

# **CONSTRUCTION MANUAL FOR 2.66" CORRUGATION 105' DIA. TALL TANKS (28 RINGS AND TALLER)**

Owner's Manual  
Manual # PNEG-972  
Revised 6-28-2006



PNEG-972



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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.

# Safety Sign-Off Sheet

It is necessary for the employer to train the employee in the safe operating and safety procedures for this equipment. We included this sign-off sheet for your convenience and personal record keeping. All unqualified persons are to stay out of the work area at all times. A person who has not read this manual and does not understands all operating and safety instructions is not qualified to operate this equipment.

DATE	EMPLOYER'S SIGNATURE	EMPLOYEE'S SIGNATURE
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# SAFETY GUIDELINES

This manual contains information that is important for you, the owner/operator, to know and understand. This information relates to protecting **personal safety** and **preventing equipment problems**. It is the responsibility of the owner/operator to inform anyone operating or working in the area of this equipment of these safety guidelines. To help you recognize this information, we use the symbols that are defined below.

Please read the manual and pay attention to these sections. Failure to read this manual and it's safety instructions is a misuse of the equipment and may lead to serious injury or death.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



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



**WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



**CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

**CAUTION**

**CAUTION** used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

**NOTE**

**NOTE** indicates information about the equipment that you should pay special attention to.

# General Safety Statement

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The GSI Group, Inc.'s, principal concern is your safety and the safety of others associated with grain handling equipment. This manual is to help you understand safe operating procedures and some problems which may be encountered by the operator and other personnel.

As owner and/or operator, it is your responsibility to know what requirements, hazards and precautions exist and inform all personnel associated with the equipment or in the area. Safety precautions may be required from the personnel. Avoid any alterations to the equipment. Such alterations may produce a very dangerous situation, where serious injury or death may occur.

You should consider the location of the bin site relative to power line locations or electrical transmission equipment. We recommend you contact your local power company to review your installation plan or for information concerning required equipment clearance. Clearance of portable equipment that may be taken to the bin site should be reviewed and considered as well. Any electrical control equipment in contact with the bin should be properly grounded and installed in accordance with National Electric Code provisions and other local or national codes.

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



This product has sharp edges! These sharp edges may cause serious injury. To avoid injury, handle sharp edges with caution and use proper protective clothing and equipment at all times.

Sidewall bundles or sheets must be stored in a safe manner. The safest method of storing sidewall bundles is laying horizontally with the arch of the sheet upward or over like a dome. Sidewall sheets stored on edge must be secured in a way that they cannot fall over and cause injury. Care should be taken in the handling and movement of sidewall bundles.

Personnel operating or working around equipment should 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.

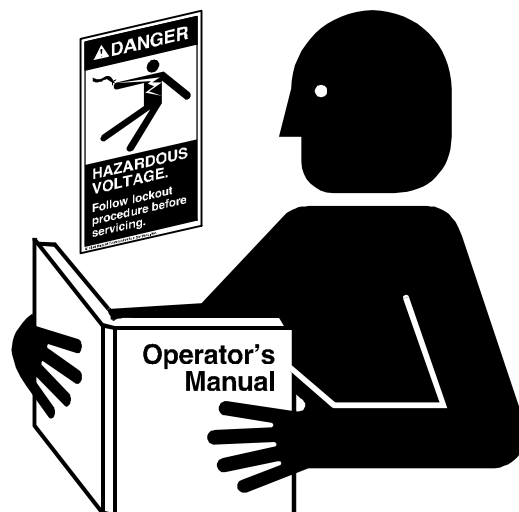
### FOLLOW SAFETY INSTRUCTIONS

Carefully read all safety messages in this manual and on your machine safety signs. 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.

Keep your machinery in proper working condition. Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

If you do not understand any part of this manual and need assistance, contact your dealer.



### PRACTICE SAFE MAINTENANCE

Understand service procedures before doing work. Keep area clean and dry.

Never lubricate, service, or adjust machine while it is in operation. Keep hands, feet, and clothing from all rotating parts.

Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any build up of grease, oil, or debris.

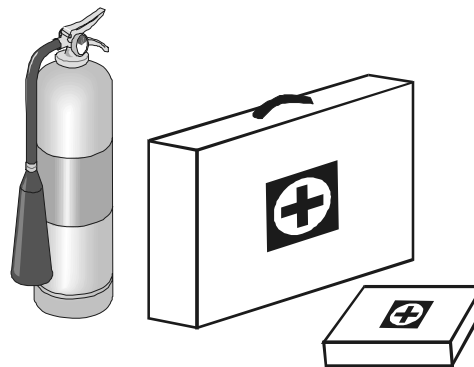


## PREPARE FOR EMERGENCIES

Be prepared if fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



## WEAR PROTECTIVE CLOTHING

Wear close fitting clothing and safety equipment appropriate to the job.

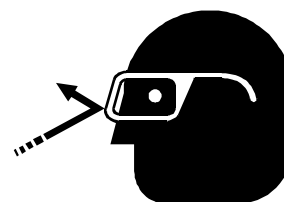
Safety glasses should be worn at all times to protect eyes from debris.

Wear gloves to protect your hands from sharp edges on plastic or steel parts.

A respirator may be needed to help prevent breathing potentially toxic fumes and dust.

Wear hard hat and steel toe boots to help protect your head and toes from falling debris.

### Eye Protection



### Gloves



### Steel Toe Boots



### Respirator



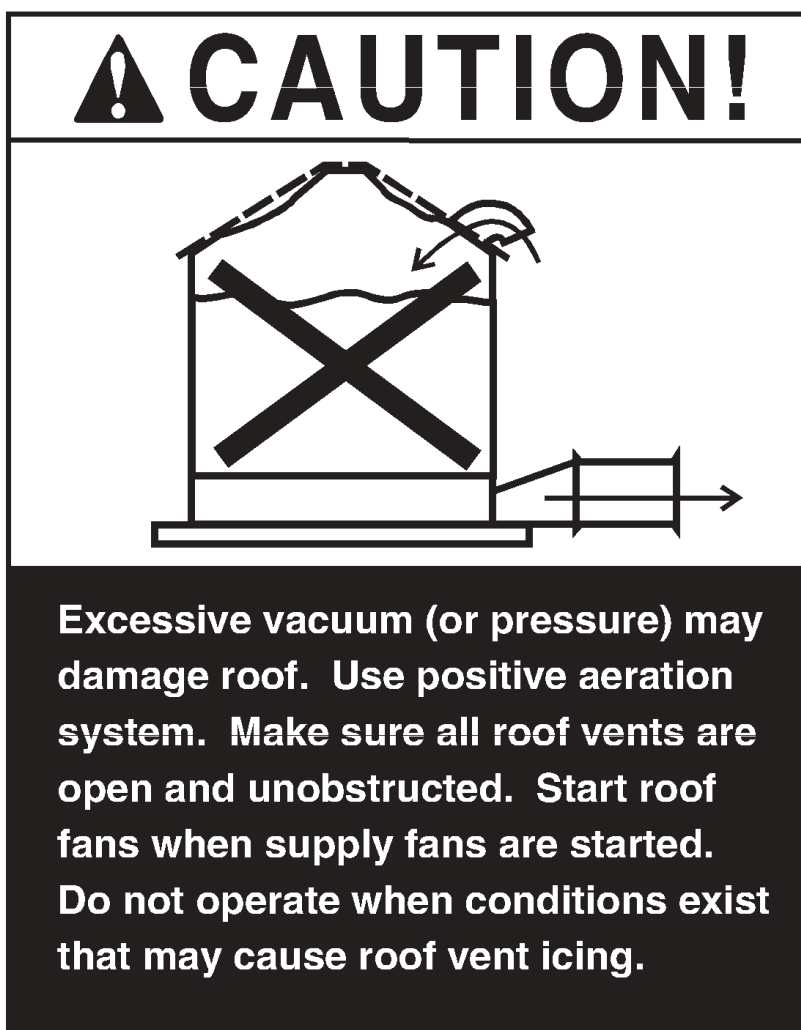
### Hard Hat





## CAUTION!

THE MANUFACTURER DOES NOT WARRANT ANY ROOF DAMAGE CAUSED BY EXCESSIVE VACUUM OR INTERNAL PRESSURE FROM FANS OR OTHER AIR MOVING SYSTEMS. ADEQUATE VENTILATION AND/OR "MAKEUP AIR" DEVICES SHOULD 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/COLD WEATHER CONDITIONS CAN CAUSE AIR EXHAUST OR INTAKE PORTS TO FREEZE.



**ATTENTION:** The decal shown below should be present on the inside of the outside door cover of the two ring, 24" porthole door cover and roof manway cover. If a decal has been damaged or is missing in any of these locations contact Grain Systems for a free replacement decal.

**THE GSI GROUP**  
1004 EAST ILLINOIS STREET  
ASSUMPTION, IL. 62510-0020  
(217)-226-4421



# DANGER



Rotating flighting will kill or dismember.



Flowing material will trap and suffocate.



Crusted material will collapse and suffocate.

## Keep clear of all augers. DO NOT ENTER this bin!

If you must enter the bin:

1. Shut off and lock out all power.
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.

## Failure to heed these warnings will result in serious injury or death.

DC-GBC-1A

**ATTENTION:** The decal shown below should be present on the outside of the outside door cover of the two ring, 24" porthole door cover and roof manway cover. If a decal has been damaged or is missing in any of these locations contact Grain Systems for a free replacement decal.

**THE GSI GROUP**

1004 EAST ILLINOIS STREET  
ASSUMPTION, IL. 62510-00020  
(217)-226-4421



# WARNING



**DON'T**



**DO**

**UNLOADING INSTRUCTIONS:**

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

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**Failure to heed these warnings  
could result in serious injury, death,  
structural damage or collapse of tank.**

DC-GBC-2A

## Properly Store Grain Bin/Silo Materials Prior to Construction to Prevent Wet Storage Stain:

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Wet storage stain (rust) will develop when closely packed bundles of galvanized material such as sidewall and roof sheets have moisture present from any source. Roof and sidewall bundles should be inspected on arrival for the presence of moisture. If moisture is present, moisture must not be permitted to remain between the sheets. In the case of moisture presence, sheets or panels should be separated immediately, wiped down, dried and sprayed with a light oil or diesel fuel.

Where possible, sidewall bundles, roof sheets and other closely packed materials should be stored in a dry, climate controlled building. Storage inside a dry building should be done if at all possible. Where outdoor storage is unavoidable, the materials should be raised out of contact from the ground or vegetation. Stacking and spacing materials should not be corrosive or wet. Materials must be protected from the weather. Weather protection that permits more air movement around the bundles is best.

The storage method of the roof bundles and sidewall sheets may also help minimize moisture presence. Roof bundles should be stored inclined. The bundles should be stored and secured in a safe & stable manner. Turning the sidewall bundles over and storing with the center of the dome “up” like a arch is an option. Sidewall bundles may be stored on edge, **however these bundles should be secured in such as way as they cannot fall over and cause injury.**

Should “white rust” or “wet storage stain” occur, contact GSI immediately concerning methods to minimize the adverse effect upon the galvanized coating.

# Introduction

READ THIS MANUAL carefully to learn how to properly use and install equipment. Failure to do so could result in personal injury or equipment damage.

INSPECT the shipment immediately upon arrival. The Customer is responsible for ensuring that all quantities are correct. Report any damage or shortages by recording a detailed description on the Bill of Lading to justify the Customer's claim from the Transport Firm. Our responsibility for damage to the equipment ends with acceptance by the delivering carrier. Save all paperwork and documentation furnished with any of the equipment/components.

THIS MANUAL SHOULD BE CONSIDERED a permanent part of your equipment and should be easily accessible when needed.

WARRANTY is provided as part of the company's support program for customers who use and maintain their equipment as described in the manual. The warranty is explained on the warranty page located on the inside back cover of this manual.

This warranty provides you the assurance that the company will back its products where defects appear within the warranty period. In some circumstances, the company also provides field improvements, often without charge to the customer, even if the product is out of warranty. Should the equipment be abused, or modified to change its performance beyond the factory specifications, the warranty will become void and field improvements may be denied.

## ATTENTION:

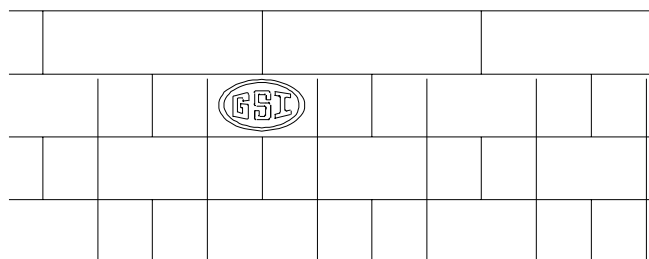
**NCL 105' DIAMETER, 28 RINGS AND TALLER  
ARE COVERED BY THIS CONSTRUCTION  
MANUAL. NCL 105' DIAMETER, 27 RING AND  
SHORTER ARE COVERED BY CONSTRUCTION  
MANUAL PNEG-1000. PLEASE OBTAIN THAT  
MANUAL IF YOU ARE BUILDING A 105'  
DIAMETER TANK 27 RINGS OR SHORTER.**

## Decal Sheet Placement

**NOTE:** The decal sheets are located in the second ring from the top. They are to be spaced evenly around the diameter of the bin.

**NOTE:** On three post bins the top ring is not normally stiffened except for 42' diameter and larger bins with stiffeners, (one per sidewall panel). Reference stiffener to sidewall attachment detail and specific gauge sheet for your bin.

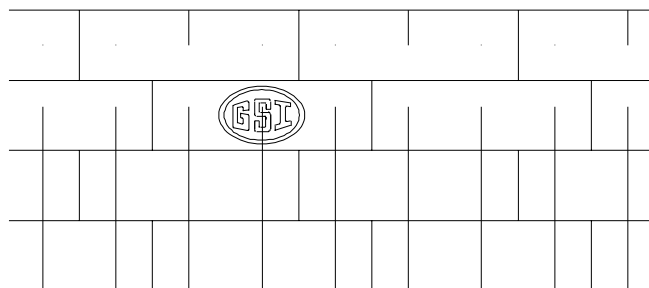
**Note:** Dashed lines represent stiffener locations.



### 2 - Post

(Two rows of stiffeners used on each sidewall sheet)

**Note:** Dashed lines represent stiffener locations

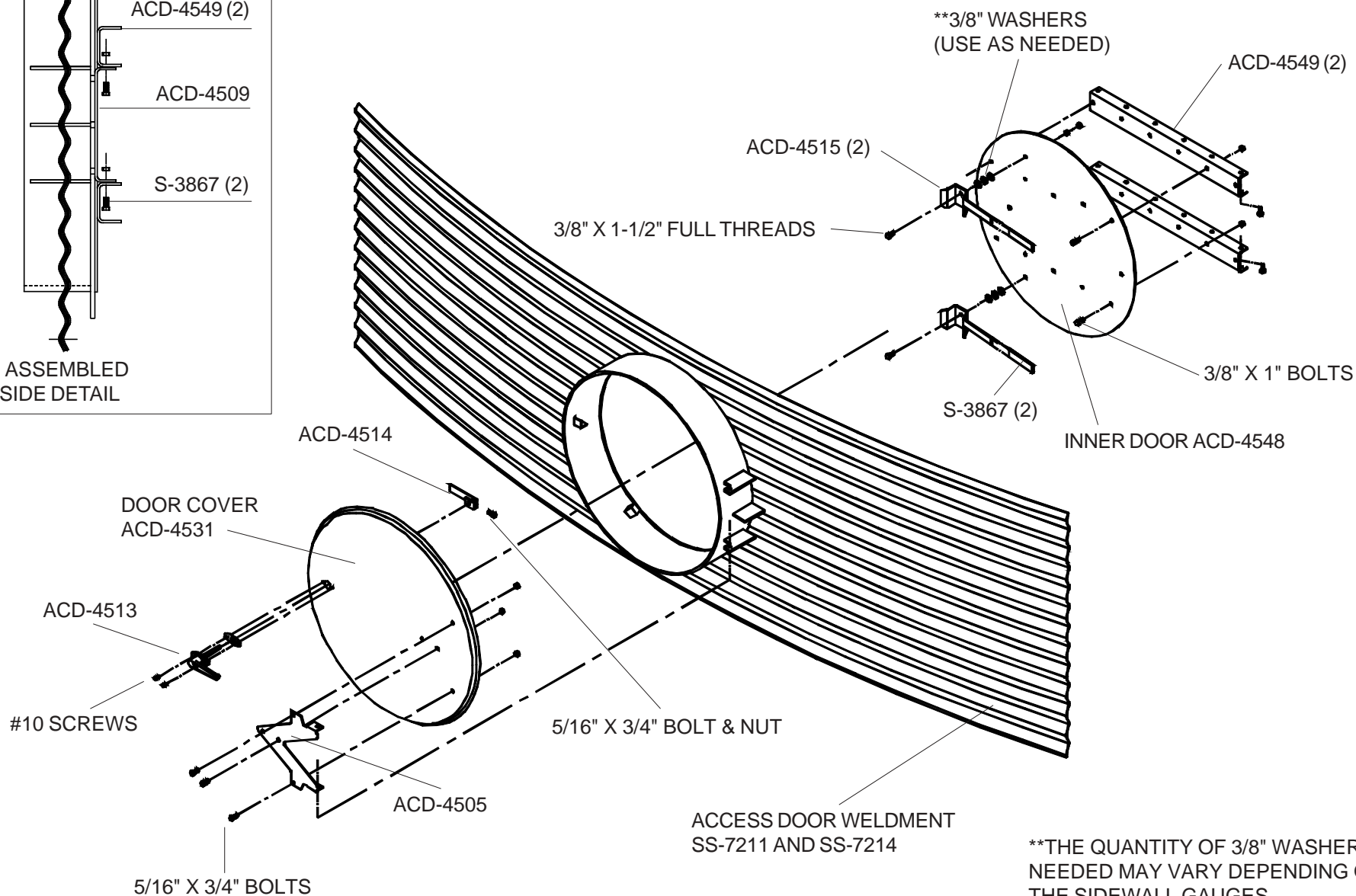
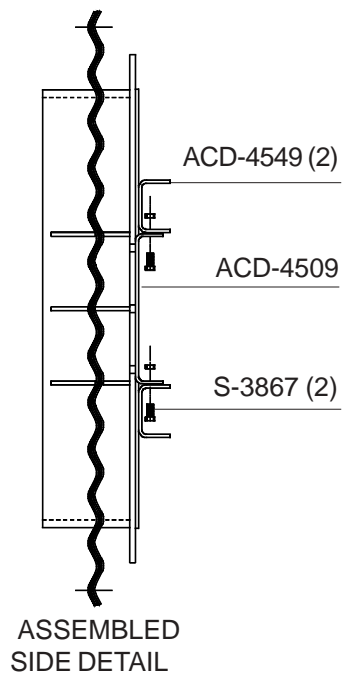


### 3 - Post

(Three rows of stiffeners used on each sidewall sheet)



## ACCESS DOOR WELDMENT ASSEMBLY HARDWARE PACKAGE PLS-41985



\*\*THE QUANTITY OF 3/8" WASHERS  
NEEDED MAY VARY DEPENDING ON  
THE SIDEWALL GAUGES.



SIDEWALL GAUGE	HORIZONTAL SEAM	VERTICAL SEAM	STIFFENER TO SIDEWALL	OVERLAP SEAM
15Q-14Q	5/16" X 3/4" (10)	5/16" X 3/4" (48)	3/8" X 1" (12)	5/16" X 3/4" (2)
13Q-10Q	3/8" X 1" (22)	3/8" X 1" (48)	3/8" X 1" (12)	3/8" X 1" (2)
9Q-8Q	3/8" X 1" (22)	3/8" X 1" (48)	3/8" X 1-1/2" (12)	3/8" X 1-1/2" (2)
6Q-5Q	3/8" X 1-1/2" (22)	3/8" X 1-1/2" (48)	3/8" X 1-1/2" (12)	3/8" X 1-1/2" (2)
11QL	3/8" X 1-1/2" (22)	3/8" X 1-1/2" (48)	3/8" X 1-1/2" (12)	3/8" X 1-1/2" (2)
10QL	3/8" X 1-1/2" (22)	3/8" X 1-1/2" (48)	3/8" X 1-1/2" (24)	3/8" X 1-1/2" (2)
9QL-8QL*	3/8" X 1-1/2" (24)	7/16" X 2-1/2" ** (48)	3/8" X 1-1/2" (24)	3/8" X 2" (6)
6QL*	3/8" X 2" (24)	7/16" X 2-1/2" ** (48)	3/8" X 2" (24)	3/8" X 2" (6)

Q - Quad punched sheets.

QL- Laminated quad punched sheets (2 sheets of same gauge bolted together)

- All bolts referenced in this table are bolts with a neoprene washers on the outside of the tank.

No washers are required on the inside of the tank..

-Reference the stiffener and splice hardware section for stiffener connection hardware usage.

Before bolting sheets together, apply a single strip of caulking on both sides and along top edge. **DO NOT CAULK BOTTOM EDGE!**

--When attaching a 13Q sheet to a 14Q sheet, use the 5/16" x 3/4" bin bolt in the horizontal seam.

--When attaching a 6Q sheet to a 8Q sheet use the 3/8" x 1" bin bolt in the horizontal seam.

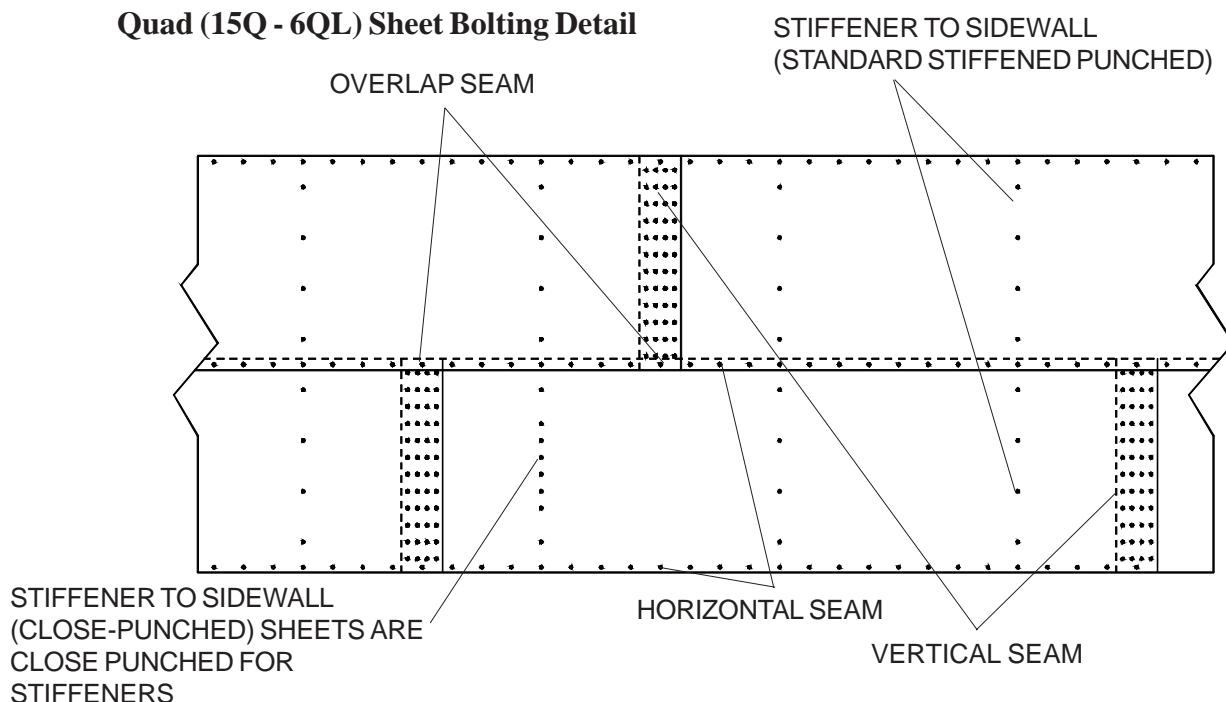
--All base sheets are bolted to the base angle with 5/16" x 1-1/4" bin bolts.

(Independent of sidewall gauge)

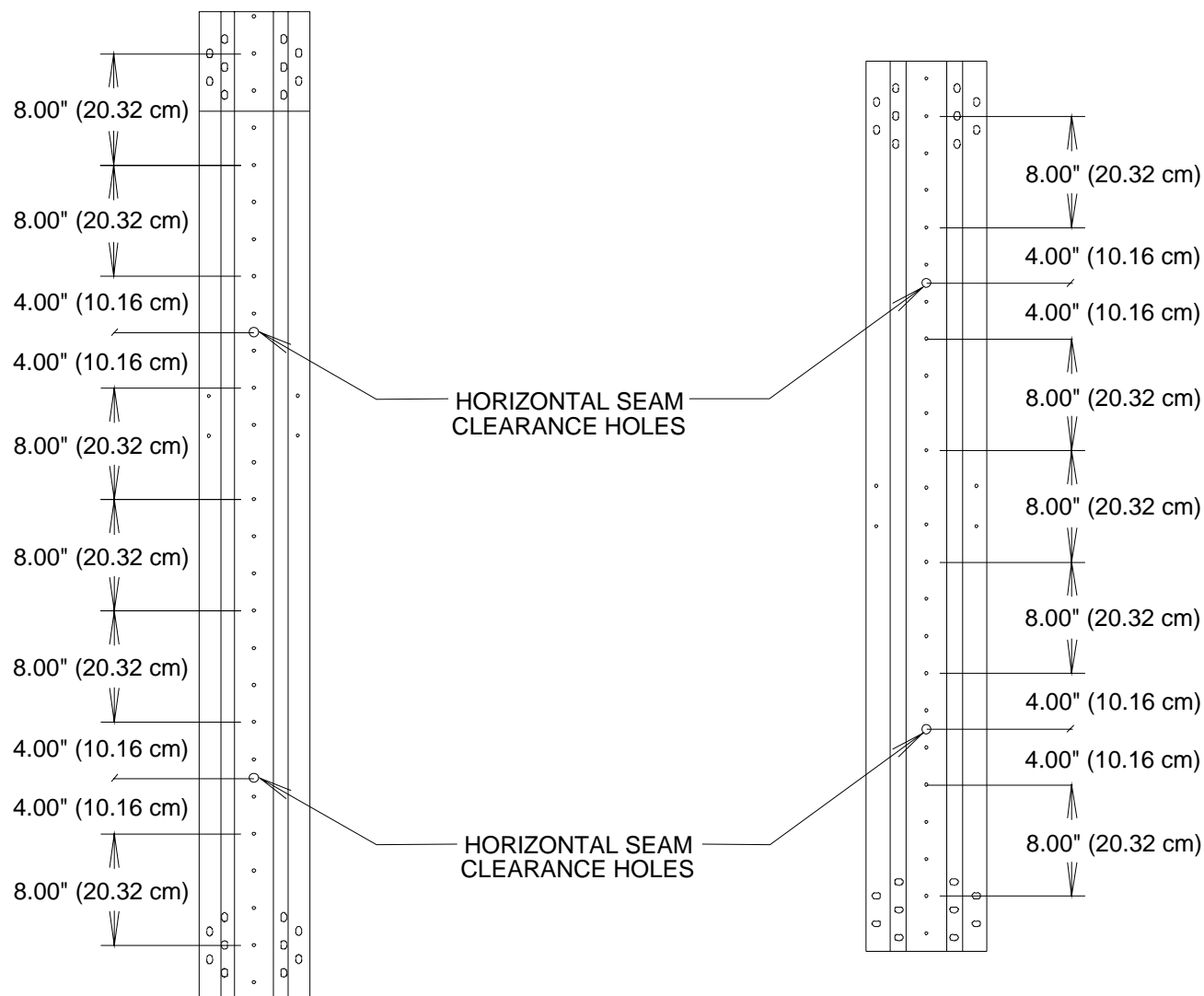
\* 6QL TO 8QL WILL BE CONNECTED USING 3/8" x 1-1/2" bolts

\*\* THESE BOLTS REQUIRE THE USE OF A SPECIAL 7/16" RECESSED NUTS (S-8479).

### Quad (15Q - 6QL) Sheet Bolting Detail



## Stiffener to Sidewall Connections 3-Post Tanks



### 2-RING OFFSET STIFFENER

(THE SAME HOLE LOCATIONS  
ARE USED FOR SS-7065 14 &  
15 GA. 2-RING STIFFENER).

### 2-RING STANDARD STIFFENER

**NOTE:**  
SOME LOCATIONS IN THE LOWER REGIONS OF THE  
TANK UTILIZE CLOSE PUNCHED SHEETS WHERE THE  
STIFFENER WILL ATTACH MORE FREQUENTLY.

## HARDWARE

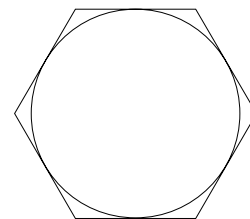
## Identifying Bolt Grades

**⚠ CAUTION**

UNDER NO CONDITION SHALL ANY OTHER BOLTS BE SUBSTITUTED FOR THOSE SUPPLIED BY THE MANUFACTURER

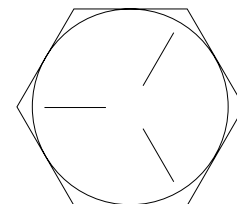
## Grade 2 Bolts

1. Grade 2 bolts are designated with a plain head and are not used in GSI Grain Bins/Silos.



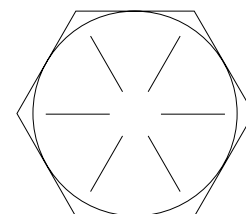
## Grade 5 Bolts

2. Grade 5 bolts are designated by 3 slash marks on the head. All 5/16" diameter bolts are to be Grade 5 or higher.



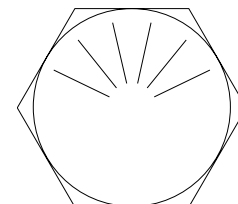
## Grade 8 Bolts

3. Grade 8 bolts are designated by 6 slash marks evenly spaced out around the head of the bolt.



## Grade 8.2 Bolts

4. Grade 8.2 bolts are designated by 6 slash marks on the head in a sunrise pattern. All 3/8" and 7/16" diameter bolts are to be Grade 8 or 8.2.

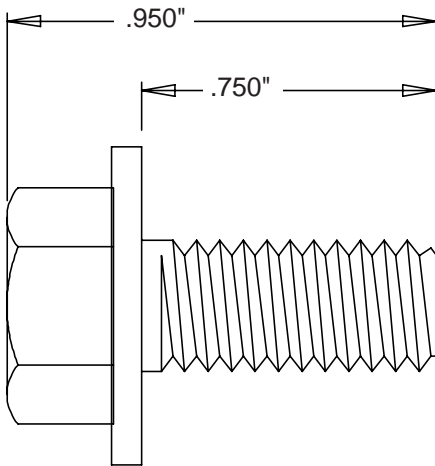


**NOTE:** Bolts should not be tightened in excess of the torque specifications to the right.

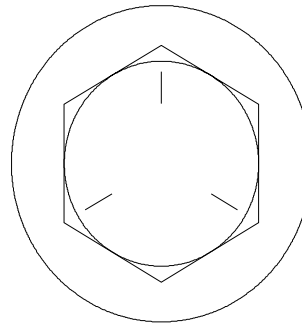
HARDWARE USAGE IS DETAILED IN THE BOLTING REQUIREMENT CHARTS, STIFFENER AND SPLICE HARDWARE CHARTS AND THE BOLTING AND THE HARDWARE REQUIREMENTS SECTION.

BOLT SIZE	TORQUE (ft. lb.)	
	MINIMUM	MAXIMUM
5/16"-18	15	20
3/8"-16	35	42
7/16" - 14	65	72
1/2" - 13	95	105

**Refer to 2.66" Commercial Tank Bolting Requirements for complete bolt usage.**



**SIDE VIEW**



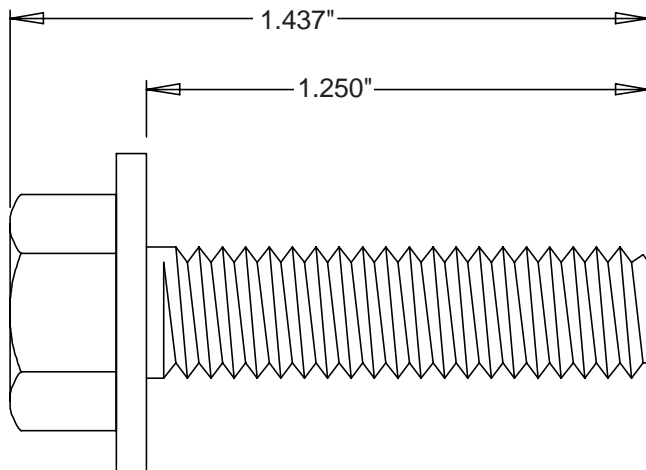
**GRADE 5**

**TOP VIEW**

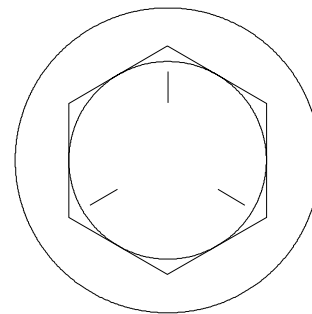
**S-275**

.3125" x .750" pre-assembled with a steel backed neoprene washer.

This bolt is used to connect horizontal and vertical seams for 14 gauge and thinner sidewall sheets to each other. It is also used in attaching roof panels to the top sidewall sheet and attaching roof panels and flashing to the center collar.



**SIDE VIEW**



**GRADE 5**

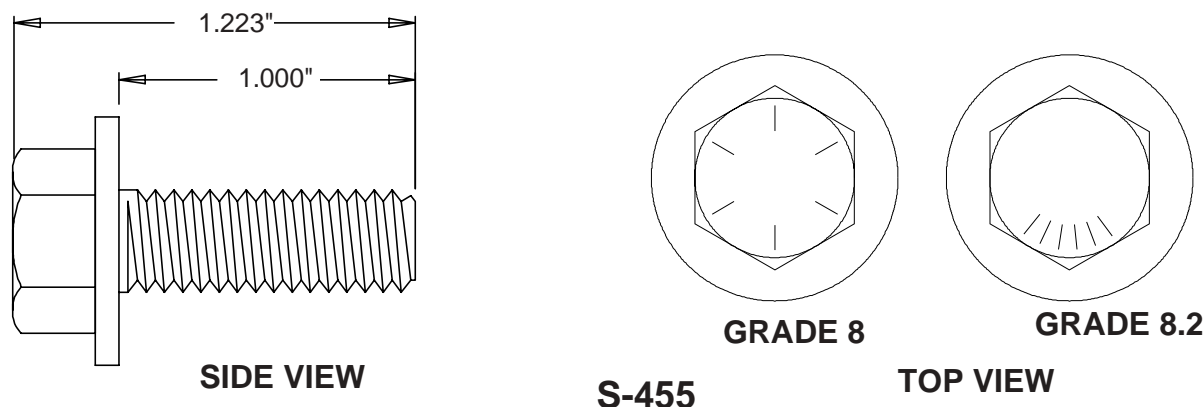
**TOP VIEW**

**S-277**

.3125" x 1.250" pre-assembled with a steel backed neoprene washer.

This bolt is primarily used to connect roof panels together where they overlap. It is also used at the bottom of the flat bottomed bins to attach the base angle to the sidewall sheet.

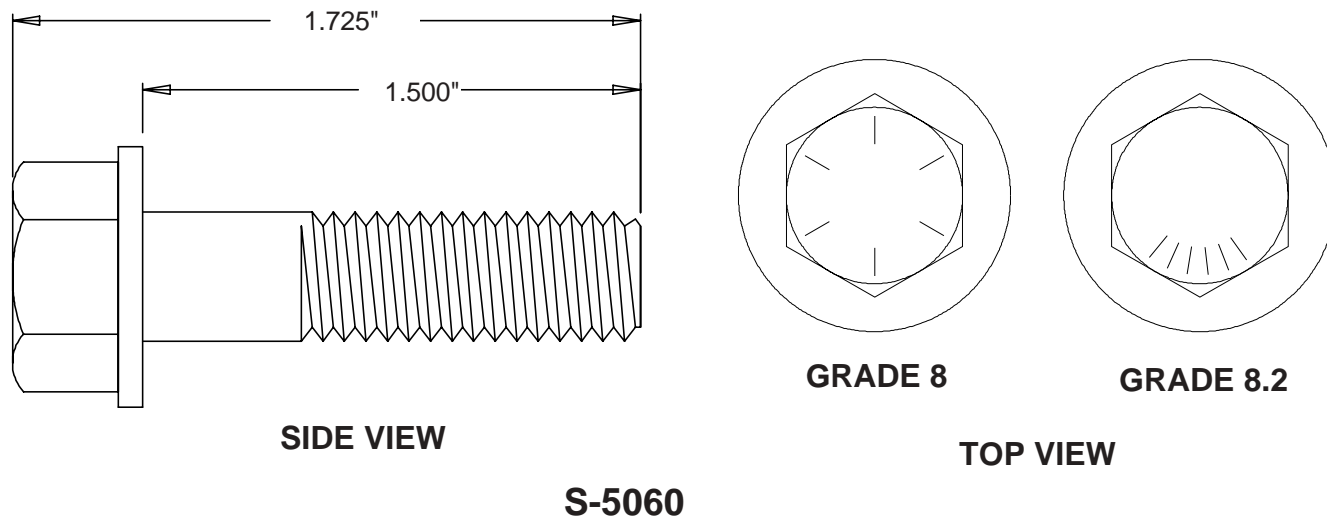
Refer to 2.66" Commercial Tank Bolting Requirements for complete bolt usage.



.375" x 1.000" pre-assembled with a steel backed neoprene washer.

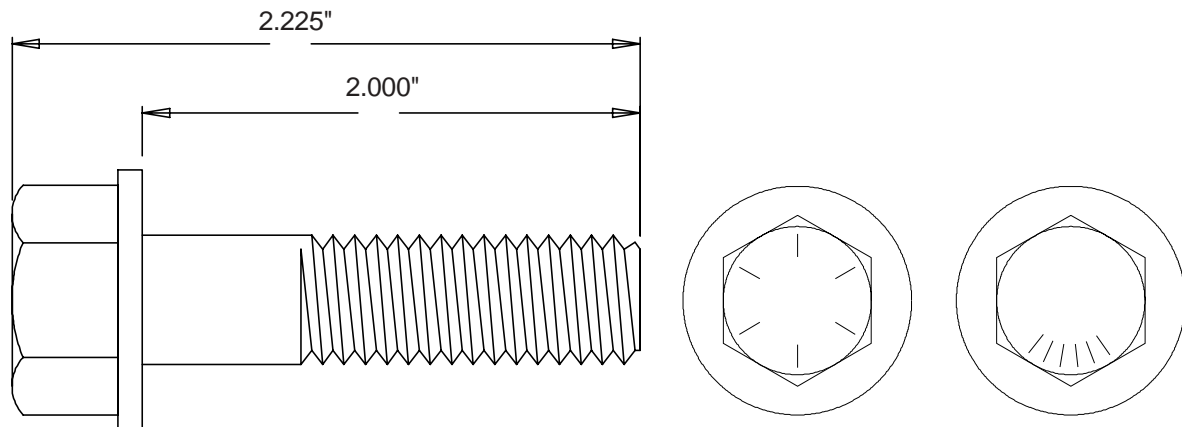
This bolt is used in horizontal and vertical seams for 13 gauge through 13gauge laminate sidewall to attach the sheets to each other. It is also used to attach the stiffener to the sidewall sheet for up to 10 gage sidewall. It is **not** used to splice the stiffeners together on the flanges where they connect to each other or the splice plates. These are also used to attach the hopper panels to the hopper support beam for the NCHT's.

**NOTE: 3/8" x 1 1/2" (S-5060) or 3/8" x 2" (S-8338) Bolts are provided for laminated stiffeners and splices.**



.375" x 1.500" pre-assembled with a steel backed neoprene washer.

It is used to connect the stiffener to the sidewall at locations where a splice plate is used to connect the stiffener, and to connect laminated stiffeners to the sidewall sheets. It is also used to bolt stiffeners to 9 gauge and thicker sidewall. This bolt is also used to bolt horizontal and vertical seams together on 6 gauge and thicker and some overlap seams. It is only used to attach the stiffener and the splice plate to the sidewall. The flanges where the stiffener bolts to the splices plates use a different bolt (one without a sealing washer).



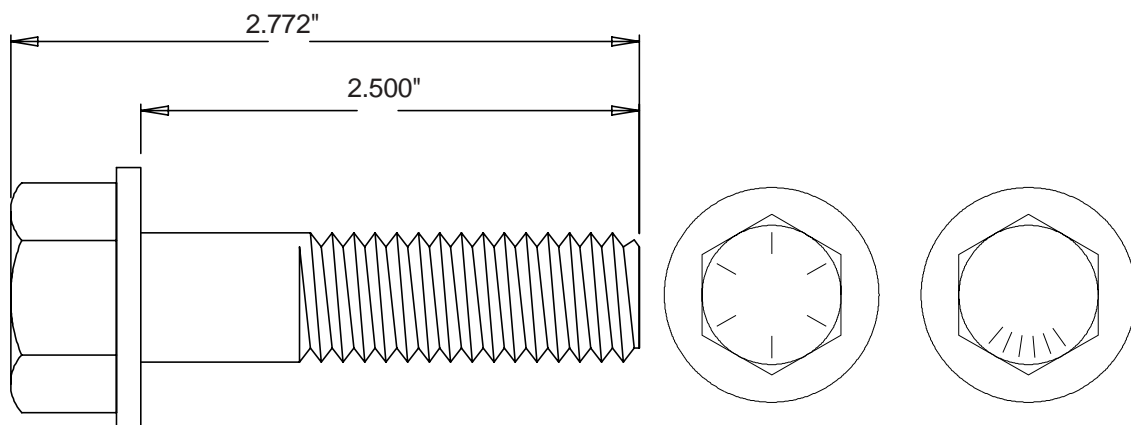
**SIDE VIEW**

**GRADE 8 OR 8.2  
TOP VIEW**

## S-8338

.375" x 2.000" pre-assembled steel backed neoprene washer.

This bolt is used in overlapping seams on 8 to 9 gage laminated sidewall sheets and to connect 6 gage laminated rings to one another. It is also used to attach stiffener to sidewall on 6 gage laminated sidewall sheets



**SIDE VIEW**

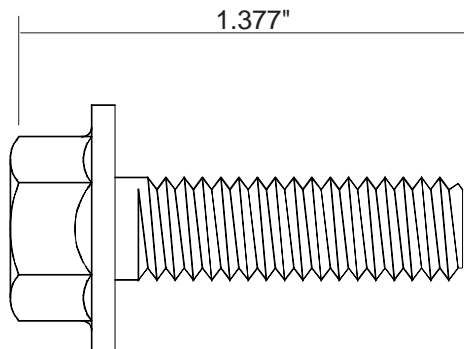
**GRADE 8 OR 8.2  
TOP VIEW**

## S-8488

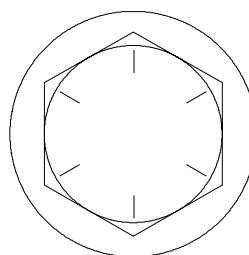
.4375" x 2.500" pre-assembled steel backed neoprene washer.

This bolt is used in the vertical seams of 9 gage laminated and thicker. A special 7/16" nut, S-8479 is required to be used in conjuncture with this bolt.

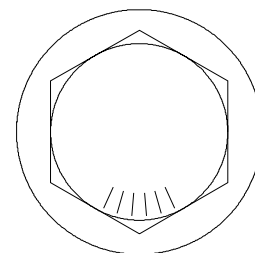
Refer to 2.66" Commercial Tank Bolting Requirements for complete bolt usage.



SIDE VIEW



GRADE 8



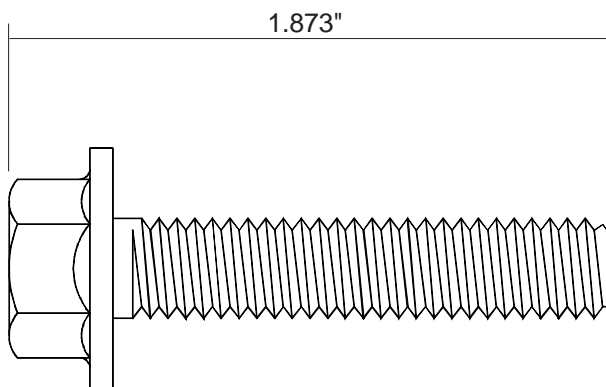
GRADE 8.2

TOP VIEW

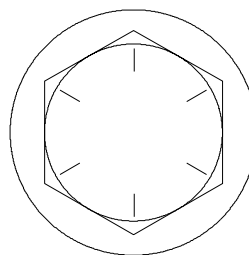
**S-7927**

.375" x 1.000" hex flanged head **without** a plastic sealing washer.

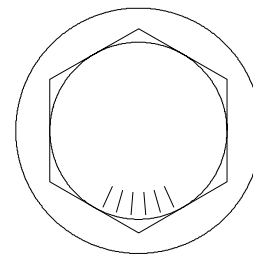
This bolt is used to splice the stiffeners together on the flanges. A steel flat washer is used on the nut side of the connection. They are also used on the roof rafter splices for commercial roof systems.



SIDE VIEW



GRADE 8



GRADE 8.2

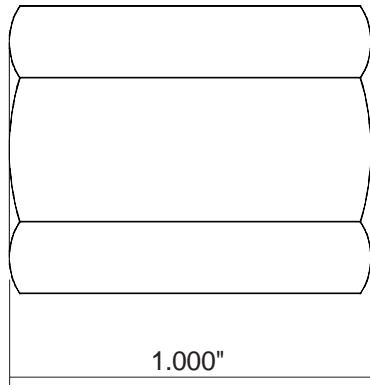
TOP VIEW

**S-7928**

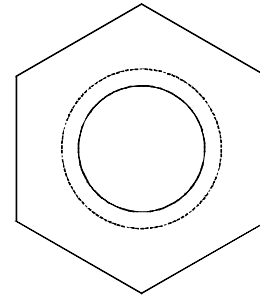
.375" x 1.500" hex flanged head **without** a plastic sealing washer.

This bolt is used to attach the flanges of the 5 gage base stiffener to the splice plates and splice laminated stiffeners together. A steel flat washer is used on the nut side of the connection.

**S-8479**  
**SPECIAL .4375 RECESSED NUT**



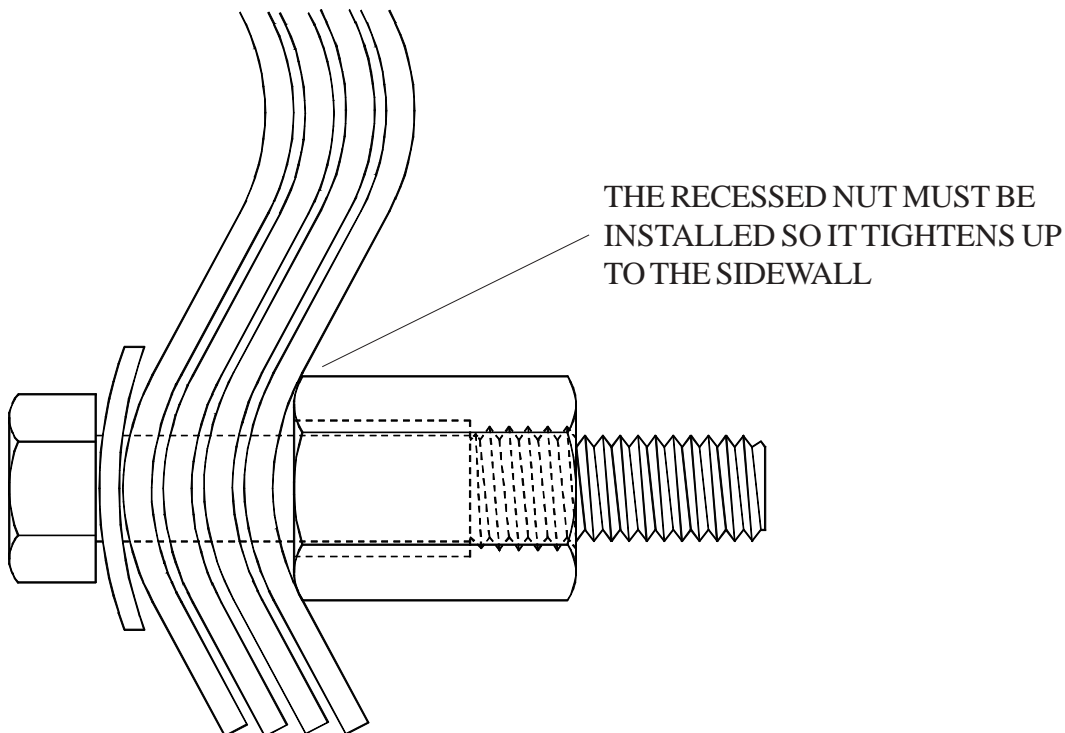
**SIDE VIEW**



**END VIEW**

This 7/16" nut is to be installed at all locations where the 7/16" x 2-1/2" bin bolt S-8488 is installed (9QL, 8QL, AND 6QL)

**S-8479**  
**SPECIAL RECESSED NUT ASSEMBLY DETAIL**

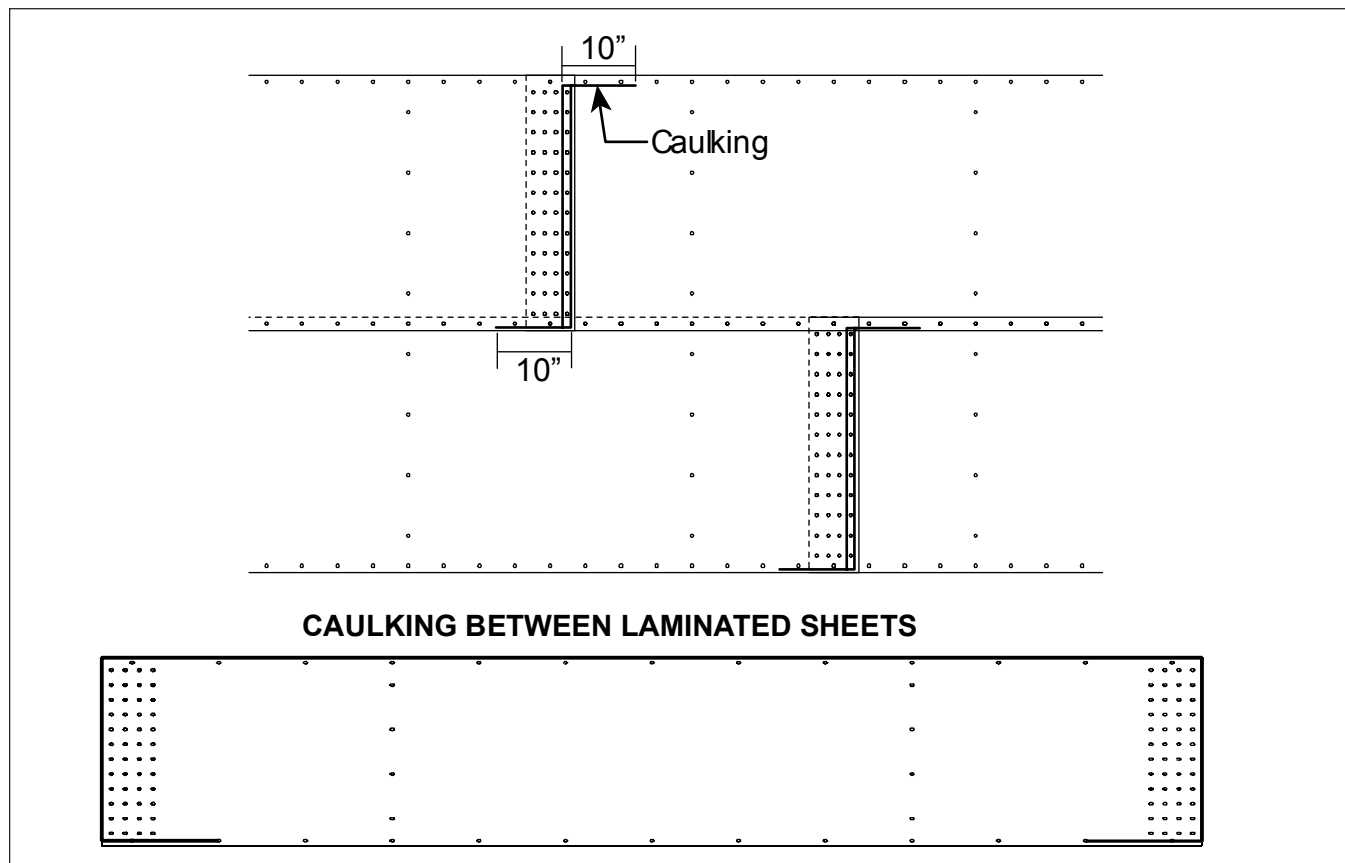


**NOTE:** The only washers shipped loose with the bins are the steel flat washers. In the shell portion of the tank is the 5/16" steel flat washer (S-845) is used where the base angle attaches to the sheet and some are used at the main eave clips. The 3/8" steel flat washers (S-248) are used at the stiffener splices and at the laminated stiffener to sidewall locations and steel flat washers are also utilized in some roof locations.

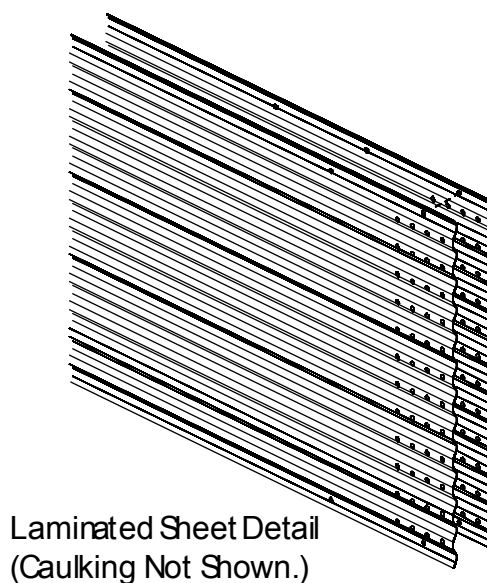
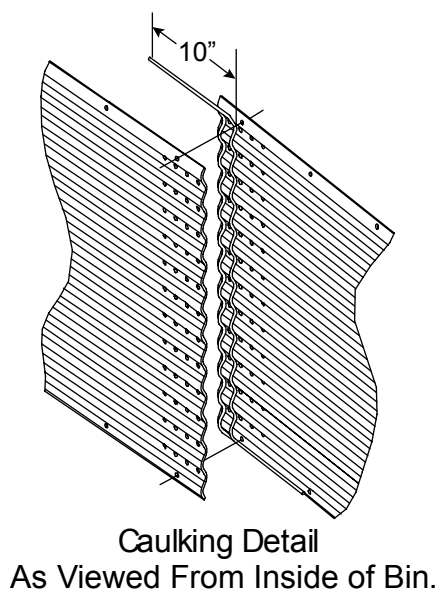


## Caulking Detail

Standard and Quad Punched Sidewall Sheets as Viewed from Outside



Apply one strip of caulking near the outside edge of the outer sheet and between the outer two rows of bolts, refer to illustration at left. A strip of caulking 10" long, should be placed along the horizontal seams. Before bolting the next ring into place, apply one strip of caulking 10" long on the front of the underlapped sheet at each joint. Also, a 10" strip of caulking is to be placed along the lower horizontal edge of lapping sheet at every vertical seam. This will fill the space that occurs between the holes caused by the overlapping sheets. Additional 10" strips must be used to fill larger gaps that occur with heavier gages and laminated gages.



## Base Angle Installation

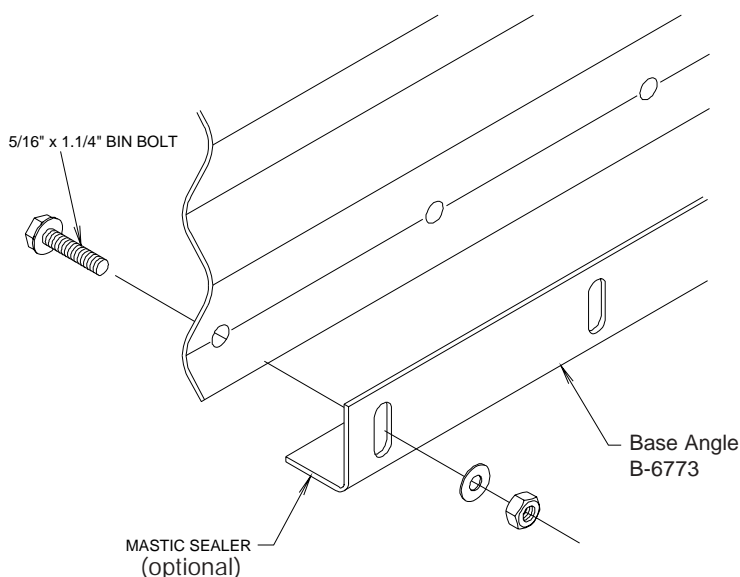
On the lower edge of the final bottom ring, attach the base angle ring. Before lowering the bin, apply the optional mastic sealer to the entire underneath side of the base angle. (See below) Next, lower the bin onto the foundation and check for an adequate seal.

Sealing the base of the bin after final construction is done by various methods and materials, based on materials available, preferences of the customer, etc....However provisions should be made to seal the base of the bin to prevent moisture from coming into the bin.

## 2.66" Sidewall Gauges

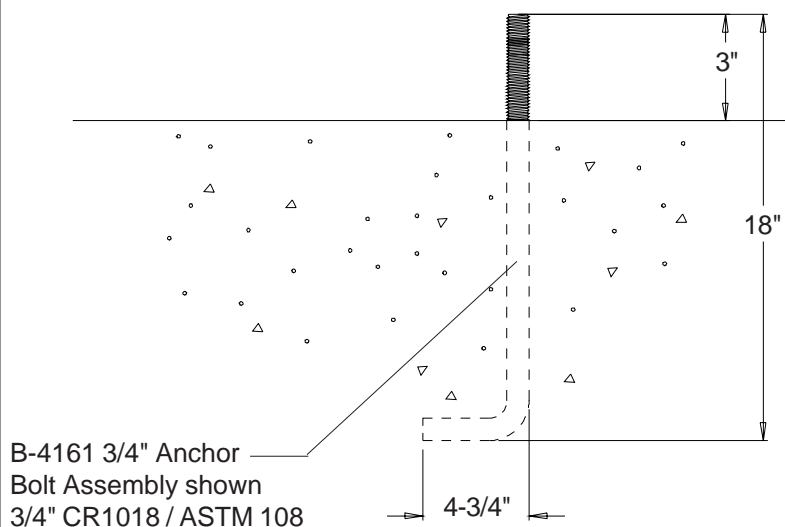
*Note: Some color codes are different than those used for stiffeners.*

Sidewall Gauge	Color Code
20	Red
19	Black/Yellow
18	Orange
17	Pink/Light Blue
16	Blue
15	Brown/Red
14	Green
13	Yellow/Blue
12	Black
11	Pink
10	Light Blue
9	Blue/Orange
8	Yellow
6	White
5	Flour. Green
Laminated Sidewall	Color Code
10	Light Blue/Gold
9	Blue/Orange/Gold
8	Yellow/Gold
6	White/Gold
5	Flour. Green/Gold



This is a minimum requirement for anchorage on standard tanks. Refer to sidedraw instructions for special anchorage details.

## ANCHOR BOLT DETAIL





**2.66" COMMERCIAL TANK  
STIFFENER INSTRUCTIONS**

**INSIDE STIFFENED ONLY**

**UNIVERSAL STIFFENER AND SPLICE HARDWARE**

<b>STIFFENERS</b>	<b>SPLICING SYSTEMS</b>
12 GA. TO 12 GA. AND THINNER	OFFSET/LAPPED STIFFENER NO SEPERATE SPLICES PLATE
12 GA. TO 11 GA. THRU	USE <b>SS-7053</b> SPLICE
8 GA. TO 5 GA.	COLOR CODE:YELLOW
5 GA. TO 5 GA.	USE <b>SS-7053</b> SPLICE
	COLOR CODE: YELLOW
5 GA. TO LAMINATED LAMINATED TO LAMINATED	USE <b>SS-6966</b> SPLICE 2 PER JOINT

**SPLICE HARDWARE USAGE**

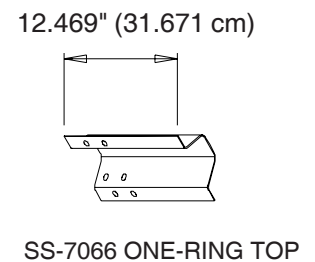
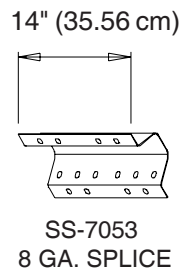
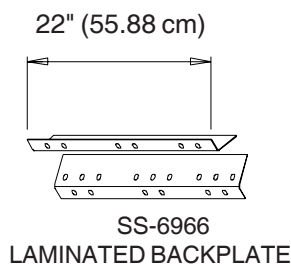
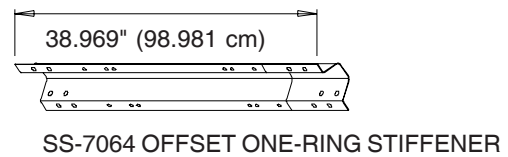
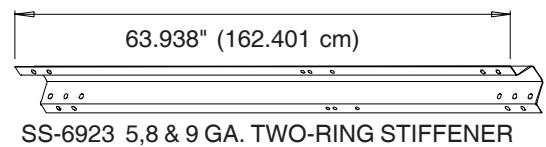
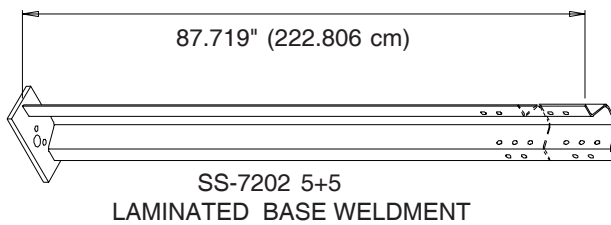
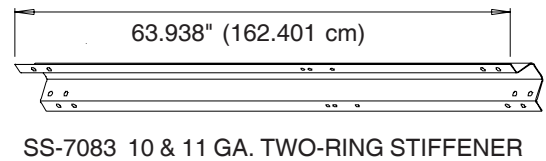
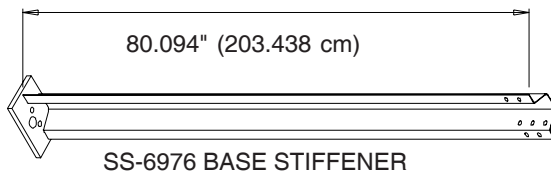
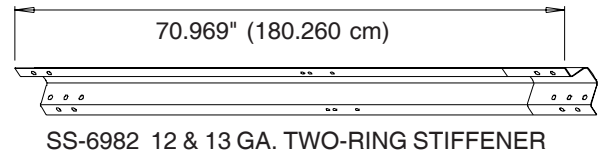
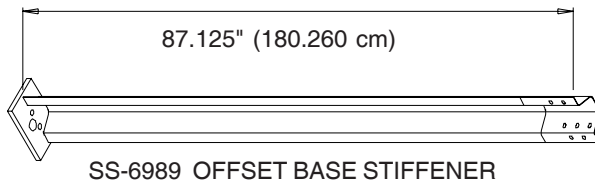
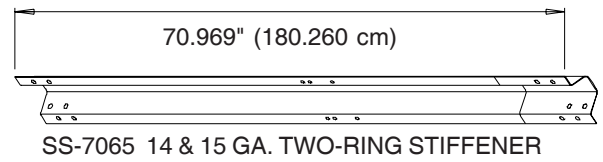
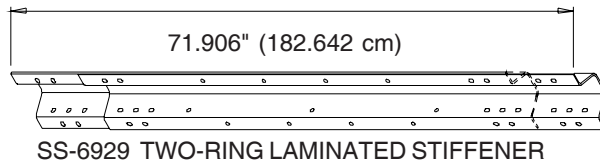
(NOT INCLUDING SIDEWALL TO SPLICE BOLTS)

14 & 15 GA. OFFSET STIFFENER JOINT	8 - 8 - 8 -	3/8" X 1" 3/8" WASHERS 3/8" NUTS	S-7927 S-248 S-456
12 & 13 GA. OFFSET STIFFENER JOINT	10 - 10 - 10 -	3/8" X 1" 3/8" WASHERS 3/8" NUTS	S-7927 S-248 S-456
10 & 11 GA. SS-7053 8 GA. SPLICE PLATE	16 - 16 - 16 -	3/8" X 1" 3/8" WASHERS 3/8" NUTS	S-7927 S-248 S-456
8 & 9 GA. SS-7053 8 GA. SPLICE PLATE	20 - 20 - 20 -	3/8" X 1" 3/8" WASHERS 3/8" NUTS	S-7927 S-248 S-456
5 GA. SS-7053 8 GA. SPLICE PLATE	20 - 20 - 20 -	3/8" X 1.1/2" 3/8" WASHERS 3/8" NUTS	S-7928 S-248 S-456
LAMINATED SS-6966	30 - 30 - 30 -	3/8" X 1.1/2" 3/8" WASHERS 3/8" NUTS	S-7928 S-248 S-456

**STIFFENER TO SIDEWALL HARDWARE USAGE**

STIFFENER TO SIDEWALL	3/8" X 1" 3/8" NUTS	S-455 S-456
SS-7053 SPLICE TO SIDEWALL	3/8" X 1.1/2" 3/8" NUTS	S-5060 S-456
LAMINATED STIFFENER TO SIDEWALL	3/8" X 1.1/2" 3/8" NUTS	S-5060 S-456

## Commercial Stiffeners for 2.66" Corrugation



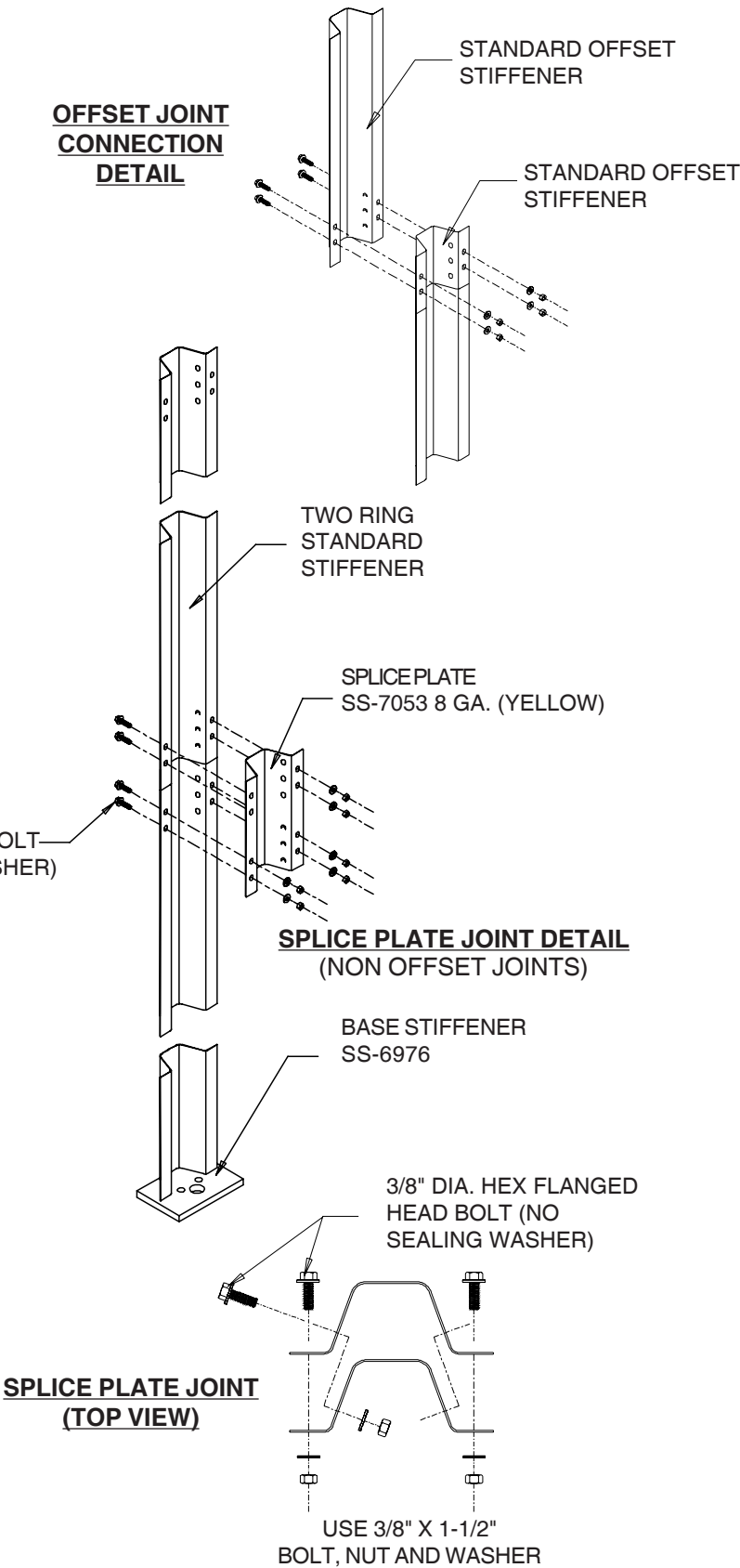
2.66" Corrugation  
Commercial Stiffener Splice Details

When installing bottom stiffeners, you may find that in some cases the stiffener with base plate attached will not rest on the foundation (due to unlevel foundation, etc.). Shim plates have been furnished and should be used to fill opening between base plate and concrete.

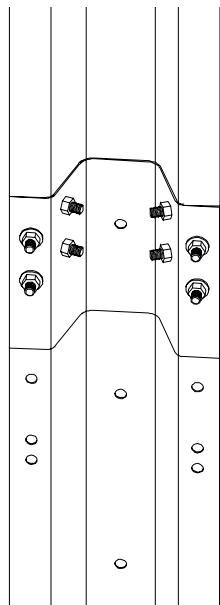
**IMPORTANT:** If shim plates are not used where required, the downward pressure of the stiffeners will not be transferred directly to the foundation, and bin failure could result.

Stiffener Color Code Chart  
*Note: Some colors are different than those used for sidewall sheets*

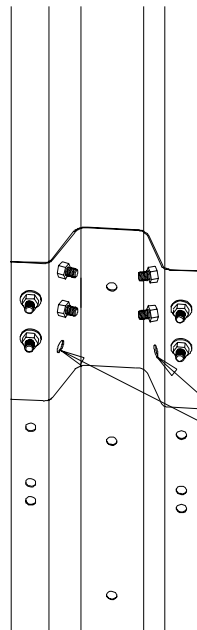
Stiffener Gauge	Color Code
15	Red
14	Green
13	Dark Blue
12	Black
11	Pink
10	Light Blue
9	Purple
8	Yellow
5	Fluorescent Green
5+12	Gold/Black
5+10	Gold/Light Blue
5+8	Gold/Yellow
5+5	Gold/Wite



**14 And 15 Gauge To 14 And 15 Gauge Offset Connection Detail.**

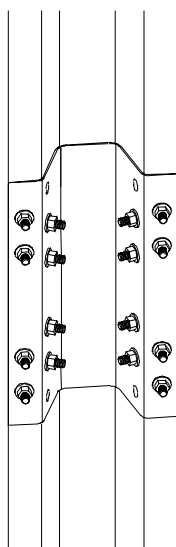


**14 And 15 Gauge To 13 And 12 Gauge Offset Connection Detail.**



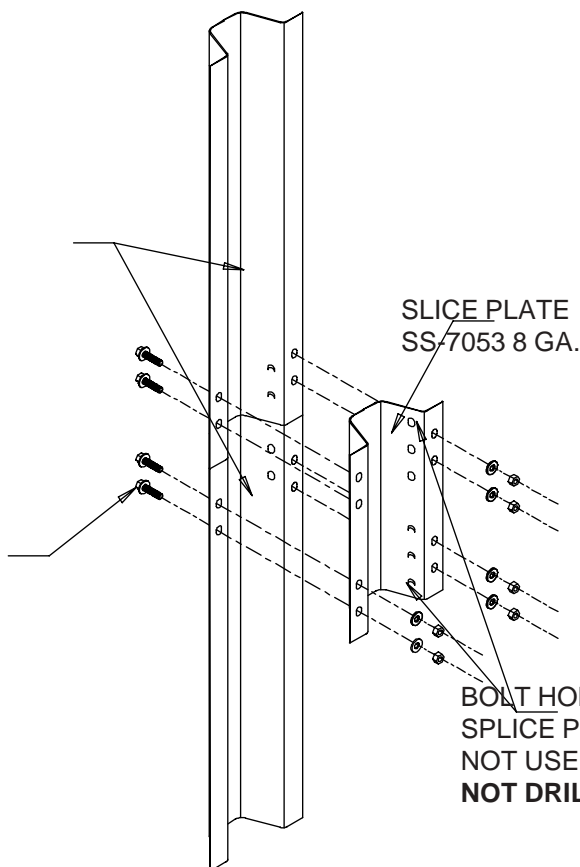
BOLT HOLE NOT  
USED IN 14 AND  
15 GAUGE.  
DO NOT DRILL.

**10 - 11 Gauge Bearing Splice**



10 OR 11 GAUGE  
STANDARD STIFFENER

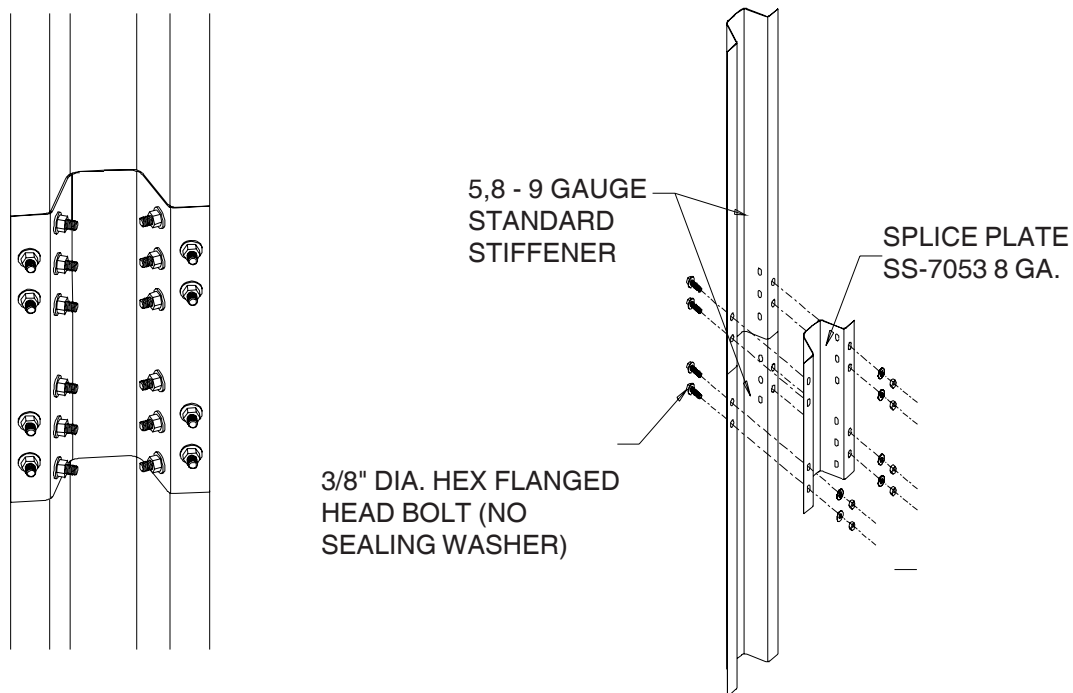
3/8" DIA. HEX  
FLANGED HEAD  
BOLT (NO SEAL-  
ING WASHER)



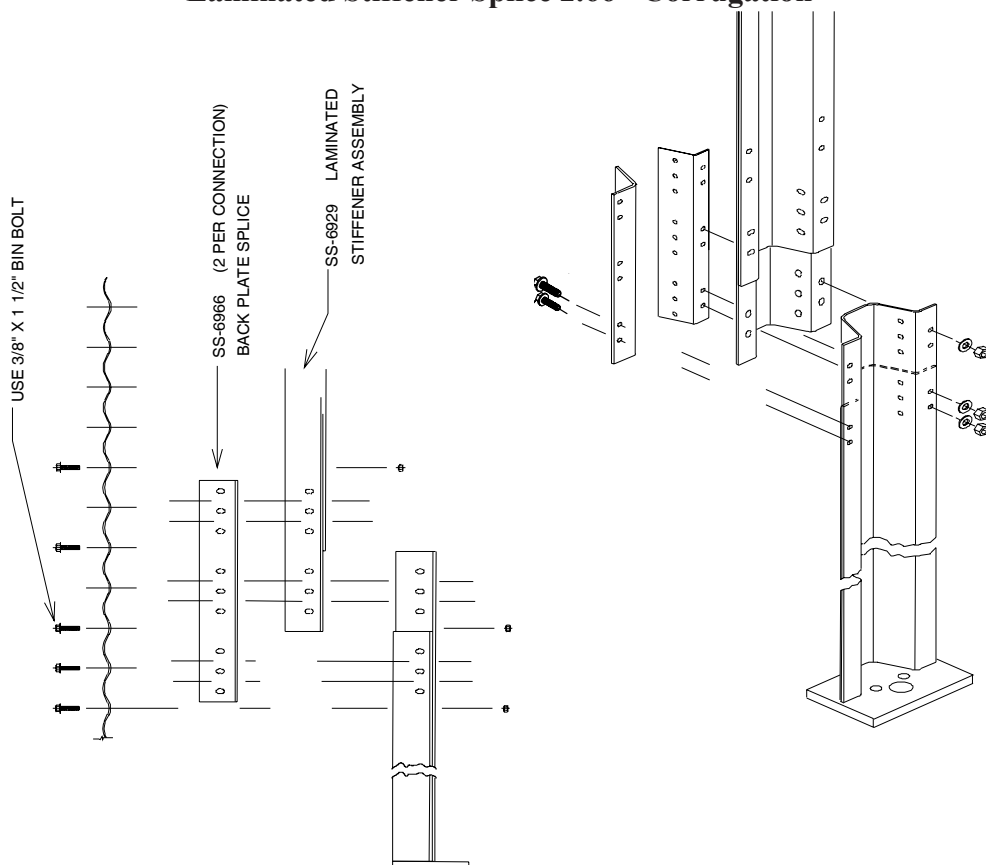
BOLT HOLES IN  
SPLICE PLATE  
NOT USED. DO  
NOT DRILL.

## 5,8 - 9 Gauge Bearing Splice

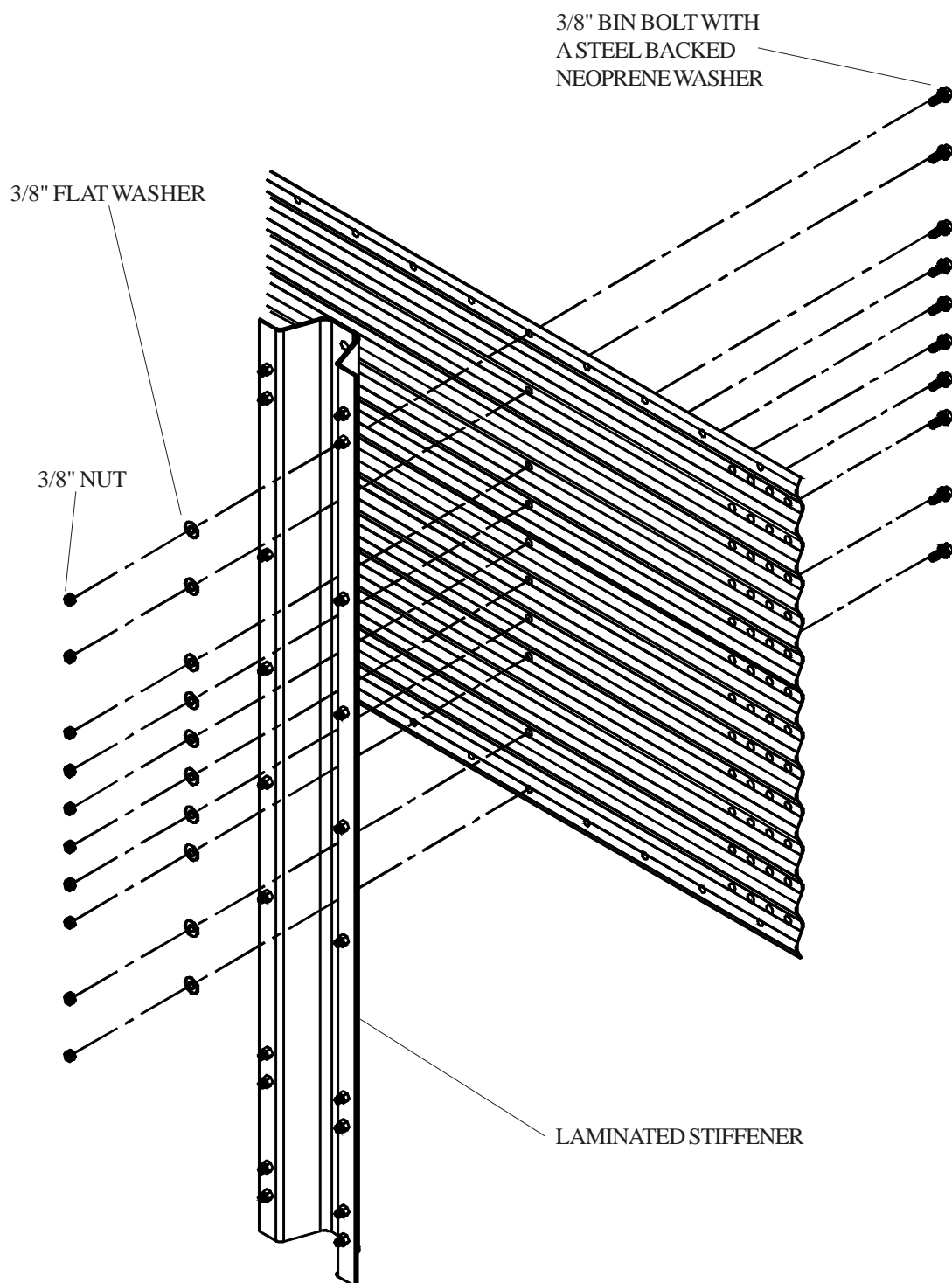
See page 28 for hardware usage chart



## Laminated Stiffener Splice 2.66" Corrugation



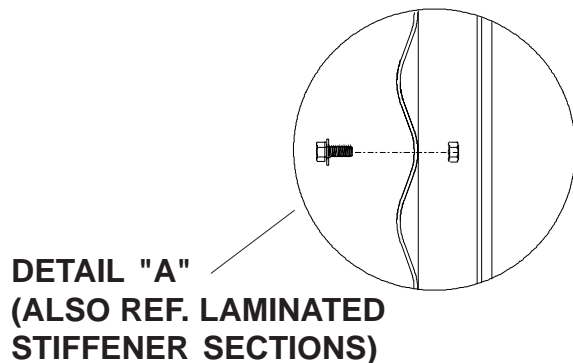
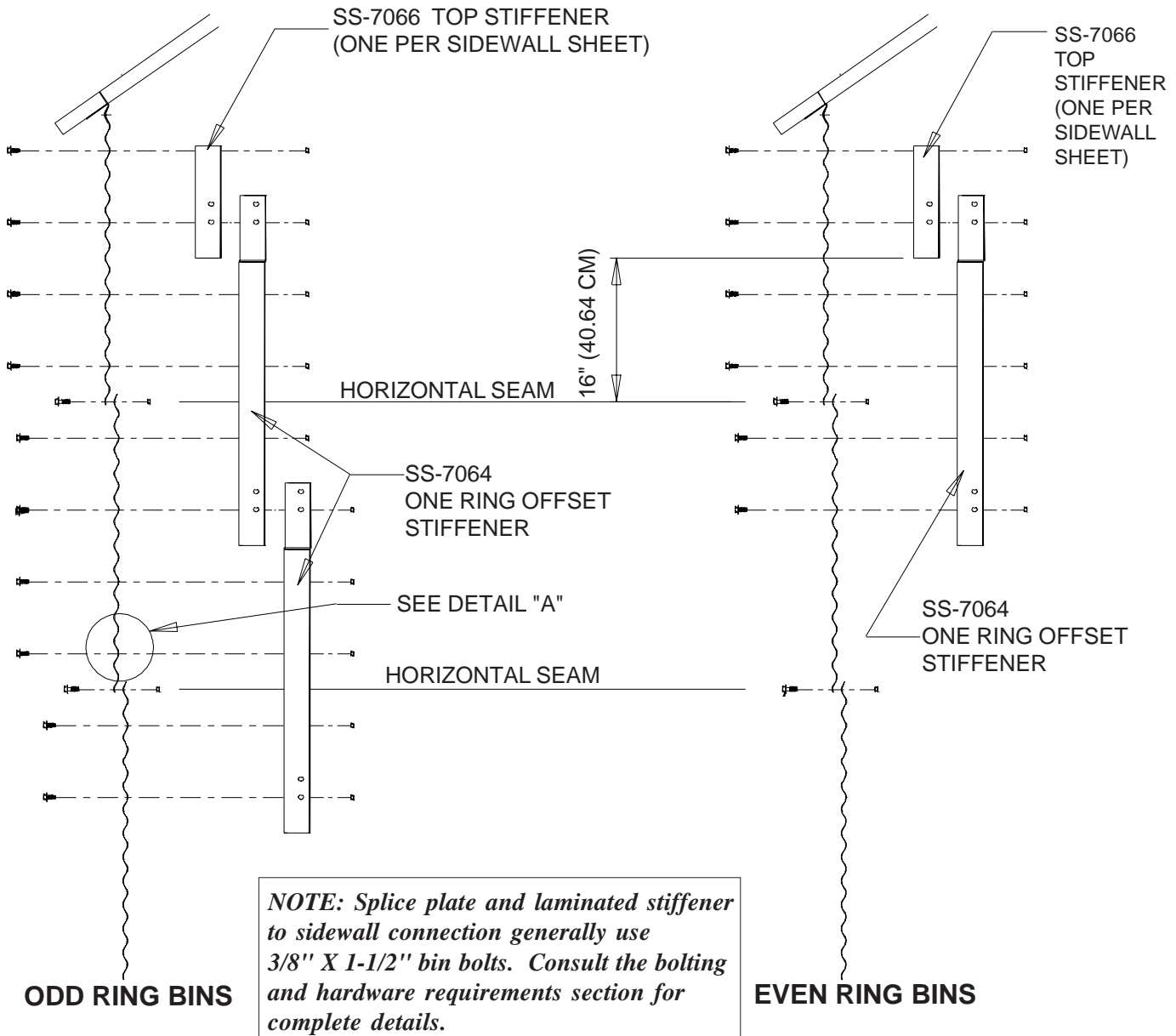




Laminated Stiffener to Sidewall Detail

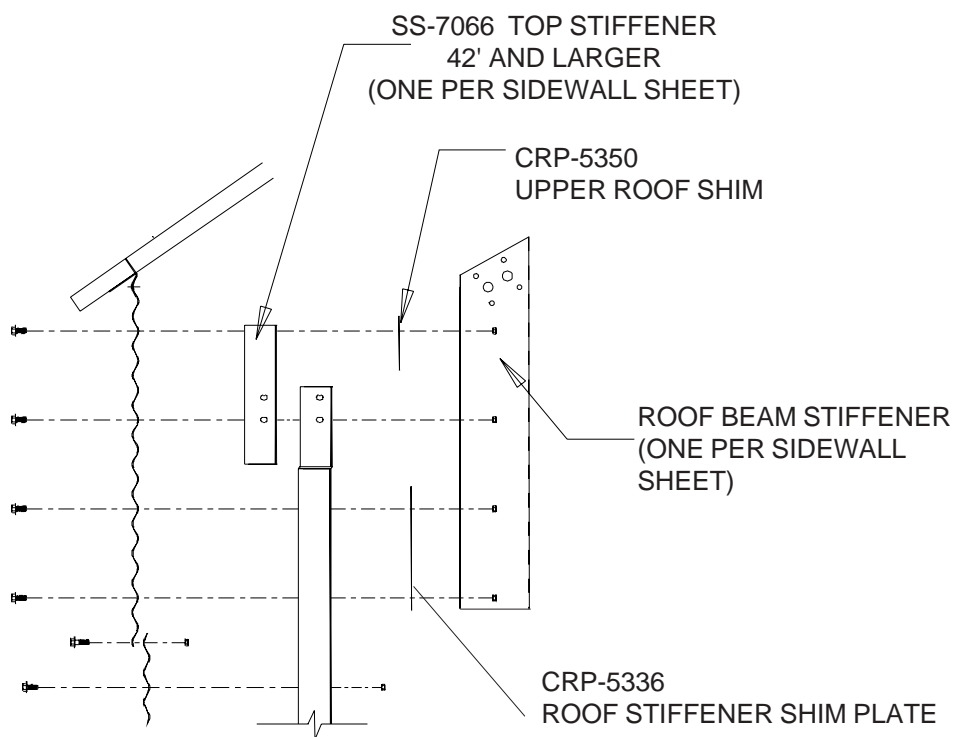
**3 Stiffeners per Sidewall Sheet**  
**Commercial Stiffener Starting Location**  
**105' Dia. 2.66" Corrugation Inside Stiffener Only**

For sidewall to stiffener connections use 3/8" dia. bin bolt. Stiffeners will bolt every 8".



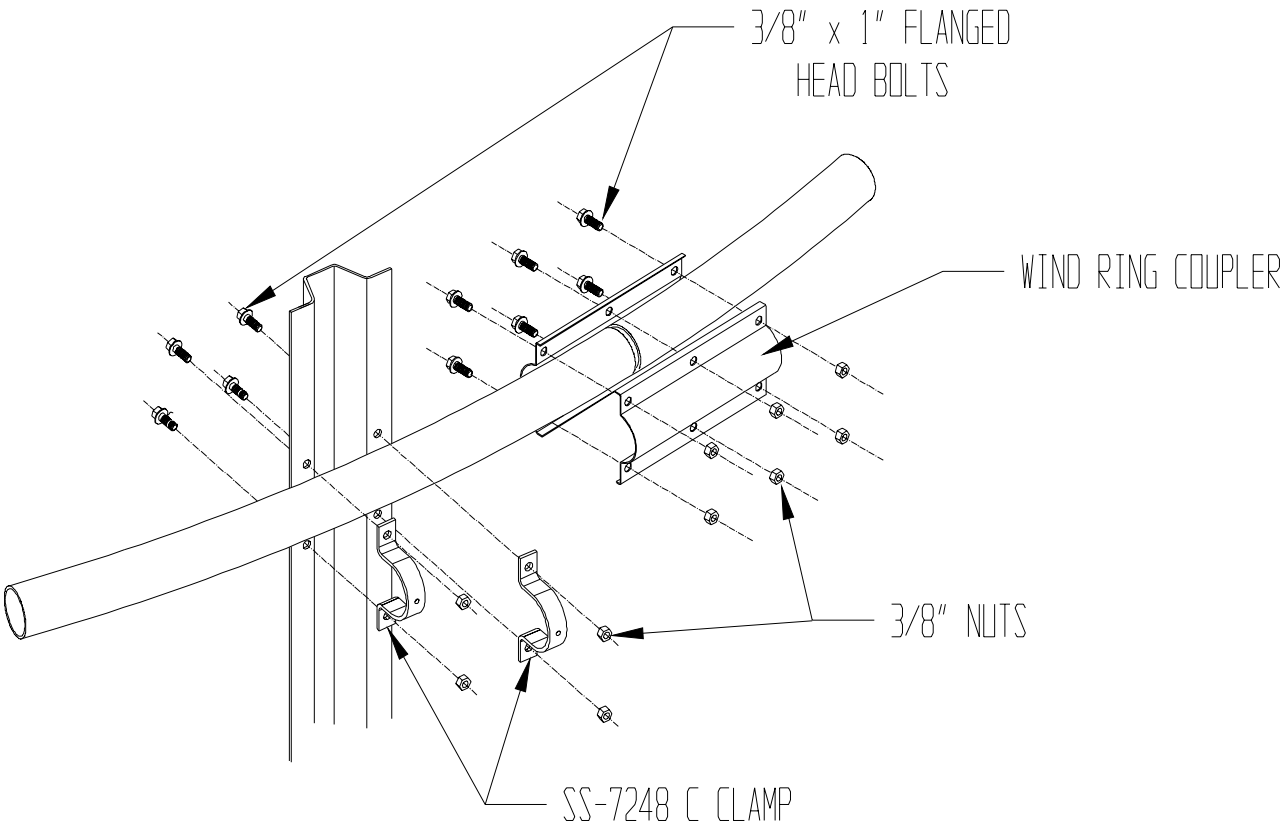
Offset joints and 8 gauge splice plated joints use 3/8" X 1" hex flanged head bolts. All other stiffener joints use 3/8" X 1-1/2" hex flanged head bolts. Washers are used on the nut side of all stiffener joint connections.

**105' Dia. Roof Stiffener Detail**  
**10,000 Lb. Peak Load Roof Stiffener Detail**  
**2.66" Corrugation Inside Stiffener Only**



**NOTE: THE STANDARD 10,000 lb. PEAK LOAD ROOF STIFFENER TO  
SIDEWALL ATTACHMENT IS SHOWN ABOVE. THE 25,000 lb.  
PEAK LOAD ROOFS HAVE SPECIAL ATTACHMENT DETAILS  
INCLUDED WITH THE ROOF INSTRUCTIONS FOR THOSE ROOFS.**

Wind Ring Assembly





**2.66" COMMERCIAL TANK  
STIFFENER INSTRUCTIONS**

**OUTSIDE STIFFENED ONLY**

**UNIVERSAL STIFFENER AND SPLICE HARDWARE**

<b>STIFFENERS</b>	<b>SPLICING SYSTEMS</b>
12 GA. TO 12 GA. AND THINNER	OFFSET/LAPPED STIFFENER NO SEPERATE SPLICES PLATE
12 GA. TO 11 GA. THRU	USE <b>SS-7053</b> SPLICE COLOR CODE:YELLOW
8 GA. TO 5 GA.	USE <b>SS-7053</b> SPLICE COLOR CODE: YELLOW
5 GA. TO 5 GA.	
5 GA. TO LAMINATED LAMINATED TO LAMINATED	USE <b>SS-6966</b> SPLICE 2 PER JOINT

**SPLICE HARDWARE USAGE**

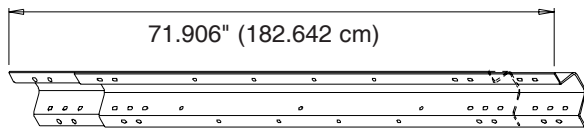
(NOT INCLUDING SIDEWALL TO SPLICE BOLTS)

14 & 15 GA. OFFSET STIFFENER JOINT	8 - 8 - 8 -	3/8" X 1" 3/8" WASHERS 3/8" NUTS	S-7927 S-248 S-456
12 & 13 GA. OFFSET STIFFENER JOINT	10 - 10 - 10 -	3/8" X 1" 3/8" WASHERS 3/8" NUTS	S-7927 S-248 S-456
10 & 11 GA. SS-7053 8 GA. SPLICE PLATE	16 - 16 - 16 -	3/8" X 1" 3/8" WASHERS 3/8" NUTS	S-7927 S-248 S-456
8 & 9 GA. SS-7053 8 GA. SPLICE PLATE	20 - 20 - 20 -	3/8" X 1" 3/8" WASHERS 3/8" NUTS	S-7927 S-248 S-456
5 GA. SS-7053 8 GA. SPLICE PLATE	20 - 20 - 20 -	3/8" X 1.1/2" 3/8" WASHERS 3/8" NUTS	S-7928 S-248 S-456
LAMINATED SS-6966	30 - 30 - 30 -	3/8" X 1.1/2" 3/8" WASHERS 3/8" NUTS	S-7928 S-248 S-456

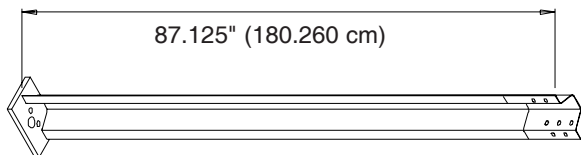
**STIFFENER TO SIDEWALL HARDWARE USAGE**

STIFFENER TO SIDEWALL	3/8" X 1" 3/8" NUTS	S-455 S-456
SS-7053 SPLICE TO SIDEWALL	3/8" X 1.1/2" 3/8" NUTS	S-5060 S-456
LAMINATED STIFFENER TO SIDEWALL	3/8" X 1.1/2" 3/8" NUTS	S-5060 S-456

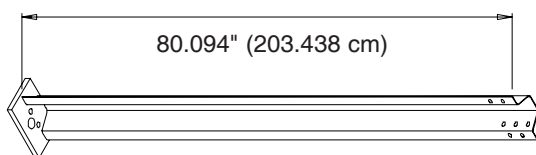
### Commercial Stiffeners For 2.66" Corrugation



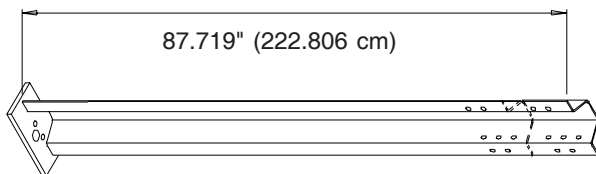
SS-6929 TWO-RING LAMINATED STIFFENER



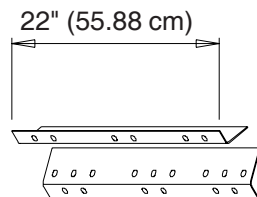
SS-6989 OFFSET BASE STIFFENER



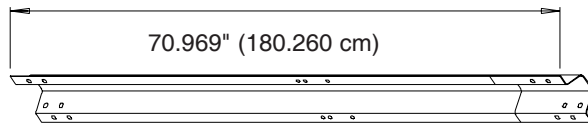
SS-6976 BASE STIFFENER



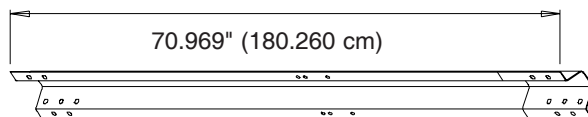
SS-7202 5+5  
LAMINATED BASE WELDMENT



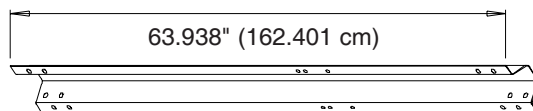
SS-6966  
LAMINATED BACKPLATE



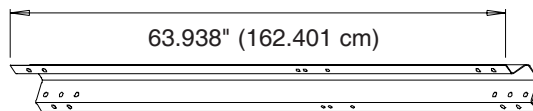
SS-7065 14 & 15 GA. TWO-RING STIFFENER



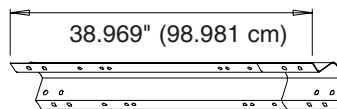
SS-6982 12 & 13 GA. TWO-RING STIFFENER



SS-7083 10 & 11 GA. TWO-RING STIFFENER

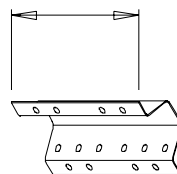


SS-6923 5,8 & 9 GA. TWO-RING STIFFENER



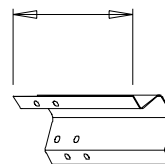
SS-7064 OFFSET ONE-RING STIFFENER

14" (35.56 cm)



SS-7053  
8 GA. SPLICE

12.469" (31.671 cm)



SS-7066 ONE-RING TOP

## 2.66" CORRUGATION

### Commercial Stiffener Splice Details

When installing bottom stiffeners, you may find that in some cases the stiffener with base plate attached will not rest on the foundation (due to unlevel foundation, etc.). Shim plates have been furnished and should be used to fill opening between base plate and concrete.

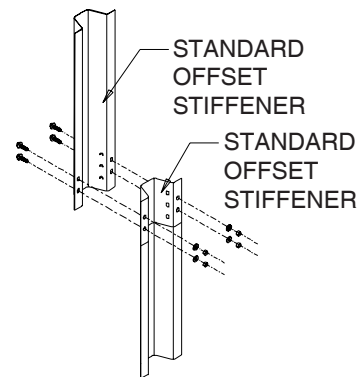
**IMPORTANT:** If shim plates are not used where required, the downward pressure of the stiffeners will not be transferred directly to the foundation, and bin failure could result.

#### Stiffener Color Code Chart

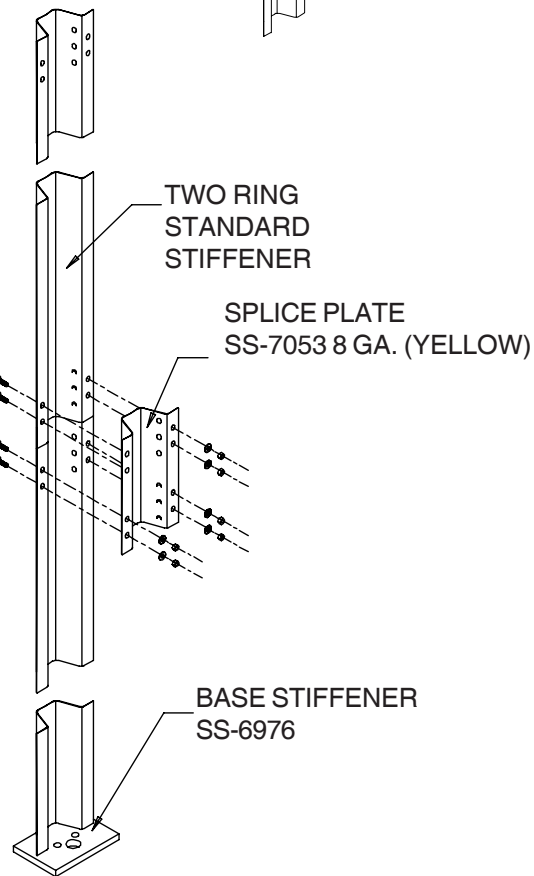
*Note: Some colors are different than those used for sidewall sheets.*

Stiffener Gauge	Color Code
15	Red
14	Green
13	Dark Blue
12	Black
11	Pink
10	Light Blue
9	Purple
8	Yellow
5	Fluorescent Green
5+12	Gold/Black
5+10	Gold/Light Blue
5+8	Gold/Yellow
5+5	Gold/White

#### OFFSET JOINT CONNECTION DETAIL

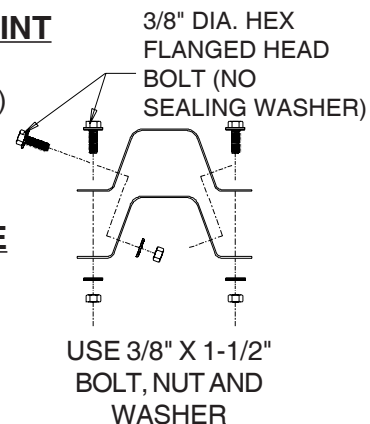


3/8" DIA. HEX  
FLANGED HEAD  
BOLT (NO  
SEALING WASHER)



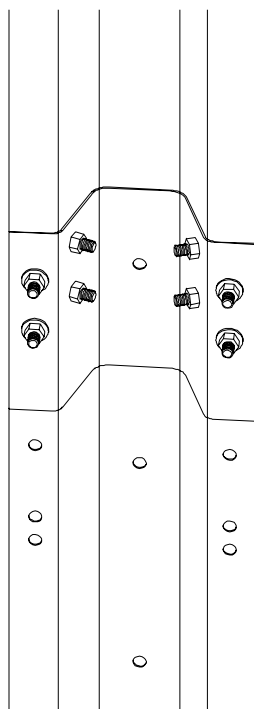
#### SPLICE PLATE JOINT DETAIL (NON OFFSET JOINTS)

#### SPLICE PLATE JOINT (TOP VIEW)

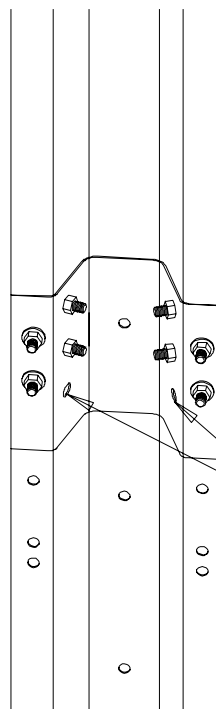




14 And 15 Gauge To 14 And 15 Gauge Offset  
Connection Detail.



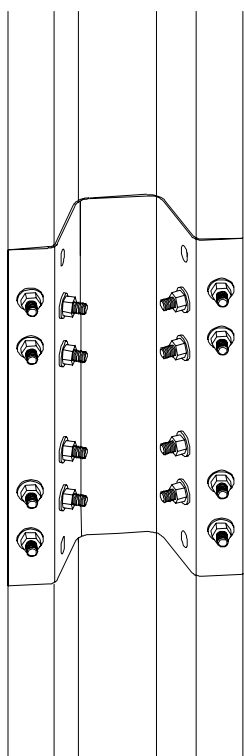
14 And 15 Gauge To 13 And 12 Gauge Offset  
Connection Detail.



BOLT HOLE  
NOT USED  
IN 14 AND 15  
GAUGE.  
DO NOT DRILL.

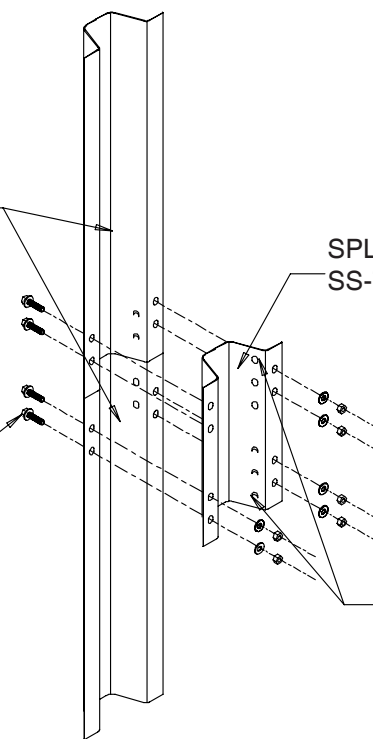
### 10 And 11 Gauge Bearing Splice

See Page 35 For Usage Chart



10 OR 11 GAUGE  
STANDARD STIFF-  
ENER

3/8" DIA. HEX  
FLANGED HEAD BOLT  
(NO SEALING WASHER)

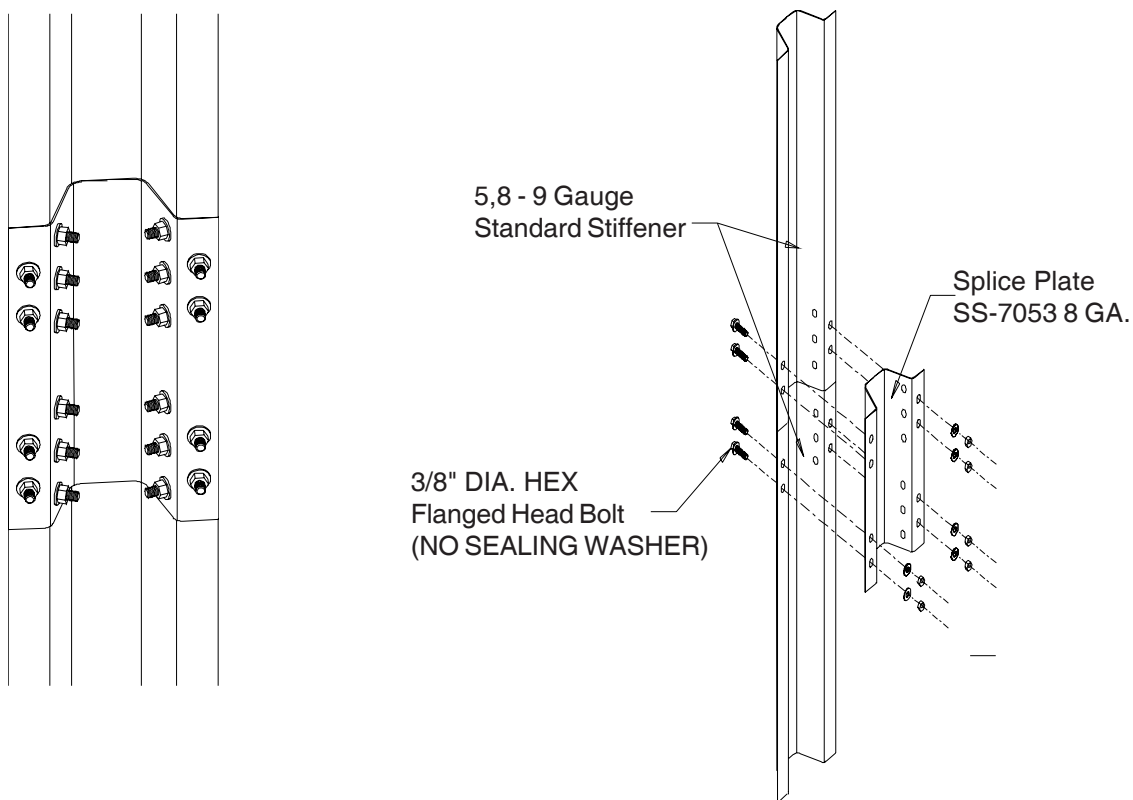


SPLICE PLATE  
SS-7053 8 GA.

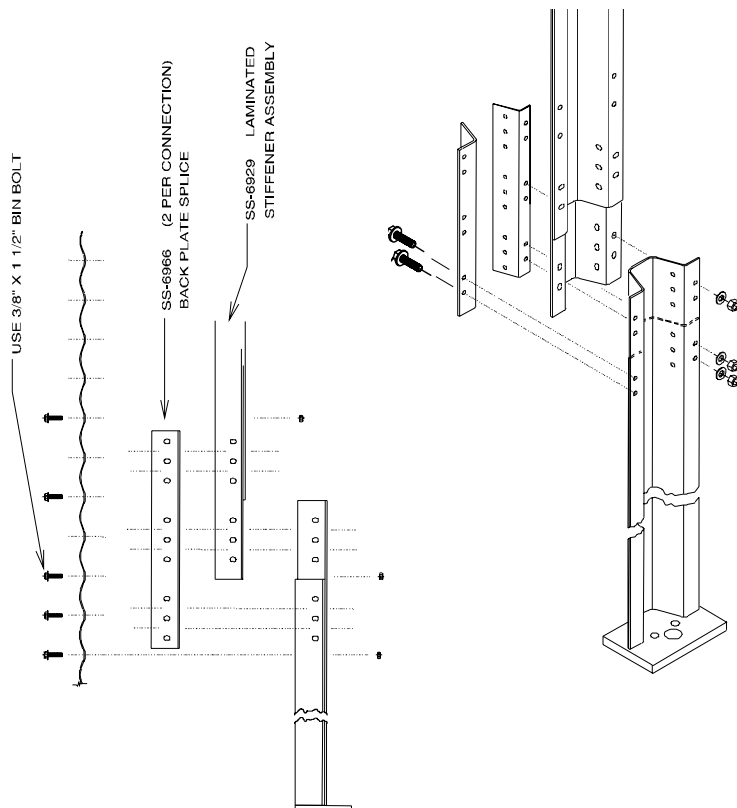
BOLT HOLES IN  
SPLICE PLATE  
NOT USED.  
DO NOT DRILL.

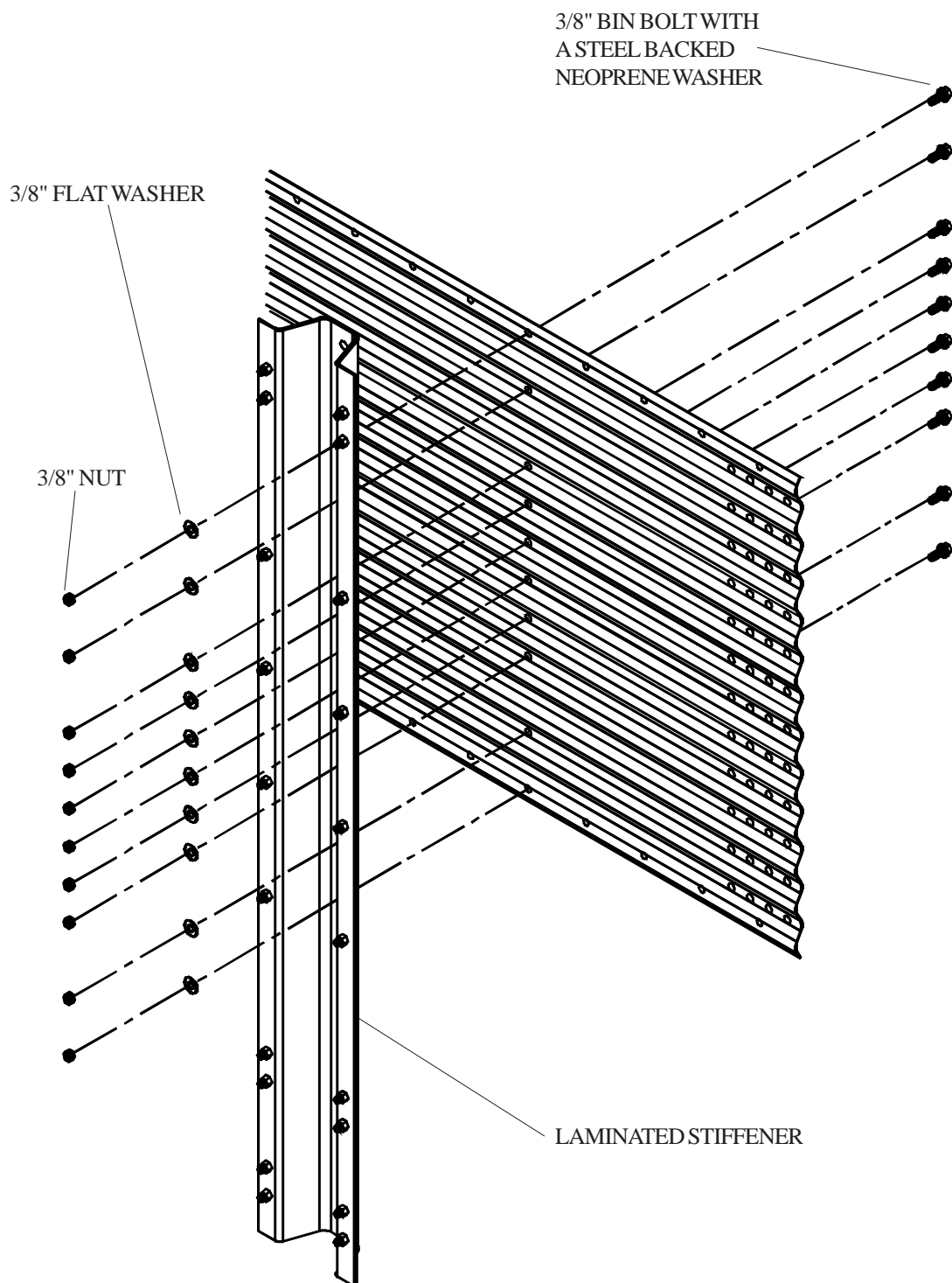
## 5,8 - 9 Gauge Bearing Splice

See Page 42 For Usage Chart



## Laminated Stiffener Splice 2.66" Corrugation

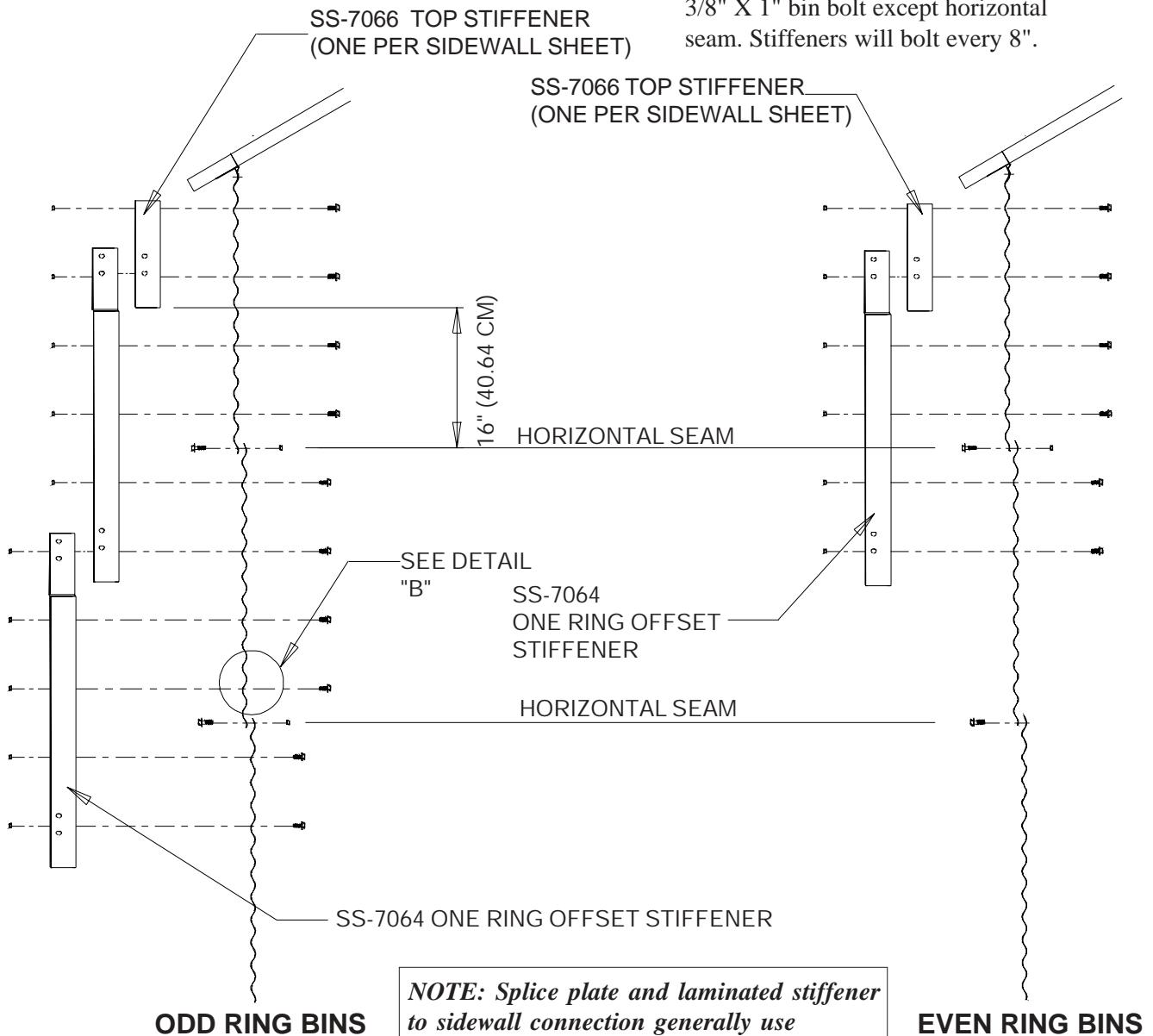




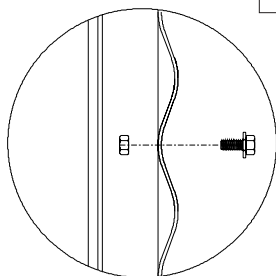
Laminated Stiffener to Sidewall Detail

**3 Stiffeners Per Sidewall Sheet**  
**Commercial Stiffener Starting Location - 105' DIA.**  
**2.66" Reverse Corrugation Outside Stiffener Only**

For sidewall stiffener connections use 3/8" X 1" bin bolt except horizontal seam. Stiffeners will bolt every 8".



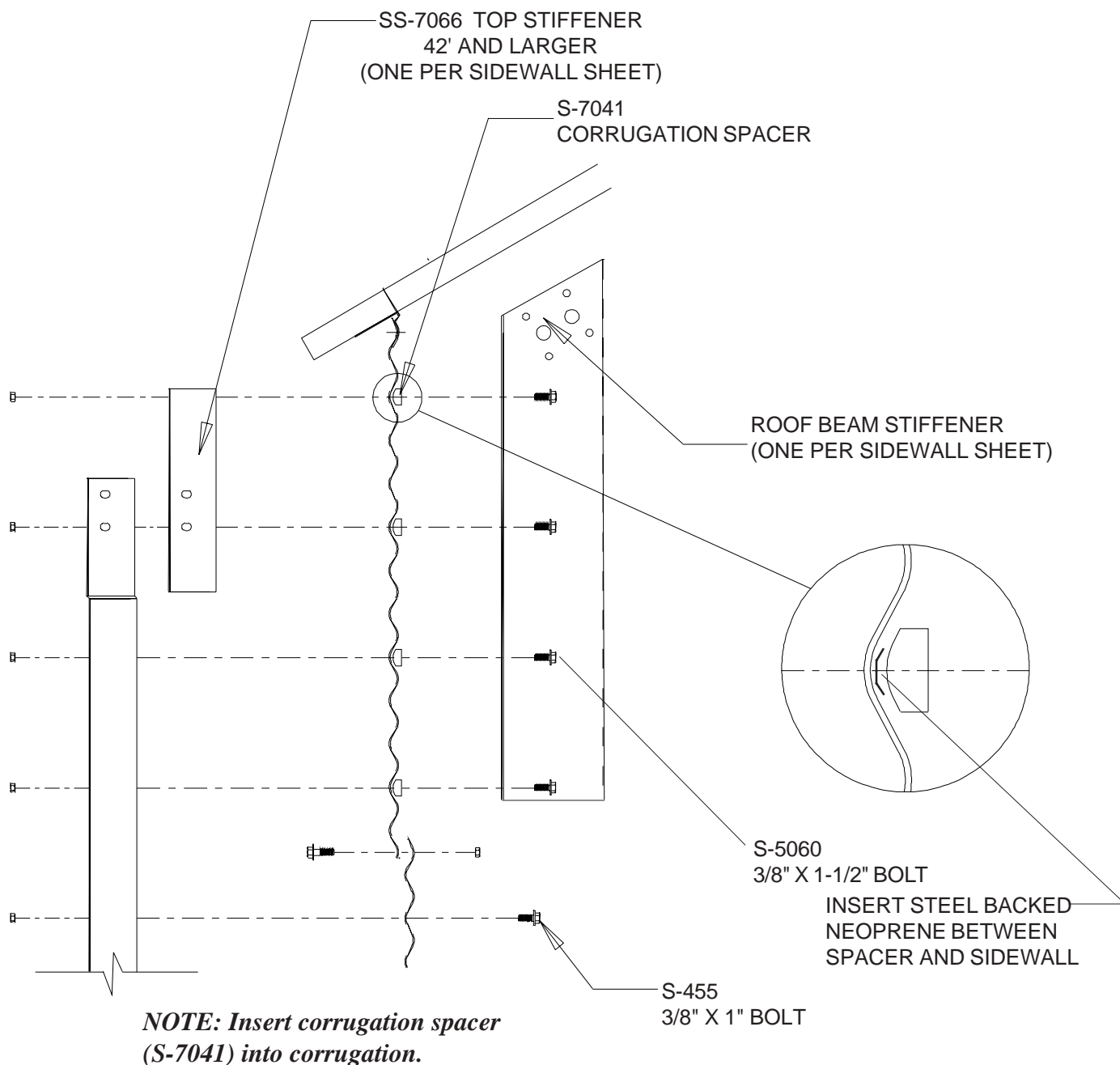
**NOTE:** Splice plate and laminated stiffener to sidewall connection generally use 3/8" X 1-1/2" bin bolts. Consult the bolting and hardware requirements section for complete details.



**DETAIL "B"**  
**(ALSO REF. LAMINATED  
 STIFFENER SECTIONS)**

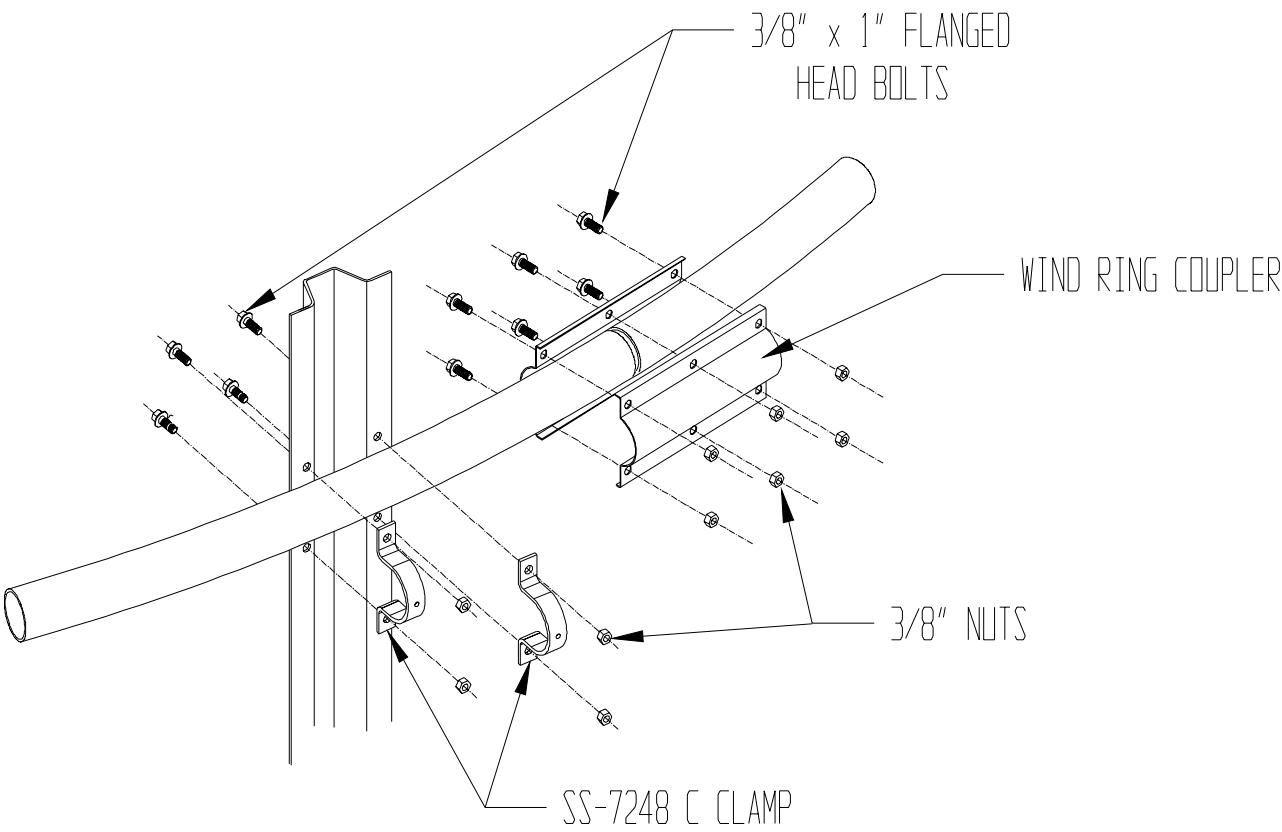
Offset joints and 8 Gauge splice plated joints use 3/8" X 1" hex flanged head bolts. All other stiffener joints use 3/8" X 1-1/2" hex flanged head bolts. Washers are used on the nut side of all stiffener joint connections

**72' Thru 105' DIA. Roof Stiffener Detail**  
**60' DIA. 10,000 Lb. Peak Load Roof Stiffener Detail**  
**2.66" Corrugation Outside Stiffener Only**



**NOTE: THE STANDARD 10,000 lb. PEAK LOAD ROOF STIFFENER TO SIDEWALL ATTACHMENT IS SHOWN ABOVE. THE 20,000 lb. PEAK LOAD ROOFS HAVE SPECIAL ATTACHMENT DETAILS INCLUDED WITH THE ROOF INSTRUCTIONS FOR THOSE ROOFS.**

Wind Ring Assembly





*ACCESSORY  
INSTRUCTIONS*

## Installation And Management Of Side Draw Systems

Grain Systems designs and manufacturers bins to the highest standards, however proper installation and good usage practices for a commercial flume system are essential, regardless of manufacturer. The following practices address general usage and installation criteria for such systems.

### A.) SIDE DRAW INSTALLATION:

1.) Side discharge is only permitted in GSI commercial bins when a GSI manufactured side draw flume system has been installed. No corrugated steel bin should be unloaded through the sidewall without installation of such a system and permission of the manufacturer.

2.) Installation of a flume system may require installation of additional wind rings and 1" diameter anchor bolts. Reference the attached pages or the commercial bin section of the GSI sales catalog. Installation of multiple systems requires additional wind rings and must be placed a minimum of 90 degrees apart. Installation of multiple systems requires approval of GSI engineering.

3.) A side draw should not be the only discharge system available. A standard center discharge and conveyor should be installed.

### B.) SIDE DRAW MANAGEMENT AND USAGE:

1.) Side draw systems are intended for use with dry flowable grain. Side draws 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.

2.) In multiple system installations only one side draw may be used at any one time.

3.) Filling should not be occurring at the same time as grain is being withdrawn through the side draw flume system.

4.) Prolonged storage of grain in the sloped condition produced by side draw discharge may accelerate differential settlement and result in deformations of the bin/silo. After using the side draw system the sloped grain should 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/silo.

5.) If geotechnical investigations or past experience indicate significant foundation level soil variations or a site propensity toward differential settlement, side draw 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.



**1" Anchor Bolts Required With Sidedraw Systems  
Used With 2.66" Corrugation Commercial Tanks**

CORRUGATION	TANK DIAMETER	TOTAL NUMBER OF 1" ANCHOR BOLTS
2.66"	42'	42
2.66"	48'	48
2.66"	54	54
2.66"	60'	60
2.66"	72'	72
2.66"	75'	75
2.66"	78'	78
2.66"	90'	90
2.66"	105'	105

**Use 1" diameter anchor bolts at all of the required stiffener locations.**

**Additional Wind Rings Required For 2.66" Commercial Tanks  
With Side Draw Chute Systems  
(One System Only)**

	42'		48'		54'		60'		72'		75'		78'		90'		105'		
RINGS	STD	ADD	STD	ADD	STD	ADD	STD	ADD	STD	ADD	STD	ADD	STD	ADD	STD	ADD	STD	ADD	RINGS
37	--	--	--	--	7	1	7	1	7	1	8	1	8	1	--	--	--	--	37
36	--	--	--	--	6	1	6	1	7	1	7	1	7	2	--	--	--	--	36
35	--	--	--	--	6	1	6	1	6	1	7	1	7	1	7	1	--	--	35
34	--	--	--	--	5	1	5	1	6	2	6	2	6	2	6	2	6	2	34
33	--	--	--	--	4	2	4	2	5	2	5	3	5	3	5	3	6	2	33
32	4	1	4	1	4	1	4	1	5	2	5	2	5	2	5	2	5	3	32
31	3	2	3	2	4	1	4	1	4	2	4	2	4	2	4	2	5	3	31
30	3	2	3	2	4	1	4	1	4	1	4	1	4	1	4	2	4	3	30
29	2	1	3	1	3	2	3	2	3	2	3	2	3	2	4	2	4	3	29
28	2	1	2	1	2	2	2	2	2	2	3	2	3	2	3	3	4	3	28
27	1	1	2	1	2	2	2	2	2	2	3	2	3	2	3	3	3	4	27
26	1	1	1	1	2	2	2	2	2	2	2	2	3	2	3	3	3	4	26
25	--	1	1	1	1	2	1	2	2	2	2	2	2	2	3	3	3	4	25
24	--	1	--	1	1	2	1	2	2	2	2	2	2	2	2	3	3	3	24
23	--	1	--	1	1	2	1	2	2	2	2	2	2	2	2	3	2	4	23
22	--	1	--	1	1	2	1	2	2	2	2	2	2	2	2	3	2	3	22
21	--	1	--	1	--	3	1	2	2	2	2	2	2	2	2	3	2	3	21
20	--	1	--	1	--	3	1	2	2	2	2	2	2	2	2	3	2	3	20
19	--	1	--	1	--	3	1	2	1	3	2	2	2	2	2	3	2	3	19
18	--	1	--	1	--	3	1	2	1	3	1	3	2	2	2	3	2	3	18
17	--	1	--	1	--	3	1	2	1	2	1	2	1	2	2	2	2	2	17
16	--	1	--	1	--	3	--	3	1	2	1	2	1	2	1	2	1	2	16
15	--	1	--	1	--	3	--	3	1	2	1	2	1	2	1	1	1	2	15
14	--	1	--	1	--	2	--	2	--	2	--	2	--	2	1	2	1	2	14
13	--	1	--	1	--	1	--	2	--	2	--	2	--	2	--	2	1	1	13
12	--	--	--	--	--	1	--	2	--	2	--	2	--	2	--	2	1	1	12

NOTE: Consult the gage sheet supplied with the tank for complete wind ring quantities and placement for the specific tank the sidedraw is being installed in.

## 105' Dia. Tank 2.66" Side Draw Instructions - 3 Post (Viewed From Inside Of Bin)

**NOTE:** Reference PNEG-1000 or PNEG-066 for 90' Dia. and smaller bin sidedraw installation instructions.

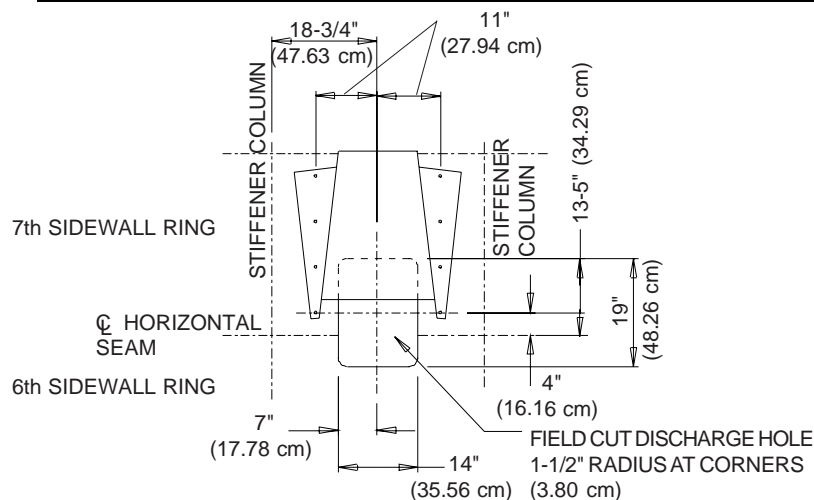
### WIND RING INSTALLATION

Tanks that use wind rings require 2-3/4" dia. holes passing through the side draw chute; with the center no less than 6" from either end and 4-3/8" from the sidewall. The wind ring must penetrate through the chute and form a complete ring. Do not locate wind ring in 8" space at chute entrance. Field drill stiffeners for wind ring attachment bracket (if required).

### DISCHARGE TUBE INSTALLATION

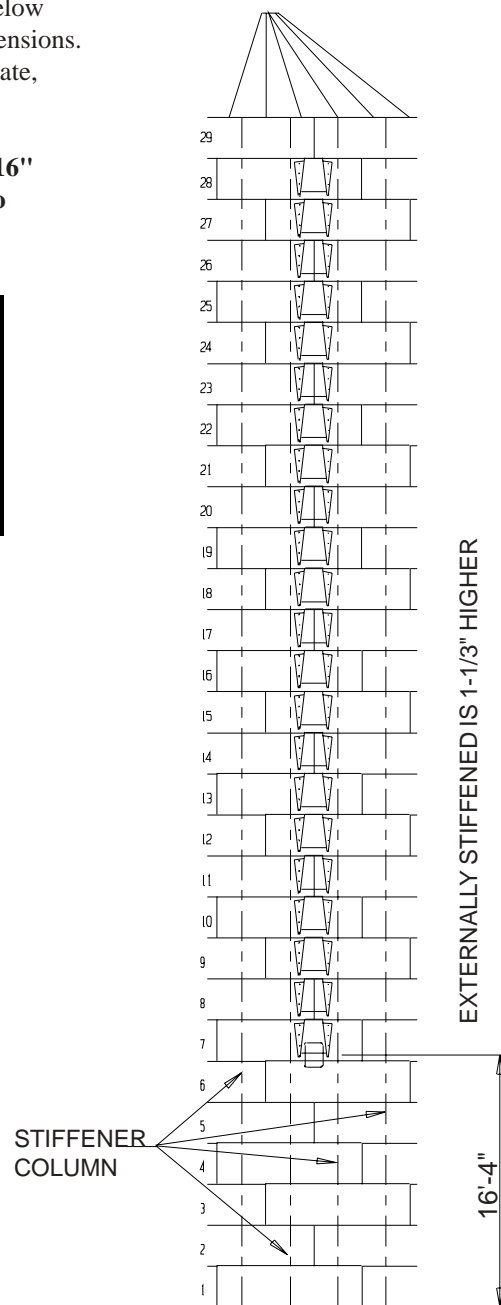
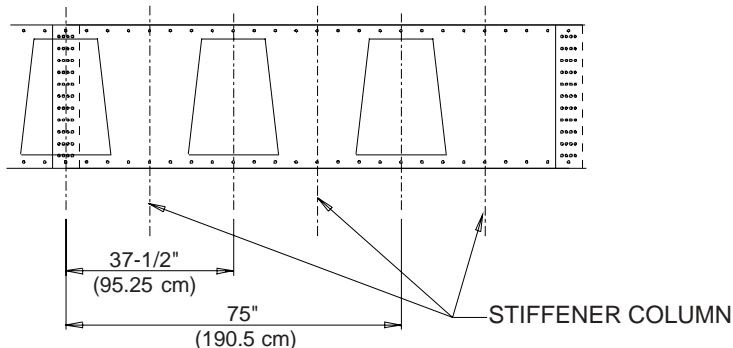
- 1.) Use the bottom 2 holes in the last chute to locate discharge tube 28" below the 7th horizontal seam. Refer to Detail "C" for sidewall sheet hole dimensions.
- 2.) For proper water shed install plate so upper body sheet overlaps the plate, as shown in Detail "D".
- 3.) Use discharge tube assembly as a template, drill all holes 1/2" diameter.
- 4.) Use 2 beads of caulking to seal discharge plate to body sheets. **Use 7/16" diameter bolts & nuts provided to bolt discharge assembly weldment to body sheets.**

NUMBER OF RINGS IN TANK	CHUTE LOCATION HORIZONTAL STARTING LOCATION
ALL	1.) LOCATE 1ST CHUTE IN 2ND RING FROM TOP 2.) TOP BOLT HOLES IN CHUTE TO BE LOCATED ON 2ND CORRUGATION OF BODY SHEET
11, 14, 17, 20, 23, 26, 29, & 32, 35	3.) CENTER CHUTE 75 INCHES (LEFT TO RIGHT) FROM 1ST HOLE IN 2ND BODY SHEET
10, 13, 16, 19, 22, 25, 28, & 31, 34	3.) CENTER CHUTE 37.500 INCHES (LEFT TO RIGHT) FROM 1ST HOLE IN 2ND BODY SHEET
12, 15, 18, 21, 24, 27, 30, & 33	3.) CENTER CHUTE OVER VERTICAL SEAM.



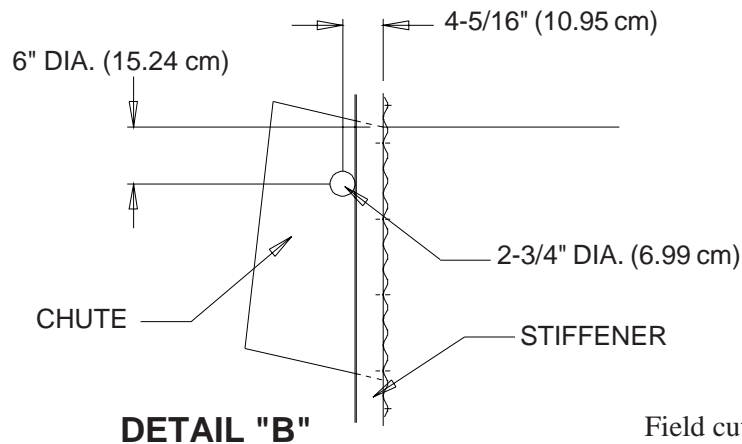
### DETAIL "C"

#### FIRST CHUTE LOCATION

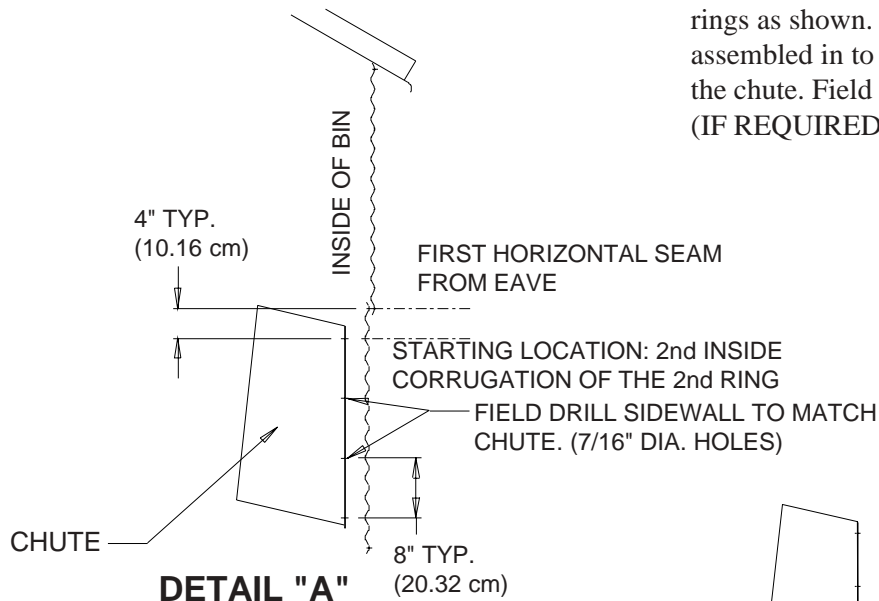


### VIEWING INSIDE OF TYPICAL 29 RING BIN

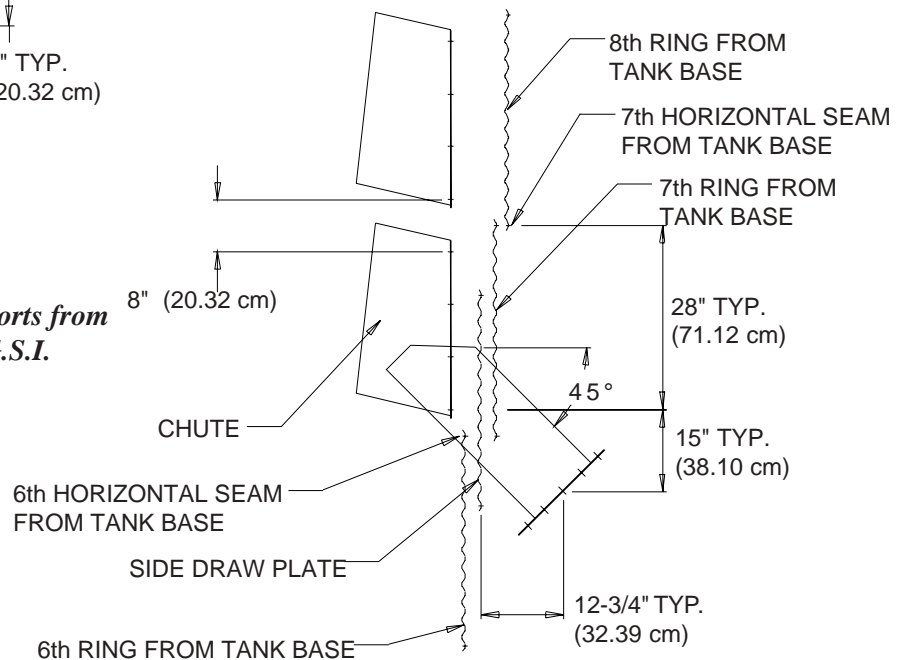
**NOTE:** Unload tube and supports from rack & pinion not provided by G.S.I.

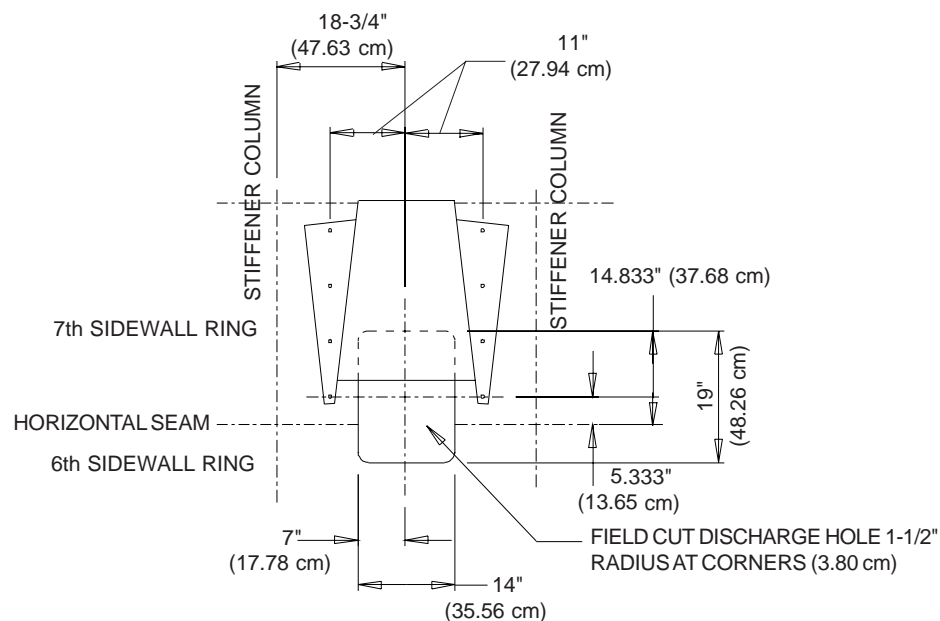
**2.66" Side Draw Instructions - 3 Post (Internally Stiffened)**

Field cutting of chutes is necessary to install the wind rings. Locate wind rings as shown. The wind ring must be assembled in to a complete ring and penetrate through the chute. Field drill stiffeners for attachment brackets (IF REQUIRED).



**NOTE:** *Unload tubes and supports from rack & pinion not provided bt G.S.I.*

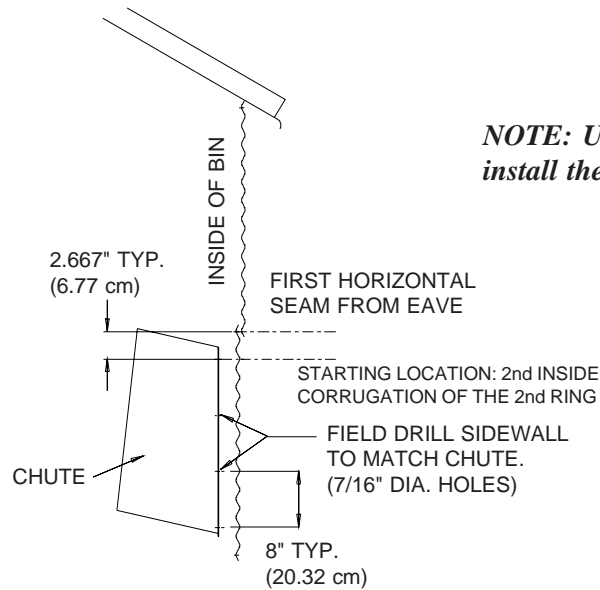




**DETAIL "C"(EXTERNALLY STIFFENED)(3 POST)**

*NOTE: Unload tubes and supports from rack & pinion down are not provided by G.S.I.*

## 2.66" Side Draw Instructions - 3 Post (Externally Stiffened)

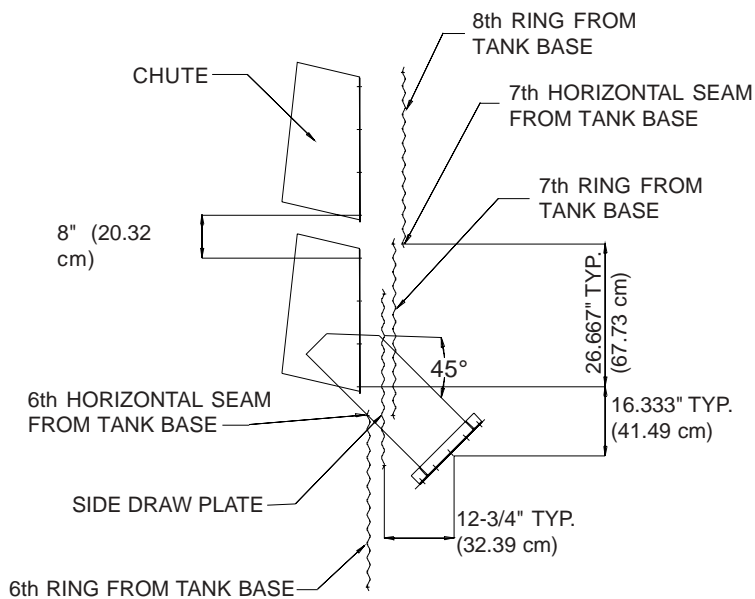


**NOTE:** Use 3/8" diameter bolts to install the chute to the sidewall.

**DETAIL "A" (EXTERNALLY STIFFENED)**

**NOTE:** Unload tubes and supports from rack & pinion down are not provided by G.S.I.

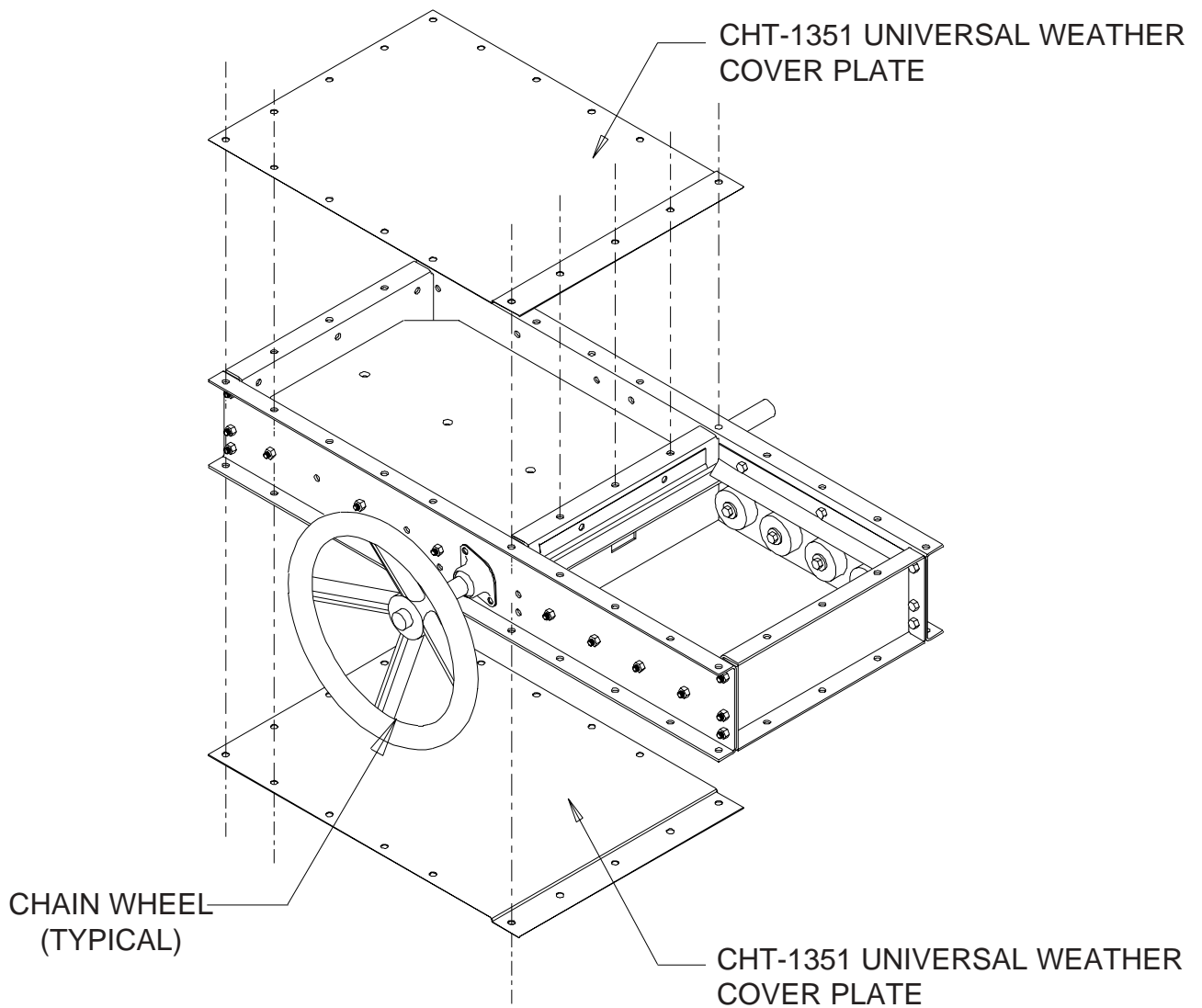
**NOTE:** Use 7/16" x 2-1/2" bolts and recessed nuts to install the discharge tube.



**DETAIL "D" (EXTERNALLY STIFFENED)**

### Weather Cover Assembly Instructions For Roller Valve

- 1.) Install weather cover kit after gate has been installed.
- 2.) Use bead caulking at all seams where weather cover attaches to gate.
- 3.) Use 5/8" x 3/4" bolts & nuts to plug all holes not in use.
- 4.) Use 1/4" self-drillers to seal gate end plate corners.



# NOTES



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