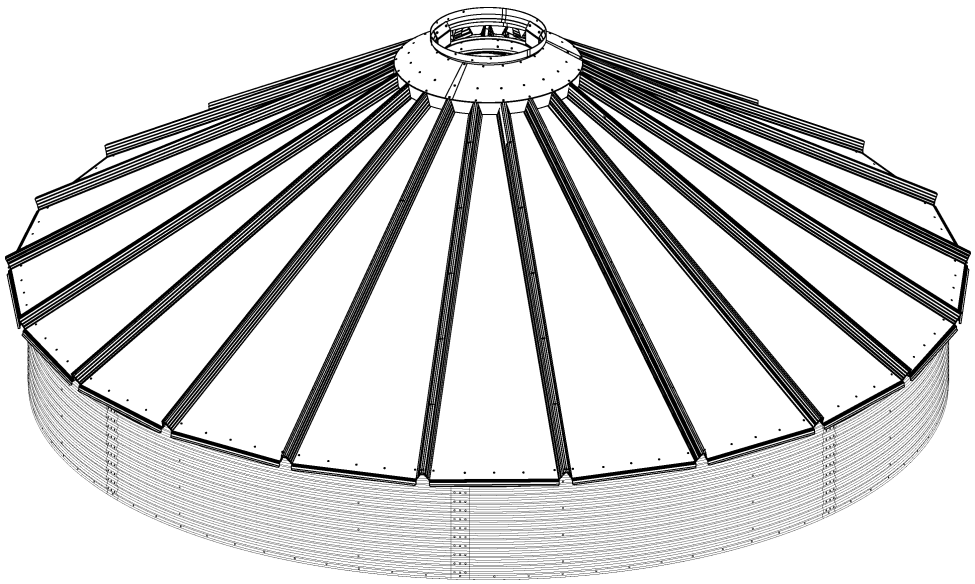


21' Diameter Gamma
Roof Assembly Instructions

Construction Manual

PNEG-2145

Version: 1.**2**

Date: **11-17-20**

PNEG-2145

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

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. Save these safety guidelines for future reference.

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-0001-3

Cautionary Symbols 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.

DANGER — This symbol indicates an imminently hazardous situation which, if not avoided, **will result in serious injury or death.**

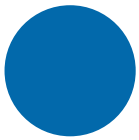
WARNING — This symbol indicates a potentially hazardous situation which, if not avoided, **can result in serious injury or death.**

CAUTION — This symbol indicates a potentially hazardous situation which, if not avoided, **can result in minor or moderate injury.**

NOTICE — 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

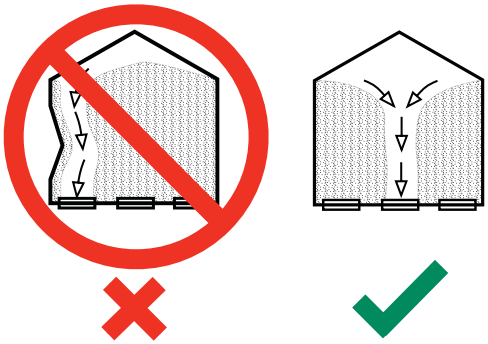
Prevent Roof Damage Due to Vacuum Pressure

- 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.
- Running fans during high humidity or cold weather conditions can cause air exhaust or intake ports to freeze.

ST-0028-2

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

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

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

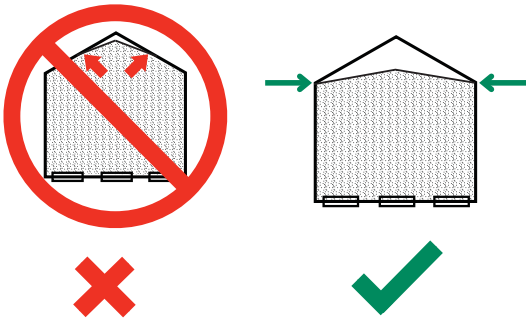
Stay Clear of Hoisted Equipment

- 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-0058-1

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

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.

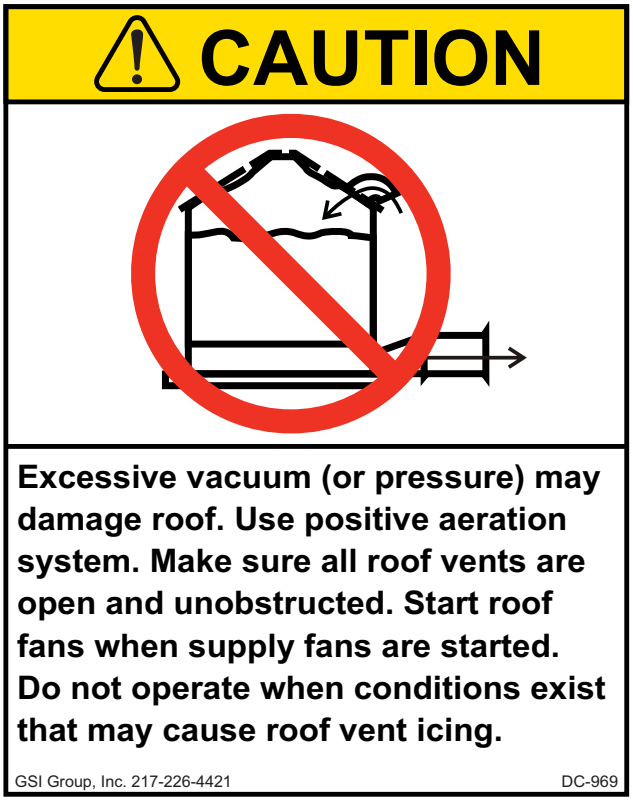
If “white rust” or “wet storage stain” occurs, contact the manufacturer immediately about ways to minimize the adverse effect upon the galvanized coating.

2. 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 of missing decal, contact us to receive a free replacement.

GSI Decals
1004 E. Illinois St.
Assumption, IL. 62510
Phone: 1-217-226-4421

Location	Decal #	Decals	Description
Located next to aeration system.	**DC-969**		**Caution Vacuum Pressure**

Location	Decal #	Decals	Description
On bin door covers	DC-GBC-1A		Danger Keep Clear of Augers
On bin door covers	DC-GBC-2A		Warning Unload Instructions

Bolt Torque Specifications

The specification torque 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 has not been tightened enough.

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

Bolt	Minimum Torque				Minimum Torque			
	Sealing Joints (Joints with Sealing Washers)		Structural Joints (Joints without Sealing Washers)		Sealing Joints (Joints with Sealing Washers)		Structural Joints (Joints without any Sealing Washers)	
	ft./lbs.	N-m	ft./lbs.	N-m	ft./lbs.	N-m	ft./lbs.	N-m
5/16"-18 JS Grade 8 with Seal	20	27	-	-	25	34	-	-
3/8"-16 JS Grade 8 with Seal	30	41	-	-	35	47	-	-
7/16"-14 JS Grade 8 with Seal	50	68	-	-	60	60	-	-
3/8"-16 YDP Grade 8 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

Installing the Roof Rafter Bracket to the Top Outside Stiffener

The roof rafter bracket is the vertical member which supports the rafter. It is installed to the inside perimeter of the sidewall sheet at the same time as the top outside stiffener.

What You Should Know

NOTE: *Do not tighten the nuts (C) until all hardware has been installed attaching the rafter bracket, to the sidewall and the outside stiffener.*

1. From the inside perimeter of the sidewall, place the bolt (B) to attach the rafter bracket (D) to the top outside stiffener (A) through the hole located approximately 4" down from the top of the sidewall sheet (G).

   NOTE: *Install the bolts from the inside to the outside of the bin, passing through the rafter bracket, corrugation spacer, sealing washer, sidewall sheet and outside stiffener and flange nut*.

   NOTE: *Make sure to install the bolts through every second hole from the top of the rafter bracket.*

2. On the inside perimeter, install a sealing washer (F), corrugation spacer (E) and rafter bracket (D).
3. On the outside perimeter, install the outside top ring stiffener (A).
4. Tighten the hardware to the recommended torque specifications. See bolt torque specifications on *Page 14.*

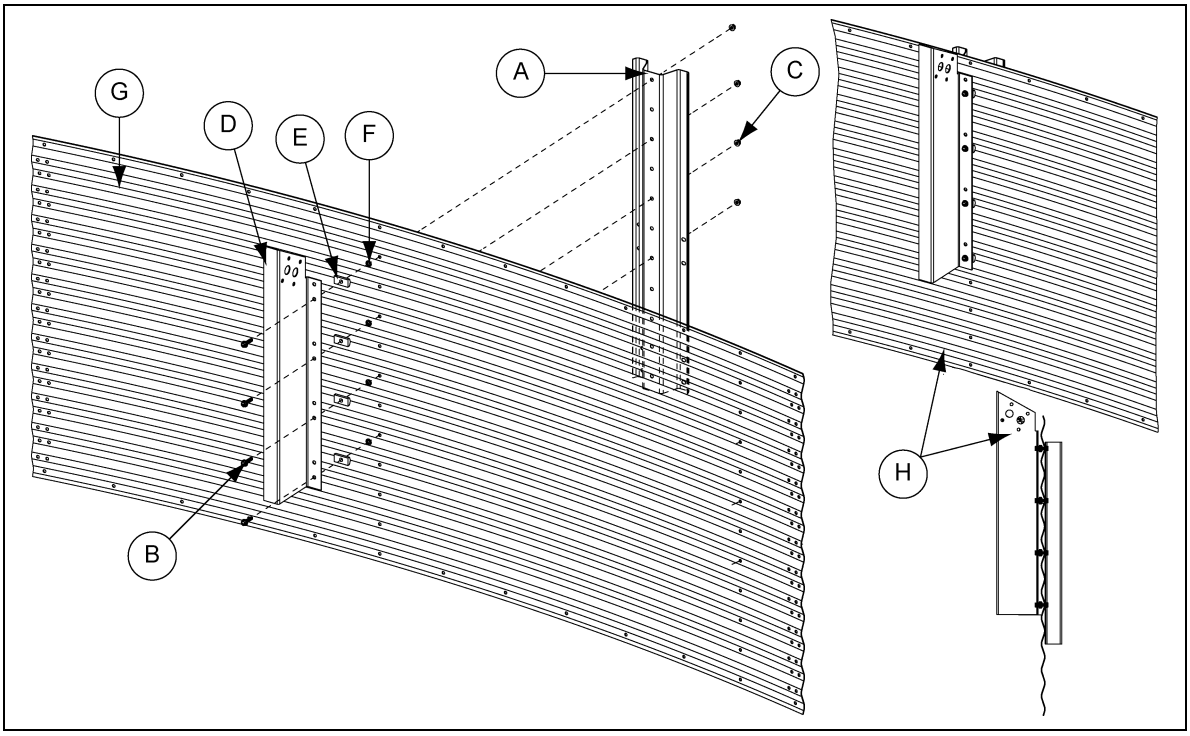


Figure 4A *Installing the Roof Rafter Bracket to the Top Outside Stiffener (FC Stiffened Bins) - 4.00"*

Ref #	Part #	Description
A	FC-42066XX	1 Ring Top Stiffener
B	S-7488	3/8" x 1-1/2" Flange Bolt
C	S-9426	3/8" Nut
D	CTR-1364	Roof Rafter Bracket

Ref #	Part #	Description
E	S-7041	Corrugation Spacer
F	S-3558	Sealing Washer
G		Sidewall Sheet
H		Assembled View

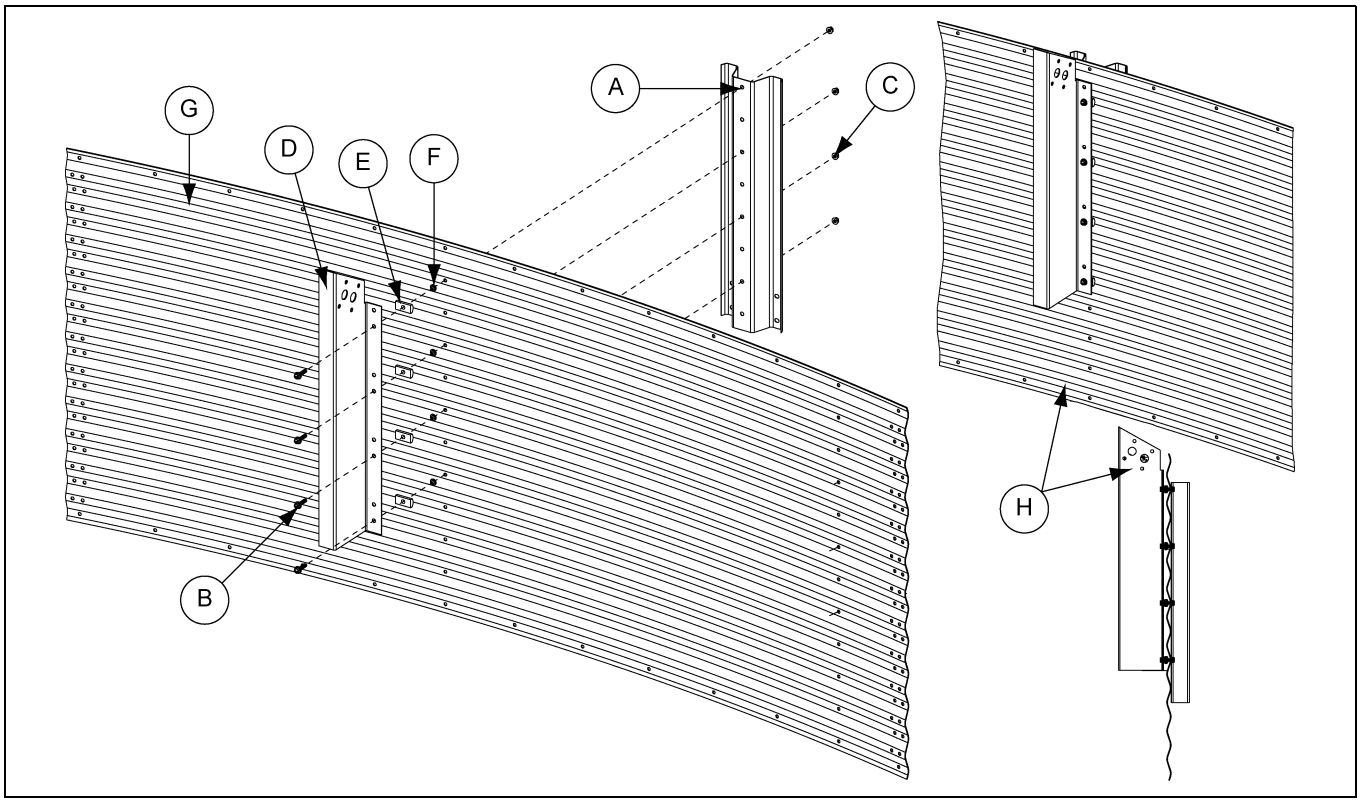


Figure 4B *Installing the Roof Rafter Bracket to the Top Outside Stiffener (40-Series Stiffened Bins) - 4.00"*

Ref #	Part #	Description
A	CTS-2185XX	1 Ring Top Stiffener
B	S-7488	3/8" x 1-1/2" Flange Bolt
C	S-9426	3/8" Nut
D	CTR-1364	Roof Rafter Bracket
E	S-7041	Corrugation Spacer
F	S-3558	Sealing Washer
G		Sidewall Sheet
H		Assembled View

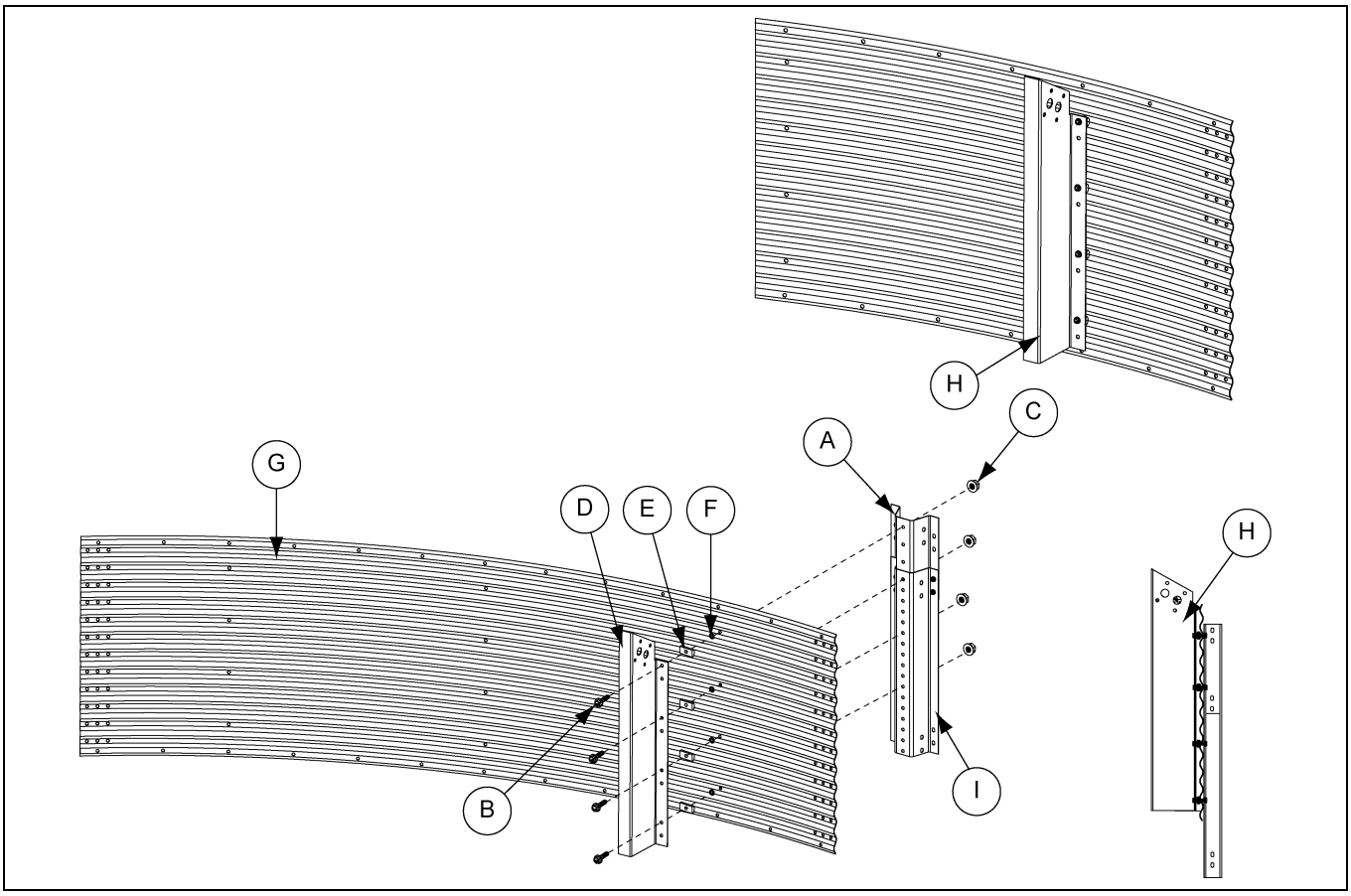


Figure 4C *Installing the Roof Rafter Bracket to the Top Outside Stiffener (Universal Stiffened Bins) - 2.66"*

Ref #	Part #	Description
A	SS-7066XX	1 Ring Top Stiffener
B	S-7488	3/8" x 1-1/2" Flange Bolt
C	S-9426	3/8" Nut
D	CTR-1364	Roof Rafter Bracket
E	S-7041	Corrugation Spacer
F	S-3558	Sealing Washer
G		Sidewall Sheet
H		Assembled View
I	SS-7064XX	1 Ring Offset Stiffener

Installing the Eave Clip and Intermediate Eave Angle to the Sidewall Sheet

The eave clips and intermediate eave angles are installed onto the sidewall sheet to assemble the roof panels.

1. Install the eave clips (B or F) to the sidewall sheet (E) with flange bolts (C) and flange nuts (D).

   NOTE: *Make sure to install the eave clips (B or F) to the inside of the sidewall sheet (E).*

2. Install the intermediate eave angle (A) to the sidewall sheet (E) with flange bolts (C) and flange nuts (D) between the two (2) eave clips (B or F).

   NOTE: *Make sure to install the intermediate eave angle (A) to the outside of the sidewall sheet (E) for 4.00" bins. (See Figure 4D.)*

   NOTE: *Make sure to install the intermediate eave angle (A) to the inside of the sidewall sheet (E) for 2.66" bins. (See Figure 4E on Page 19.)*

3. Repeat the process to continue installing the remaining eave clips (B or F) and intermediate eave angles (A).

4. Tighten the hardware to the recommended torque specifications. See bolt torque specifications on *Page 14.*

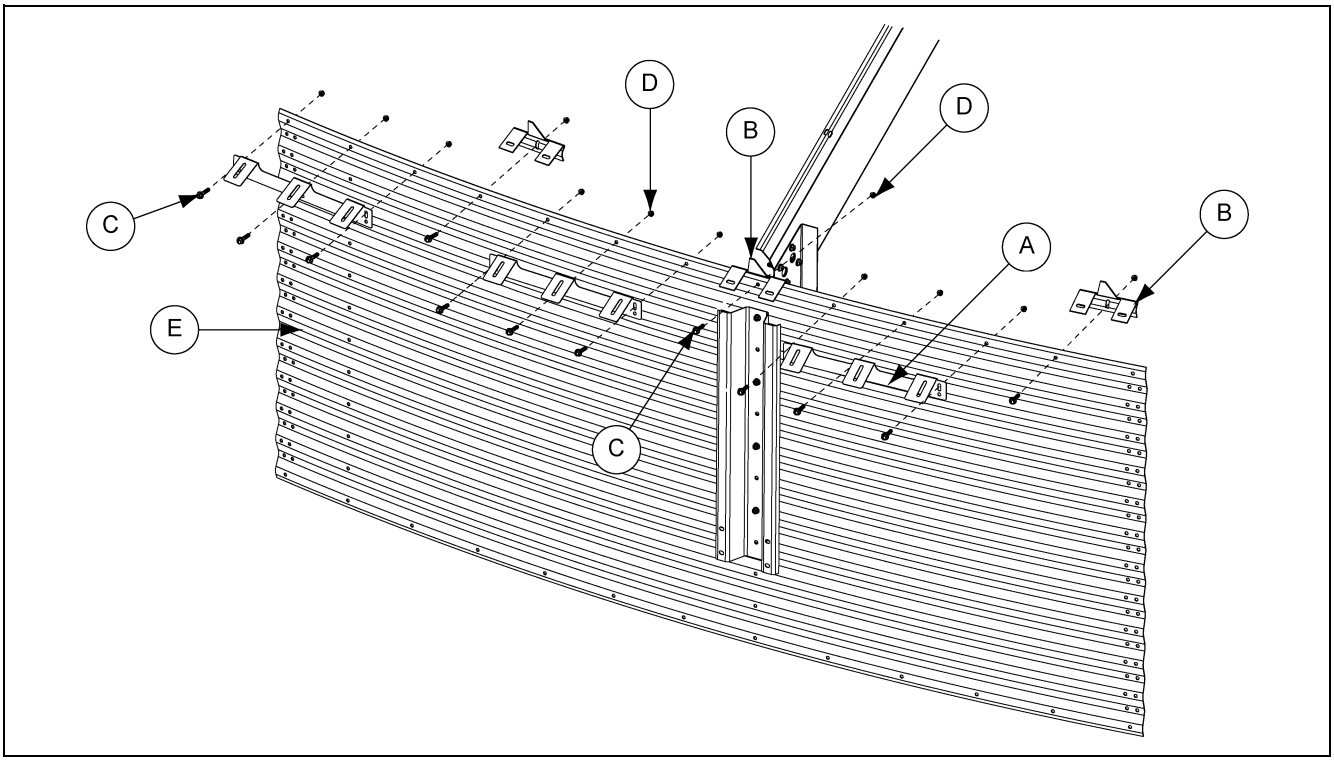


Figure 4D *Installing the Eave Clip and Intermediate Eave Angle to the Sidewall Sheet for 4.00"*

Ref #	Part #	Description
A	CTR-1183	Intermediate Eave Angle
B	CTR-1201	Eave Clip
C	S-10260	5/16" x 1" Flange Bolt

Ref #	Part #	Description
D	S-3611	5/16" Flange Nut
E		Sidewall Sheet

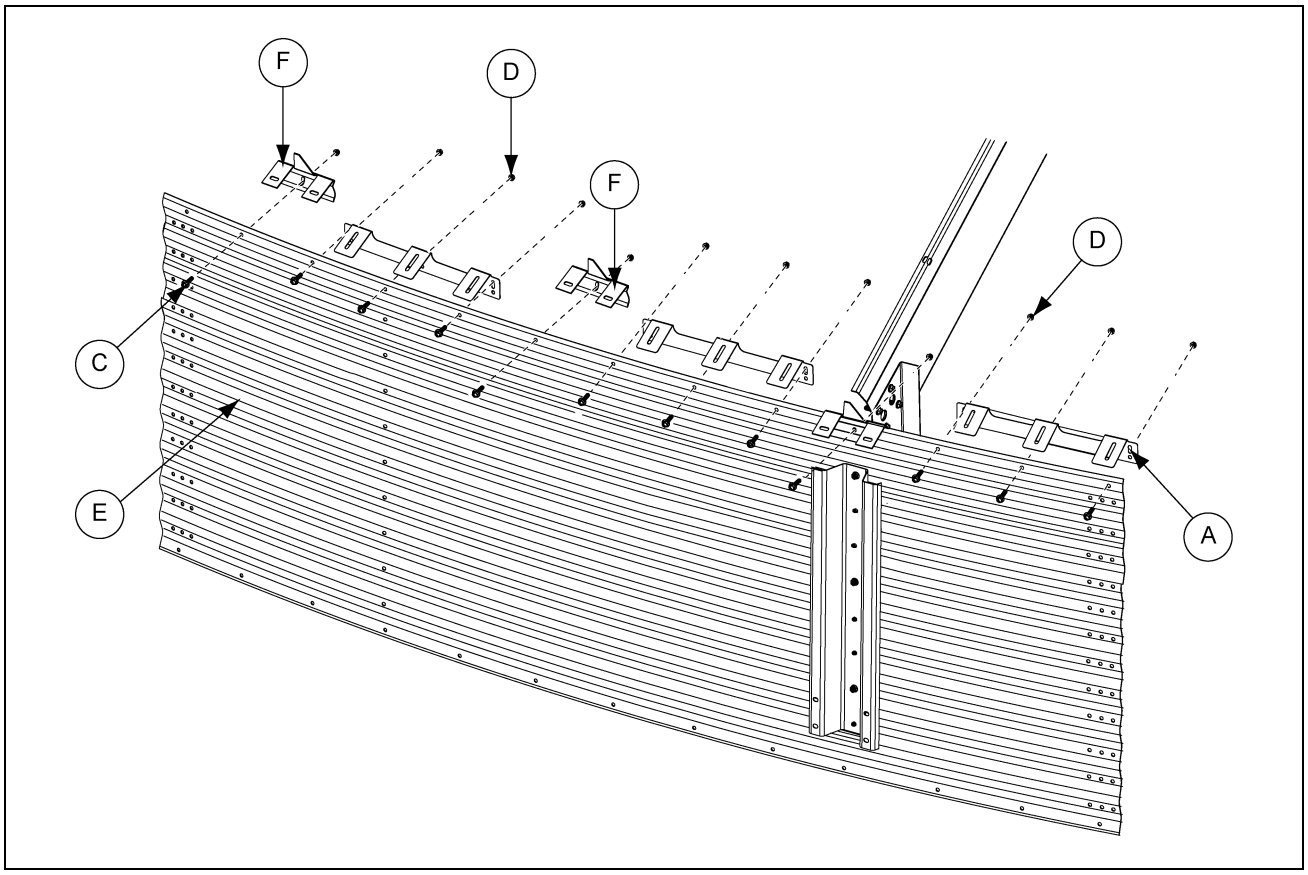


Figure 4E *Installing the Reverse Rolled Eave Clip and Intermediate Eave Angle to the Sidewall Sheet for 2.66"*

Ref #	Part #	Description
A	CTR-1183	Intermediate Eave Angle
C	S-10260	5/16" x 1" Flange Bolt
D	S-3611	5/16" Flange Nut
E		Sidewall Sheet
F	CTR-1198	Reverse Rolled Eave Clip

Attaching the Peak Ring Attach Clips to the Rafter

Peak ring attach clips secure the rafter to the peak ring weldment.

What You Should Know

Each roof rafter receives two (2) peak ring attach clips.

1. Determine the correct orientation of each rafter (A) by identifying the roof panel holes (E) located near the end of each rafter (A).
2. Install peak ring attach clips (B) to both sides of the roof rafter (A).
3. Use flange bolts (C) and flange nuts (D) to secure the peak ring attach clips (B) to the rafter (A). Tighten to the recommended torque specification. See bolt torque specifications on *Page 14.*

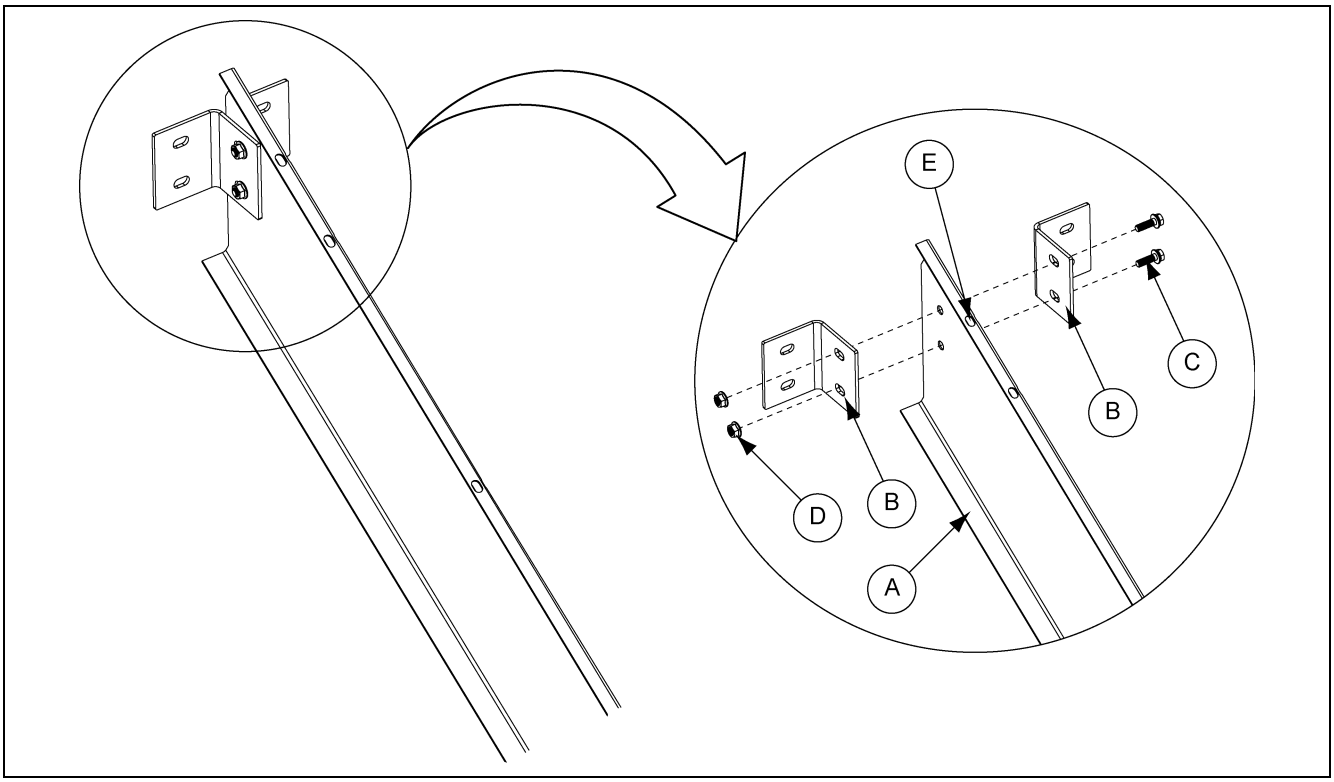


Figure 4F *Exploded View of Peak Ring Attach Clips*

Ref #	Part #	Description
A	CRP-7346	Roof Rafter
B	CRP-6092	Peak Ring Attach Clip
C	S-7487	3/8" x 1" Flange Bolt
D	S-9426	3/8" Flange Nut
E		Roof Panel Hole

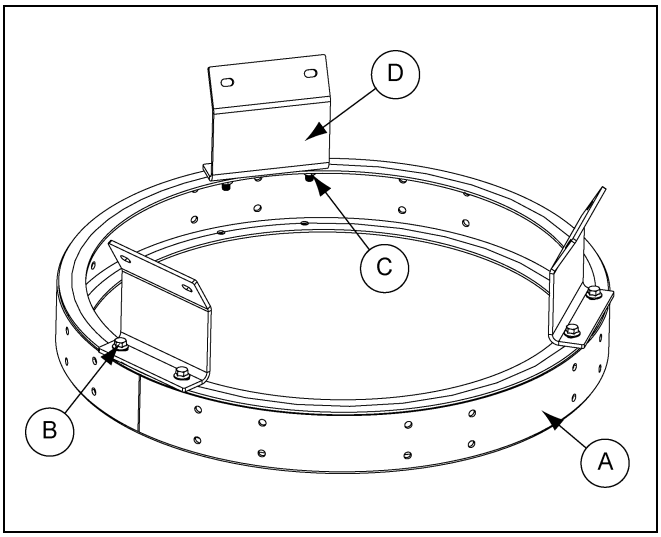
After You Finish

Repeat this process for the remaining roof rafters.

Attaching the Center Collar to Peak Ring Weldment

The center collar assembly is a three (3) piece design and attaches to the peak ring weldment using the Z-collar support clips (D).

1. Position the Z-collar center collar support clips (D) on to the peak ring weldment as shown in *Figure 4G.*
2. Install the flange bolts (B) and flange nuts (C), securing the Z-collar support clips (D) to peak ring weldment (A).

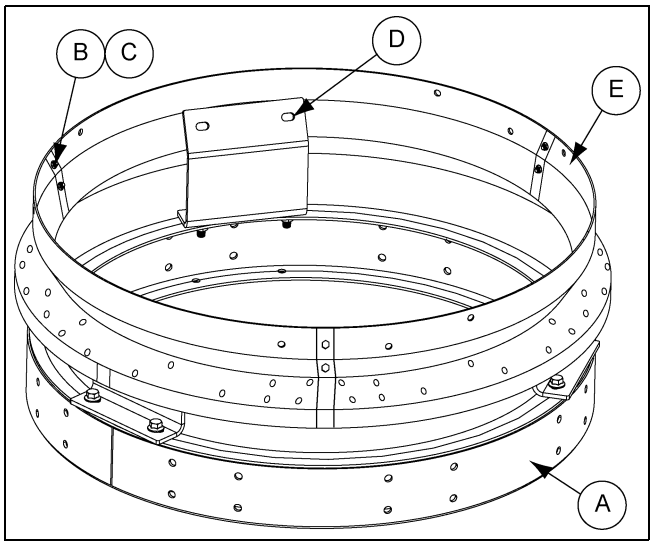


Ref #	Part #	Description
A	CRP-7299	Peak Ring Weldment
B	S-10260	5/16" x 1" Flange Bolt
C	S-3611	5/16" Flange Nut
D	CRP-4900	Z-Collar Support Clip

Figure 4G *Assembling the Z-Collar Support Clips*

3. Place the three (3) center collar (E) pieces over the Z-collar support clips (D) and secure the center collar pieces (E) together using flange bolts (B) and flange nuts (C) as shown in *Figure 4H.*

NOTE: *Make sure center collar (E) is free to move for adjustment on the Z-collar support clips (D) to align with the roof flashing holes.*



Ref #	Part #	Description
A	CRP-7299	Peak Ring Weldment
B	S-10260	5/16" x 1" Flange Bolt
C	S-3611	5/16" Flange Nut
D	CRP-4900	Z-Collar Support Clip
E	CRP-4608	Center Collar

Figure 4H *Attaching the Center Collar to Peak Ring Weldment*

Peak Ring/Center Collar Placement

The *Figure 4I* gives the approximate height needed to install the center collar.

With one sidewall ring in place, position the center collar at the height specified, measuring from the bottom of the center collar to the foundation as shown in *Figure 4I*. 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.*

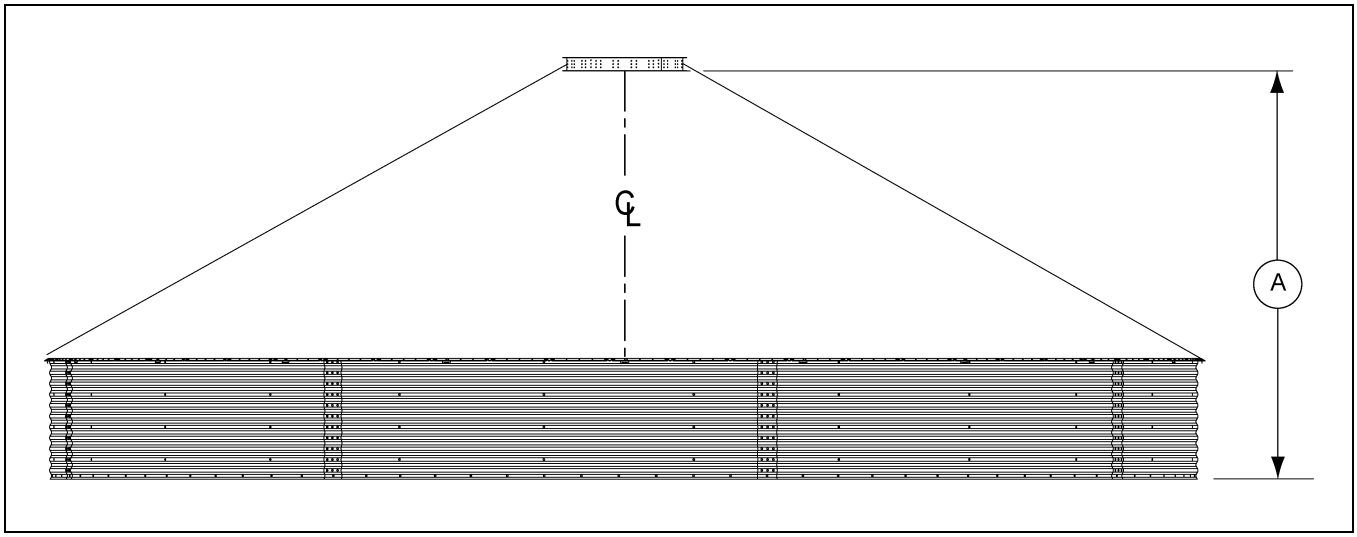


Figure 4I *Center Collar Placement*

Ref #	Description
A	The measurement from the bottom of sidewall sheets to the top of the center collar (CRP-4608).

Bin Diameter	Use with 1 Ring of 2.66" Corrugated Sidewall (A)	Use with 2 Ring of 2.66" Corrugated Sidewall (A)	Use with 1 Ring of 4" Corrugated Sidewall (A)
21'	8'-8" (264.16 cm)	11'-5" (347.98 cm)	9'-8" (294.64 cm)

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

Refer to assembling the center collar on *Page 21* for center collar clip assembly, long center collar channel and splice plate assemblies.

Attaching the Rafter assembly to Roof Rafter Bracket

Install the lower portion of the rafter assembly to the roof rafter bracket.

1. Position and align the lower portion of the rafter assembly (outside surface) (A) to the roof rafter bracket (B).
2. Install flange bolts (C) and flange nuts (D), securing the rafter assembly (A) to the roof rafter bracket (B).
3. Tighten the hardware to the recommended torque specifications. See bolt torque specifications on *Page 14.*

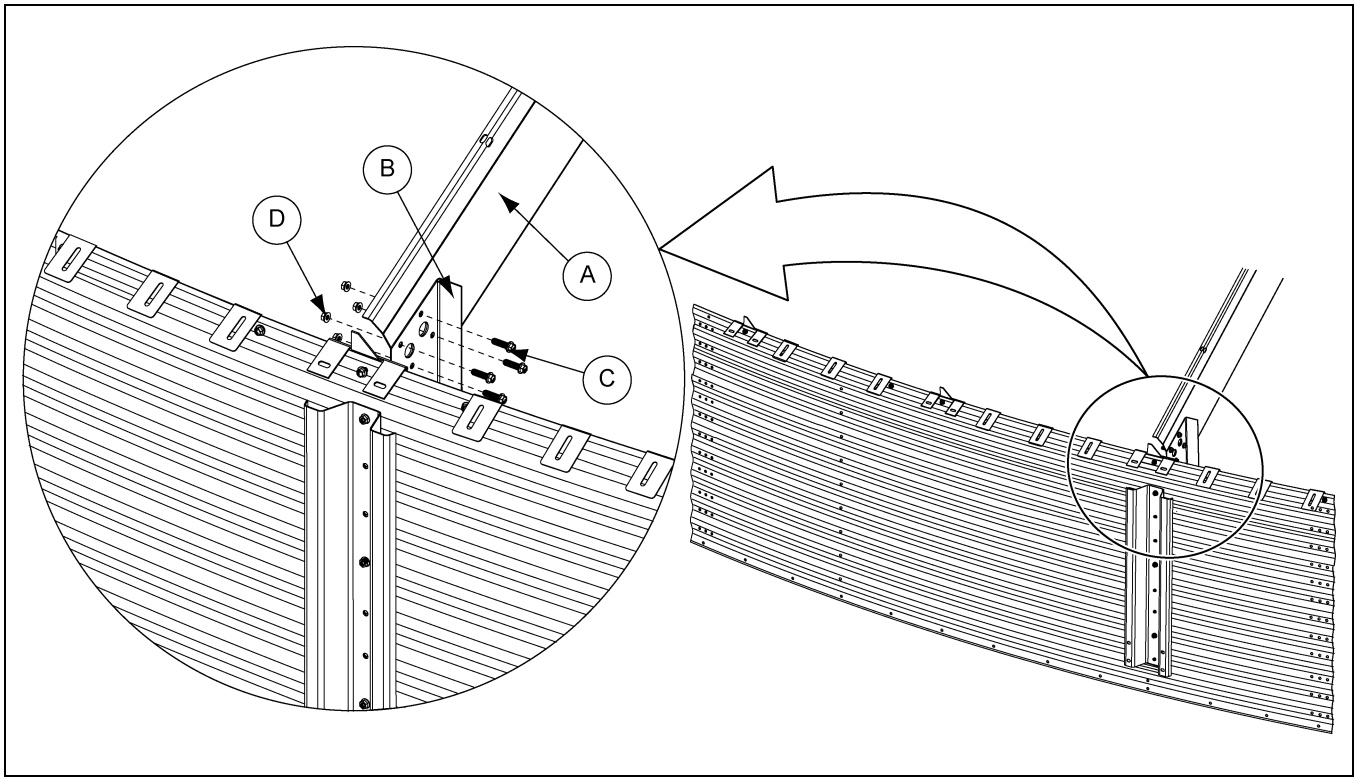


Figure 4J *Attaching the Rafter Assembly to the Roof Rafter Stiffener*

Ref #	Part #	Description
A	CRP-7346	Rafter Assembly
B	CTR-1364	Roof Rafter Bracket
C	S-7487	3/8" x 1" Flange Bolt
D	S-9426	3/8" Flange Nut

After You Finish

Repeat this process for the remaining roof rafters.

Attaching the Rafter Assembly to Peak Ring Weldment

The rafter assembly must be installed to support the peak ring weldment and main roof structure.

Before You Begin

The center collar and peak ring weldment should be assembled and secured to the support pole and the rafter assembly should be assembled. Determine the correct location of each rafter assembly. For more information, see peak ring placement on *Page 22*.

What You Should Know

Make sure the other end of the rafter assembly is connected to the roof rafter bracket.

1. Attach the rafter assembly (D) to the peak ring weldment (A) and align with the proper holes as shown in *Figure 4K.*
2. Install the flange bolts (B) and flange nuts (C) to securing the rafter assembly (D) to the peak ring weldment (A).

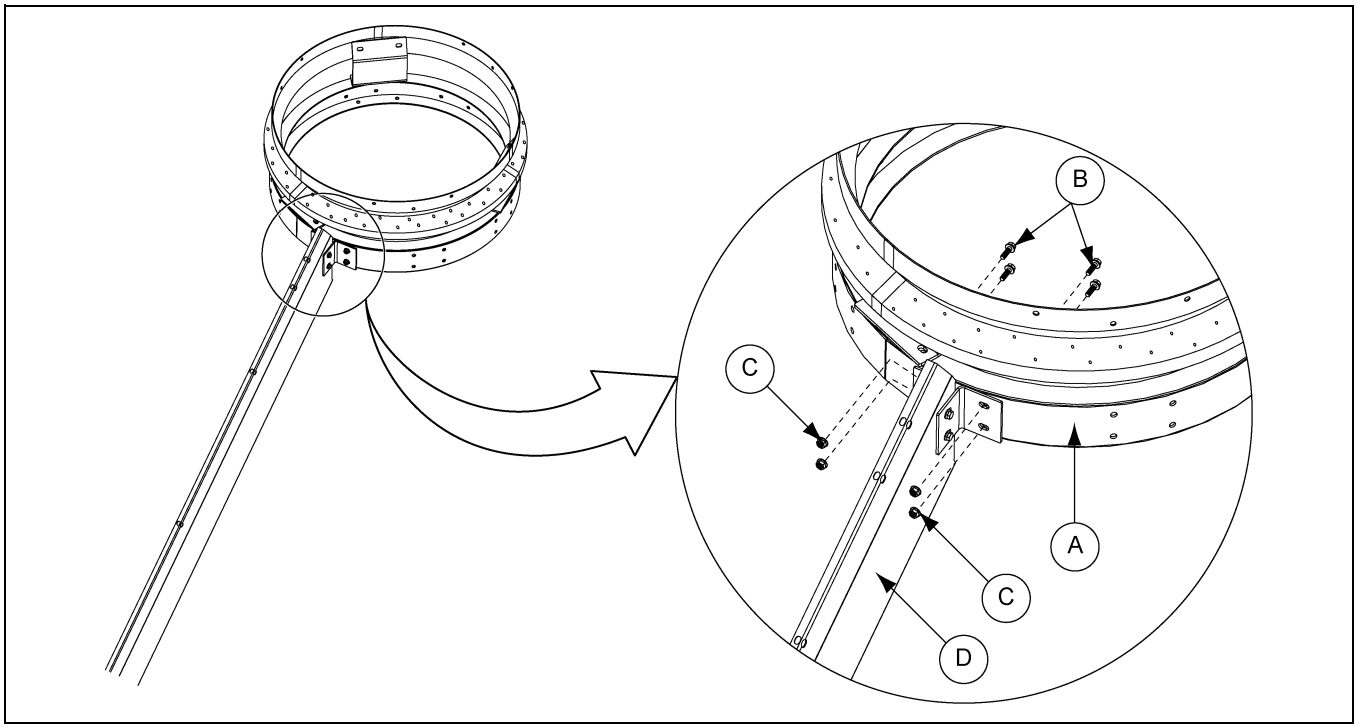


Figure 4K *Install the Rafter Assembly to the Peak Ring Weldment*

Ref #	Part #	Description
A	CRP-7299	Peak Ring Weldment
B	S-7487	3/8" x 1" Flange Bolt
C	S-9426	3/8" Flange Nut
D	CRP-7346	Rafter Assembly

After You Finish

Repeat same procedure for the rest of the rafter assemblies.

Installing the Tension Rods

What You Should Know

Tension rods connect to the rafter brackets through the rafter and are installed around the inside of the bin.

Before You Begin

Make sure all the rafters are installed before preceding the installation of tension rods.

1. Install the tension rods (A) between the two (2) rafter brackets (C) with washers (D) and nuts (E) as shown.

   NOTE: *Make sure that both ends of the tension rod (A) installed to the first hole from eave side of the rafters.*

2. Install the next tension rod (B) between the two (2) rafter bracket (C) on the second hole from the eave with washers (D) and nuts (E) as shown.

   NOTE: *Adjust tension rods (A and B) to slight tension (do not over tighten), before removing center support jack.*

3. Tighten the hardware to the recommended torque specifications. See bolt torque specifications on *Page 14.*

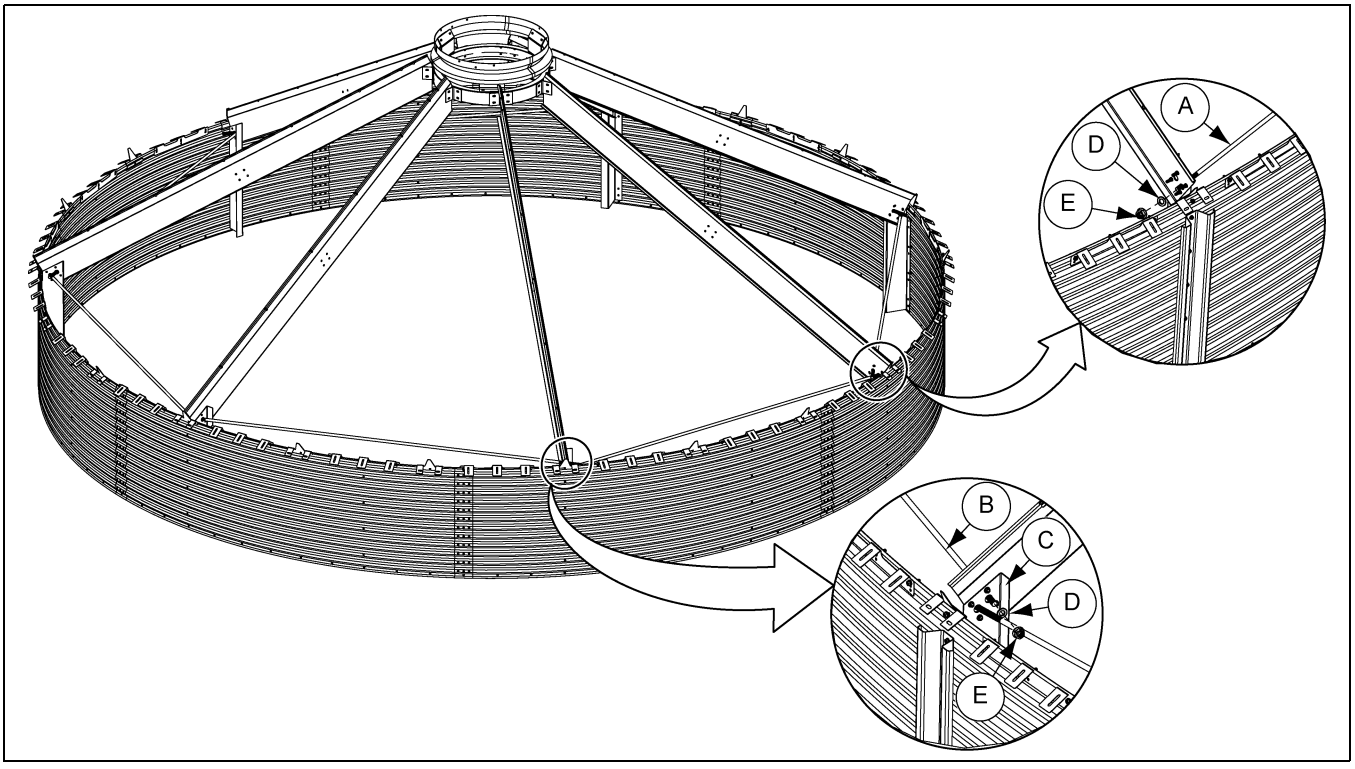


Figure 4L *Installing the Tension Rods*

Ref #	Part #	Description
A	CRP-4827	3/4" Tension Rod
B	CRP-4827	3/4" Tension Rod
C	CTR-1364	Roof Rafter Bracket

Ref #	Part #	Description
D	S-866	3/4" Washer
E	S-234	3/4" Nut

Assembling the Purlin

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

Before You Begin

All roof rafter assemblies must be installed and secured to both the peak ring weldment and roof rafter brackets.

IMPORTANT: *Do not drill any additional holes on the purlin. Install the flange bolts and flange nuts as dictated by the purlins.*

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

1. Attach an upper left purlin clip (E) and upper right purlin clip (D) to the roof rafter (B) and install two (2) flange bolts (F) and two (2) flange nuts (G).
2. Attach an upper left purlin clip (E) and an upper right purlin clip (D) to the roof rafter (A) and install two (2) flange bolts (F) and two (2) flange nuts (G).
3. Position the purlin (C) to the upper right purlin clip (D) and the upper left purlin clip (E) located between the roof rafters (A and B).

   NOTE: *Ensure that the orientation of the purlin is correct of the three (3) holes on the purlin as shown in Figure 4M.*

4. Attach a lower left purlin clip (J) and a lower right purlin clip (K) to the purlin and install eight (8) flange bolts (H) and eight (8) flange nuts (I) securing the purlin to the purlin clips.
5. After all purlins (C) are installed, tighten all hardware to the recommended torque specifications. See bolt torque specifications on *Page 14.*

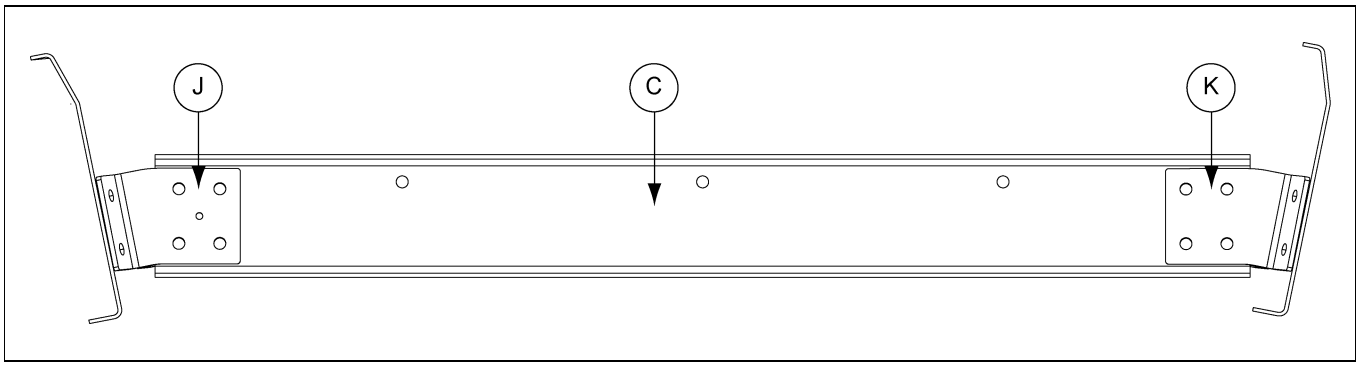


Figure 4M *Purlin Hole Orientation*

Ref #	Part #	Description
C	CRP-7347	Purlin
J	CRP-7295	Lower Left Purlin Clip
K	CRP-7309	Lower Right Purlin Clip

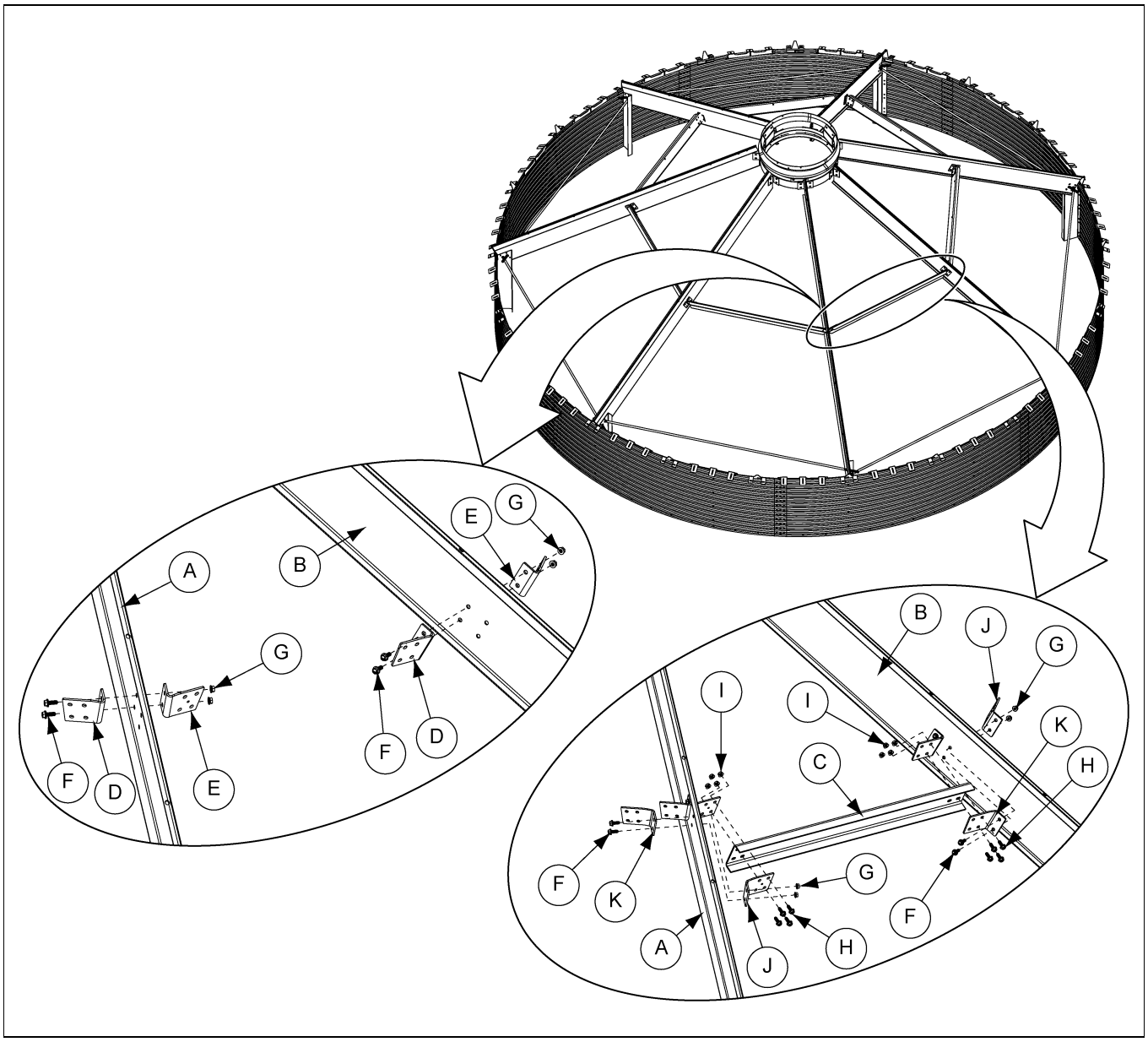


Figure 4N *Assembling the Purlin*

Ref #	Part #	Description
A	CRP-7346	Roof Rafter
B	CRP-7346	Roof Rafter
C	CRP-7347	Purlin
D	CRP-7310	Upper Right Purlin Clip
E	CRP-7308	Upper Left Purlin Clip
F	S-7487	3/8" x 1" Flange Bolt

Ref #	Part #	Description
G	S-9426	3/8" Flange Nut
H	S-10252	1/2" x 1-3/4" Flange Bolt
I	S-10253	1/2" Flange Nut
J	CRP-7295	Lower Left Purlin Clip
K	CRP-7309	Lower Right Purlin Clip

After You Finish

Repeat same procedure for the rest of the rafter assemblies.

Installation of the Roof Panel Support Clips

Roof panel support clips will support the roof panel.

What You Should Know

Roof panel support clips must be installed on each purlin of the roof assembly.

1. Install the roof panel support clip (A) to the outer surface of the purlin (B) using the flange bolts (C) and flange nuts (D).

   NOTE: *Make sure the roof panel support clip holes should face up towards the roof panel as shown in Figure 4O.*

2. Tighten the hardware to the recommended torque specifications. See bolt torque specifications on *Page 14.*

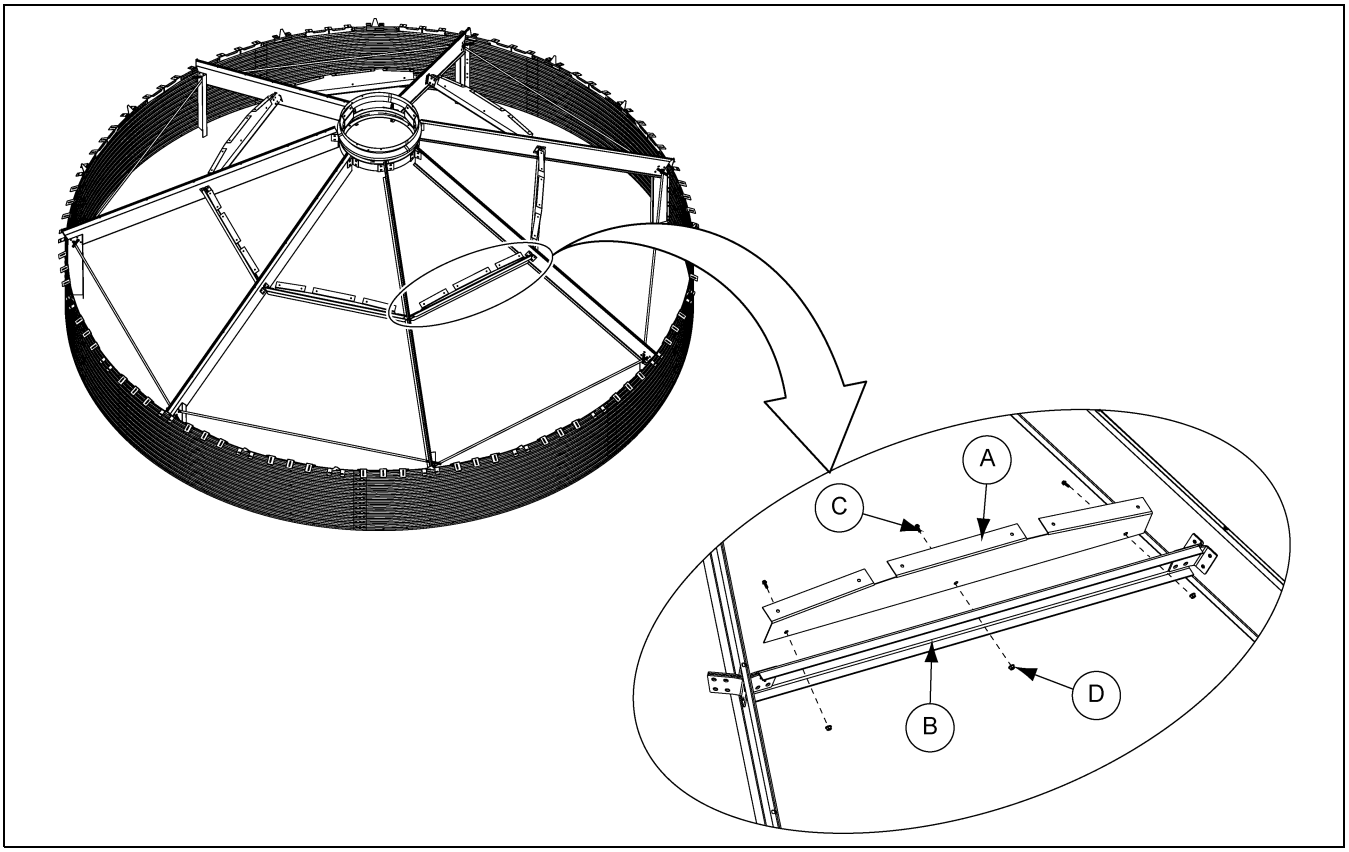


Figure 4O *Installing the Roof Panel Support Clips*

Ref #	Part #	Description
A	CRP-7350	Roof Panel Support Clip
B	CRP-7347	Purlin

Ref #	Part #	Description
C	S-10250	7/16" x 1-1/4" Flange Bolt
D	S-10251	7/16" Flange Nut

After You Finish

Repeat this procedure for installing all the remaining roof panel support clips.

Attaching the Roof Panels

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

Before You Begin

Ensure all roof rafter assemblies and purlins are installed and properly tightened. Pre-determine the manway access location. Make sure roof panel support clips are attached on the purlins before installing the roof panels (A).

What You Should Know

For adjustment purposes, roof panels (A) are installed to each rafter first, causing exposed gaps (B) between each roof panel (A) group. *(See Figure 4P.)* After all roof panels are installed, ensure that all installed hardware (flange bolts with sealing washers and flange nuts) are tightened to secure the roof panels.

When installing the roof panels (A), take into consideration placing the manway for ease of access to and from the sidewall and roof ladders.

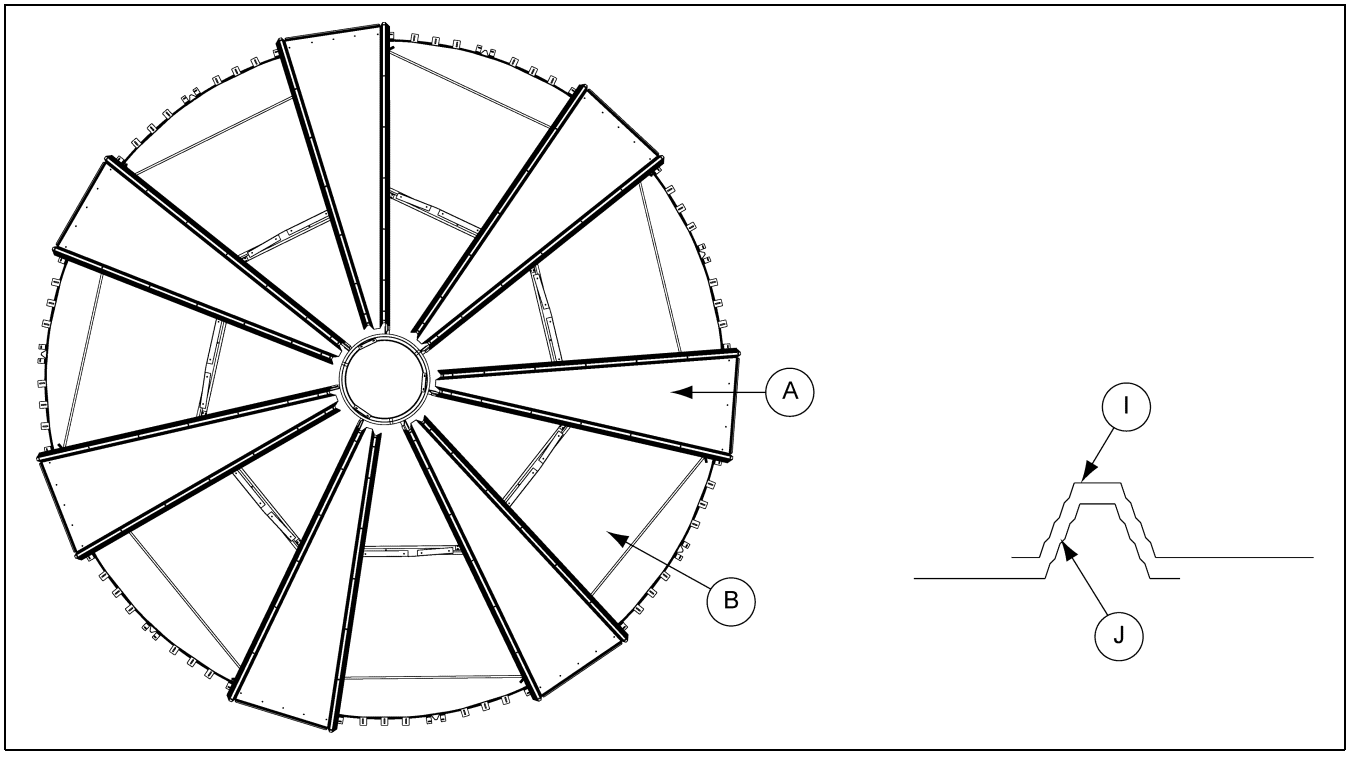


Figure 4P *Roof Panel Overview*

Ref #	Part #	Description
A	CTR-0381	Roof Panel
B		Exposed Gap
I		Upper Rib
J		Lower Rib

1. With assistance, position a roof panel (A) onto the roof rafter (D) and install a flange bolt (G) and flange nut (H) securing the upper portion of the roof panel (A).
2. Install five (5) flange bolts with sealing washers (G) and flange nuts (H), into the lower portion of the roof panel (A), securing the panel to the intermediate eave angle (F).
3. Working in a clockwise direction, continue installing roof panels (A) to each roof rafter (D), leaving an exposed gap (B) between each installed roof panel.

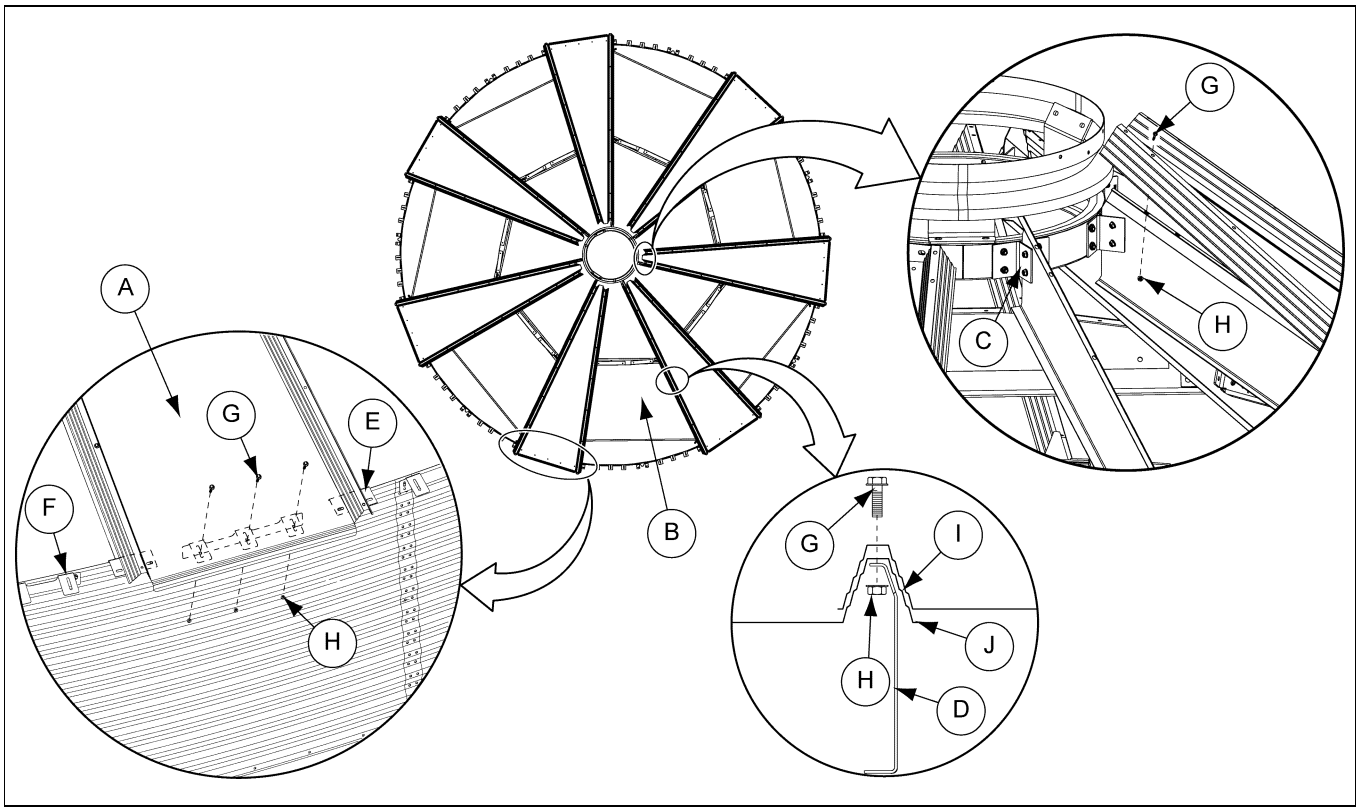


Figure 4Q *Installing the Roof Panels*

Ref #	Part #	Description
A	CTR-0381	Roof Panel
B		Exposed Gap
C	CRP-6092	Peak Ring Attach Clip
D	CRP-7346	Roof Rafter
E	CTR-1198	Eave Clip

Ref #	Part #	Description
F	CTR-1183	Intermediate Eave Angle
G	S-10260	5/16" x 1" Flange Bolt
H	S-3611	5/16" Flange Nut
I		Upper Rib
J		Lower Rib

4. After the initial roof panels (A) are installed, fill in the exposed gaps (B). Working in a **counterclockwise** direction, install two (2) additional roof panels (as shown in *Figure 4Q*), overlapping each roof panel on the left.

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

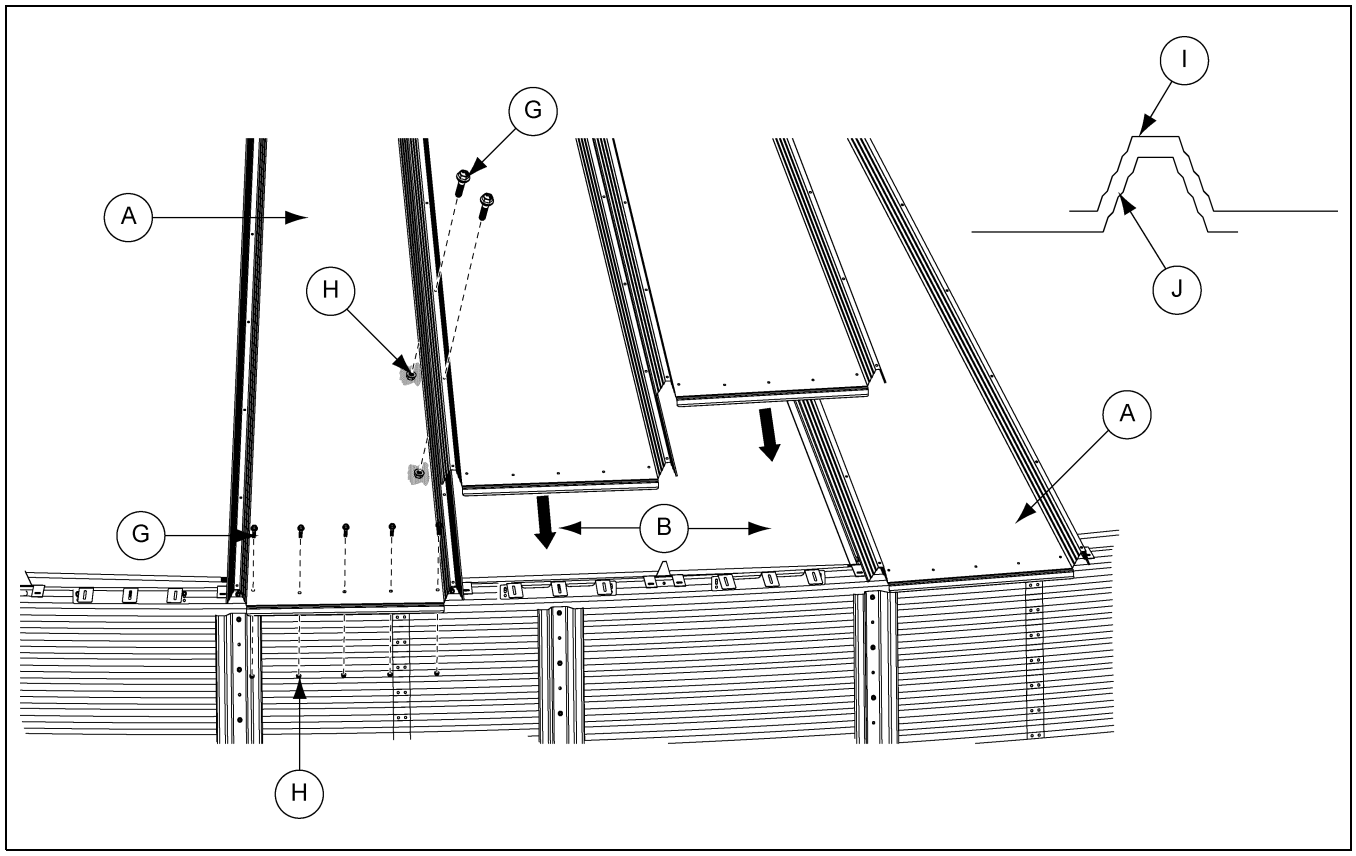


Figure 4R *Installing Roof Panels into Exposed Gaps*

Ref #	Part #	Description
A	CTR-0381	Roof Panel
B		Exposed Gap
G	S-10260	5/16" x 1" Flange Bolt
H	S-3611	5/16" Flange Nut
I		Upper Rib
J		Lower Rib

5. When all roof panels within a group are in place, install the remaining flange bolts (G) and flange nuts (H) along the roof ribs and tighten.
6. Field drill holes into the roof panels (L) through the holes in the roof panel support clips (K) and fasten using bolts (G) and nuts (H).

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

7. Tighten all hardware to the recommended torque specifications. See bolt torque specifications on *Page 14.*

   IMPORTANT: *Failure to properly secure the roof panel to the roof panel support clip and the rafter will constitute a modification to the product not specifically delineated in this manual and will void the limited warranty.*

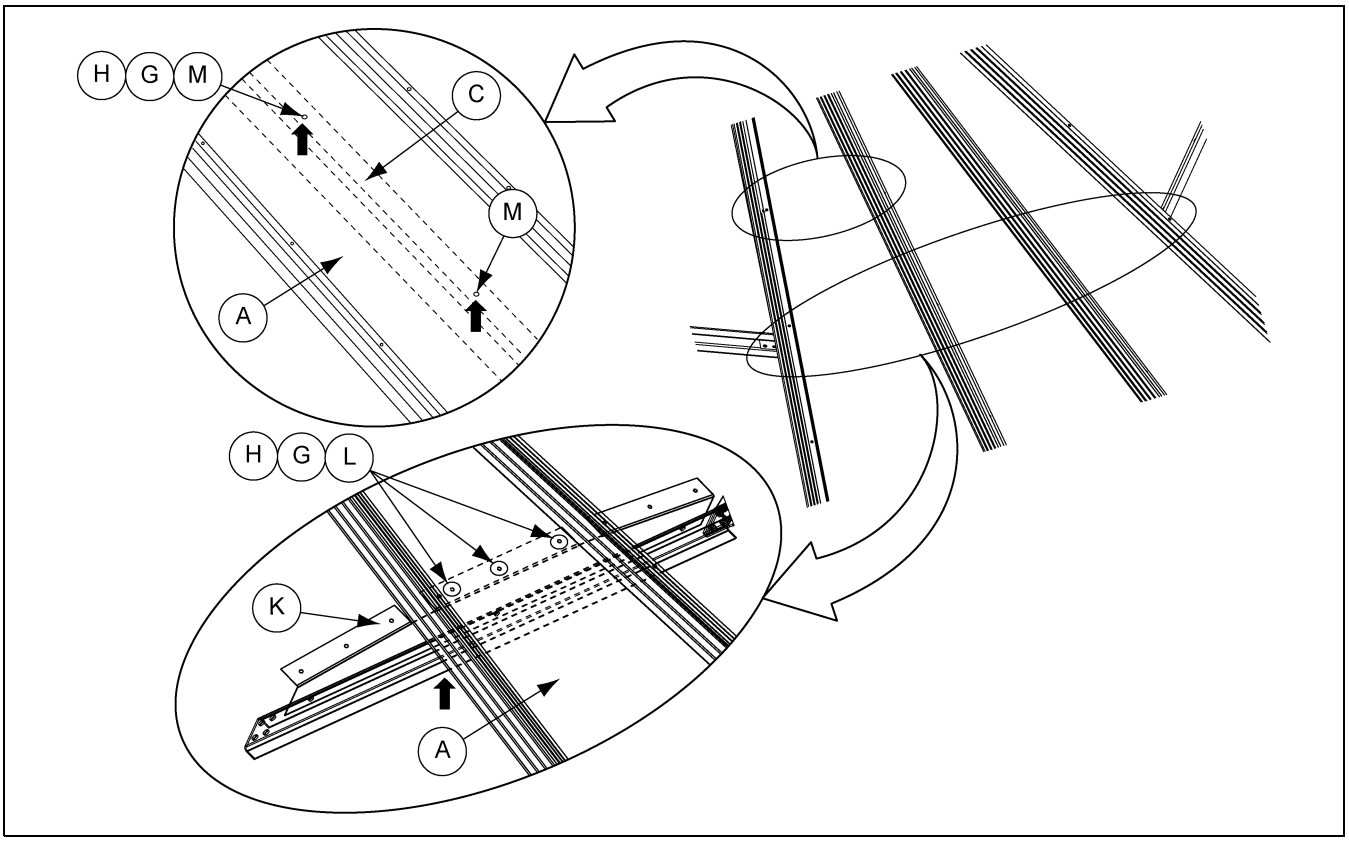


Figure 4S *Field Drill Holes*

Ref #	Part #	Description
A	CTR-0381	Roof Panel
C	CRP-7346	Roof Rafter (Under roof panel)
G	S-10260	5/16" x 1" Flange Bolt
H	S-3611	5/16" Flange Nut

Ref #	Part #	Description
K	CRP-7350	Roof Panel Support Clip
L		Roof Panel Holes (Drilled through roof panel support clips.) (Three (3) per roof panel.)
M		Roof Panel Holes (Drilled through rafter)

Installing the Roof Flashing

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

What You Should Know

There are three (3) roof flashing sections that overlap and bolt together.

1. Install the first roof flashing section (A) onto the roof panel (B) and align the holes in the roof flashing (A) with the holes in the roof panel as shown in *Figure 4T on Page 33*.
2. Adjust the center collar (C) to align with the holes in the roof flashing.
3. Install flange bolts (E) and flange nuts (F), securing the first roof flashing section (A) to the roof panel ribs.

   NOTE: *Leave the bolts out of the holes at the ends of the roof flashing for the overlap. There will be twelve (12) bolts installed into the roof ribs and five (5) bolts installed into the center collar.*

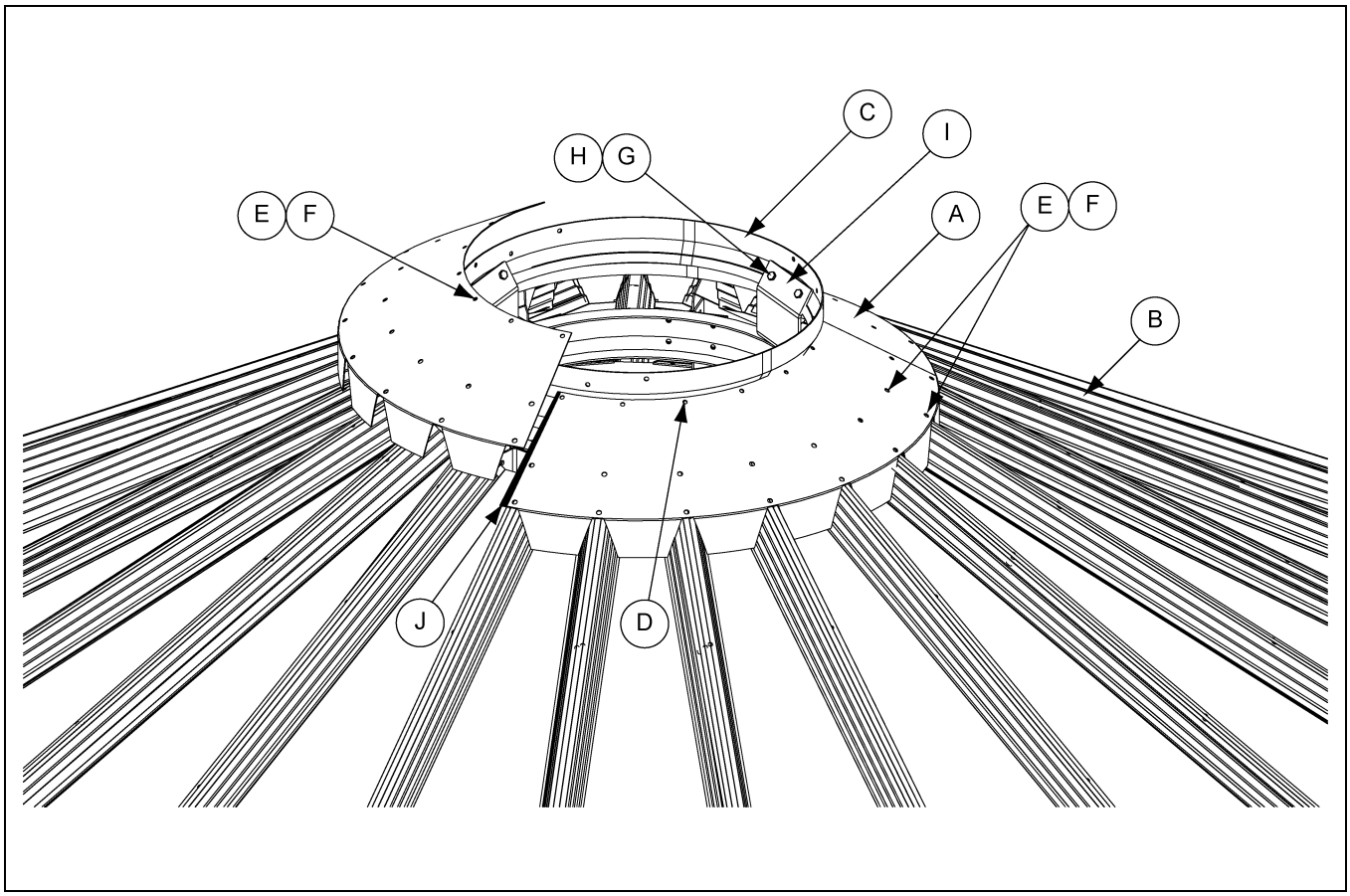


Figure 4T *Installation of the First Roof Flashing Section*

Ref #	Part #	Description
A	CTR-0640	Roof Flashing
B	CTR-0381	Roof Panel
C	CRP-4608	Center Collar
D		Align flashing and center collar holes
E	S-10260	5/16" x 1" Flange Bolt

Ref #	Part #	Description
F	S-3611	5/16" Flange Nut
G	S-7487	3/8" x 1" Flange Bolt
H	S-9426	3/8" Flange Nut
I	CRP-4900	Z-Collar Support Clip
J		Rope Caulk

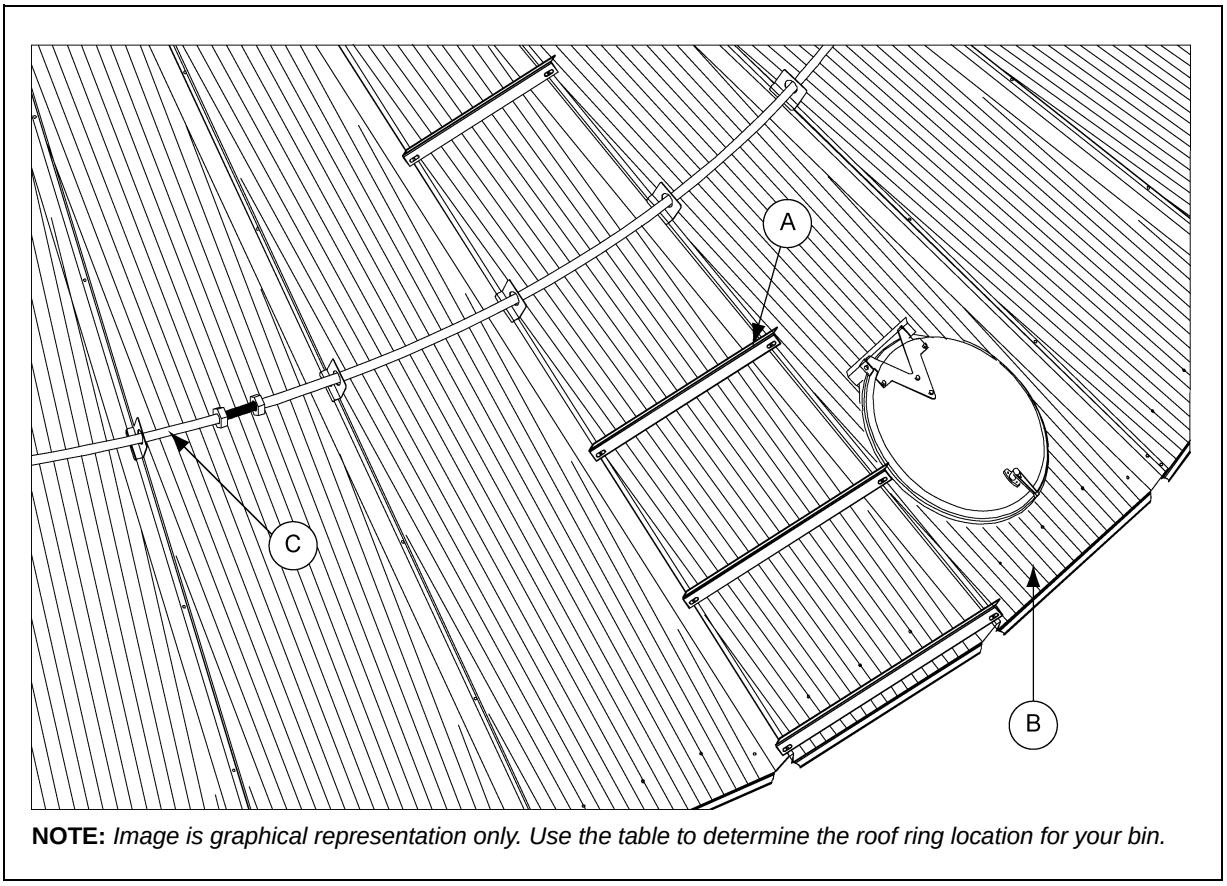
4. Place a strip of rope caulk (J) along the edge of the installed roof flashing (A) where the next roof flashing will overlap.
5. Align the holes along the edge of the next roof flashing with the holes of the previously installed roof flashing and fasten together using bolts (E) and nuts (F).
6. Repeat *Steps 1-5* with second and third roof flashing sections.

   NOTE: *Remember to place caulk between the overlap of the roof flashing sections.*
7. Field drill holes into the center collar (C) through the Z-collar support clips (I) and fasten together using the bolts (G) and nuts (H).

Roof Ring Location (Optional)

To determine the location of the roof rings, start at the wide or eave of the roof panel and count up each hole. Having counted up the required distance, as described in the table below, install the appropriate brackets.

NOTE: *The last roof ring pipe may need to be cut to length.*



NOTE: *Image is graphical representation only. Use the table to determine the roof ring location for your bin.*

Figure 4U *Roof Ring Location*

Ref #	Description
A	Roof Step
B	Roof Panel
C	Roof Ring

Roof Ring Part Number	Bin Diameter Roof Ring Location	Roof Ring Location From Eave End	Roof Ring Color Code	Number of Pipes per Ring
CRP-4703	21	3rd Hole	Red/White	5

Installing a Roof Ring

Quantity and part numbers of roof ring kits vary with the location placement and with the size of each bin. The following procedure will be similar for each kit.

1. Determine the quantity of roof ring clips (C) needed for the roof ring section (B) being installed.

   NOTE: *Each roof panel rib must have a roof ring clip installed.*

2. Install a flange bolt (A) to the roof ring clip (C) and install a sealing washer (E) to the underside of the roof ring clip (C).

3. Slide each assembled roof ring clip (C) onto a roof ring section (B) and position each roof ring clip (C) over each roof panel rib.

4. Install a flange nut (D) to each roof ring clip (C).

   NOTE: *Do not tighten hardware until all roof ring sections have been installed.*

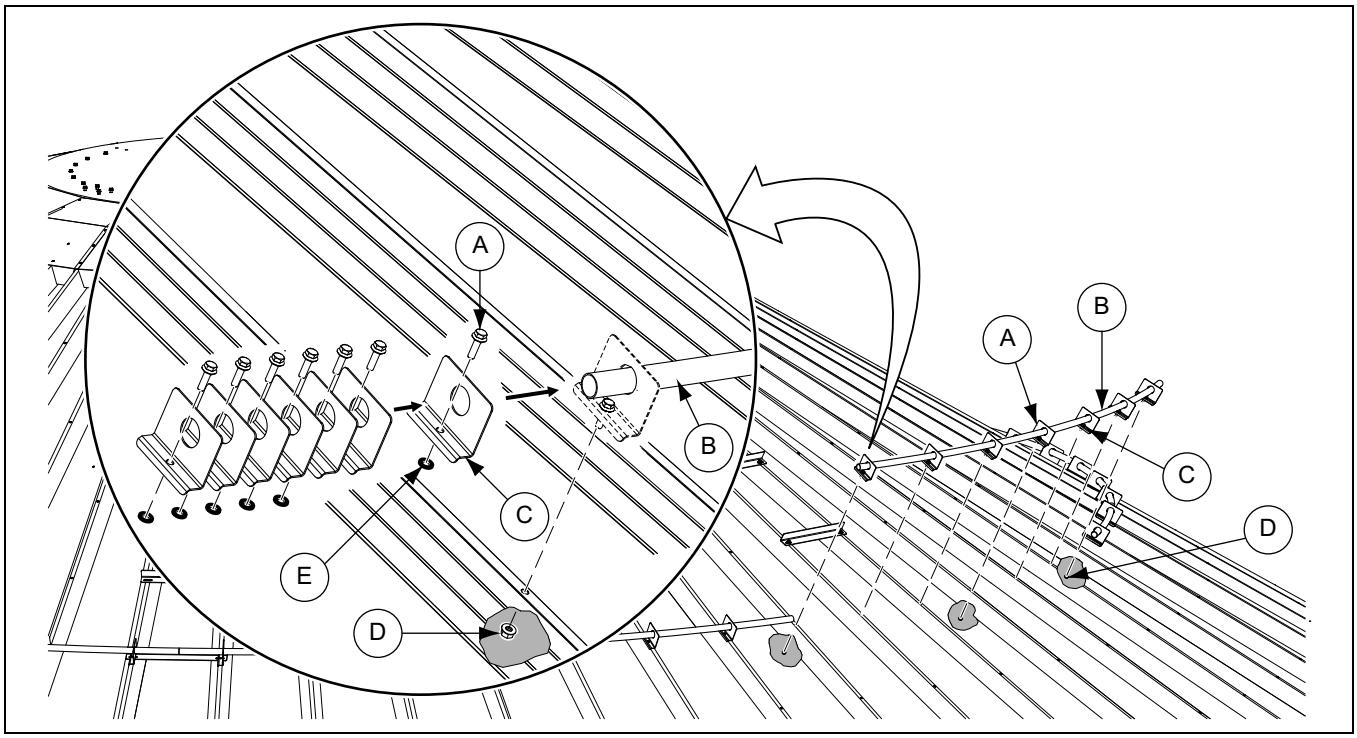


Figure 4V *Roof Ring Shown*

Ref #	Part #	Description
A	S-10260	5/16" x 1" Flange Bolt
B	CRP-5363-24	Roof Ring Section
C	R-997	Roof Ring Clip
D	S-3611	5/16" Flange Nut
E	S-10303	Sealing Washer

Installing a Roof Ring (Continued)

5. Locate a threaded stud (F) and install stud nuts (G) evenly and to the center of the threaded stud (F).
6. Install the threaded stud (F) with stud nuts (G) to the end of the roof ring section (B).

   NOTE: *Install the threaded stud (F) to the side where the next roof ring section will be installed.*
7. Repeat this process, installing each new roof ring section end onto the preceding threaded stud just installed.
8. When all roof ring sections are installed, tighten each roof ring clip (B).
9. Adjust each stud nut (G) outward, expanding each roof ring section. Continue this procedure evenly until the roof ring raises the roof, showing a slight crown.

   NOTE: *Expansion bolts should be fully contracted when assembling 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, use of suitable thread locking compounds or other effective methods.* *(See Figure 4W.)*

   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.

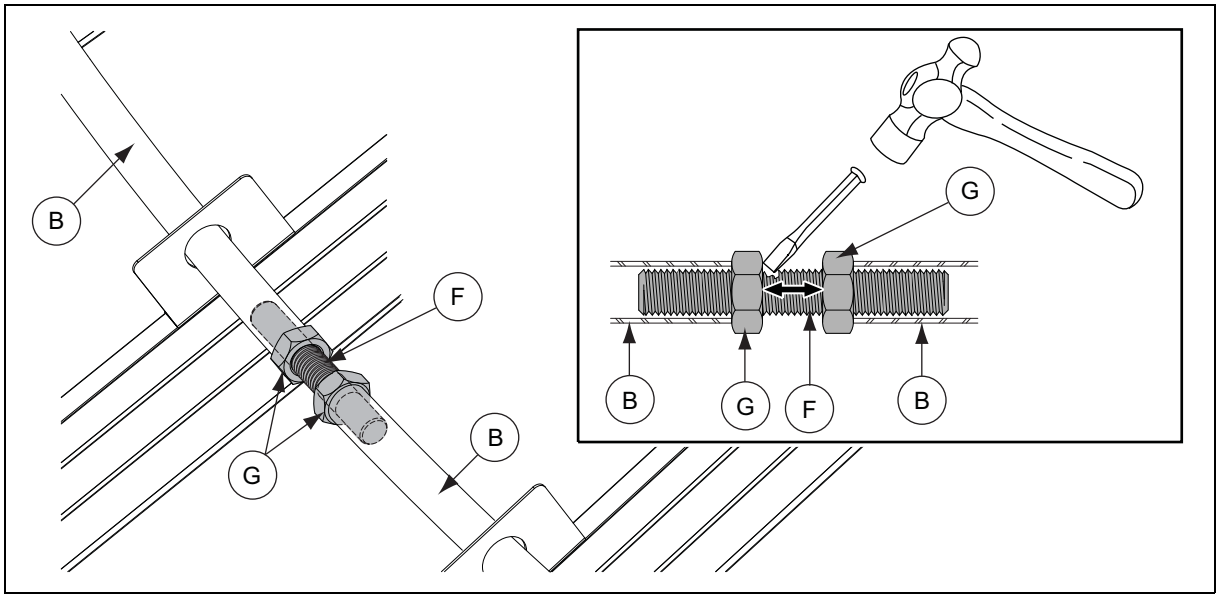


Figure 4W *Exploded View of Threaded Stud*

Ref #	Part #	Description
B	CRP-5363-24	Roof Ring Section
F	S-8765	Threaded Stud

Ref #	Part #	Description
G	S-8926	Stud Nut

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

Conditions and Limitations:

THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE LIMITED WARRANTY DESCRIPTION SET FORTH HEREIN; SPECIFICALLY, GSI DISCLAIMS ANY AND ALL OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE IN CONNECTION WITH: (I) ANY PRODUCT MANUFACTURED OR SOLD BY GSI, OR (II) ANY ADVICE, INSTRUCTION, RECOMMENDATION OR SUGGESTION PROVIDED BY AN AGENT, REPRESENTATIVE OR EMPLOYEE OF GSI REGARDING OR RELATED TO THE CONFIGURATION, INSTALLATION, LAYOUT, SUITABILITY FOR A PARTICULAR PURPOSE, OR DESIGN OF SUCH PRODUCTS.

The sole and exclusive remedy for any claimant is set forth in this Limited Warranty and shall not exceed the amount paid for the product purchased. This Warranty only covers the value of the warranted parts and equipment, and does not cover labor charges for removing or installing defective parts, shipping charges with respect to such parts, any applicable sales or other taxes, or any other charges or expenses not specified in this Warranty. GSI shall not be liable for any other direct, indirect, incidental or consequential damages, including, without limitation, loss of anticipated profits or benefits. Expenses incurred by or on behalf of a claimant without prior written authorization from the GSI warranty department shall not be reimbursed. This warranty is not transferable and applies only to the original end-user. GSI shall have no obligation or responsibility for any representations or warranties made by or on behalf of any dealer, agent or distributor. Prior to installation, the end-user bears all responsibility to comply with federal, state and local codes which apply to the location and installation of the products.

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.

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